



CFR 47 FCC PART 15 SUBPART E

CERTIFICATION TEST REPORT

For

IP CAMERA

MODEL NUMBER: DH-IPC-WL46A

**ADDITIONAL MODEL NUMBER: IPC-WL46A; DH-IPC-WL46A-0280B;
IPC-WL46A-0280B; IPC-L46N-USA; IPC-L46N-CAN; IPC-L46N; IPC-L46; IPC-L46-USA;
IPC-L46-CAN**

PROJECT NUMBER: 4790217753-2

REPORT NUMBER: 4790217753-2-2

FCC ID: SVNDH-IPC-WLX6

ISSUE DATE: Jan 18, 2022

Prepared for

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Form-ULID-008536-8 V1.0

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V0	1/18/2022	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

Product Name IP CAMERA
Model Name DH-IPC-WL46A
Additional No. IPC-WL46A; DH-IPC-WL46A-0280B; IPC-WL46A-0280B;
IPC-L46N-USA; IPC-L46N-CAN; IPC-L46N; IPC-L46;
IPC-L46-USA; IPC-L46-CAN

Sample Number 4477838

Data of Receipt Sample Dec 08, 2021

Date Tested Dec 09, 2021 ~ Jan 17, 2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 FCC PART 15 SUBPART E	PASS



Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6dB/26dB Bandwidth	FCC 15.407 (a)&(e)	PASS
2	Maximum Conducted Output Power	FCC 15.407 (a)	PASS
3	Power Spectral Density	FCC 15.407 (a)	PASS
4	Antenna Conducted Spurious Emission	FCC 15.407 (b)	PASS
5	Radiated Bandedge and Spurious Emission	FCC 15.407 (a), FCC 15.209, FCC 15.205	PASS
6	Conducted Emission Test For AC Power Port	FCC 15.207	PASS
7	Frequency Stability	FCC 15.407 (g)	PASS
8	Dynamic Frequency Selection	FCC 15.407 (h)	PASS
9	Antenna Requirement	FCC 15.203	PASS
Remark: 1) The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15E> when <Accuracy Method> 2) It is a slave device without radar detection.			

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, CFR 47 FCC Part 2, CFR 47 FCC Part 15, KDB 789033 D02 v02r01, KDB414788 D01 Radiated Test Site v01r01, KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02 and 905462 C Client Without DFS New Rules v01r02.

3. FACILITIES AND ACCREDITATIO

Test Location	UL-CCIC Company Limited, EMC&RF Lab
Address	No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122 ,China
Accreditation Certificate	<p>A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.</p> <p>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.</p> <p>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.</p>

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 recognize 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	3.1dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.4dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.4dB
Uncertainty for Radiation Emission test (1GHz to 40GHz)(include Fundamental emission)	3.9dB (1GHz-18Gz)
	4.2dB (18GHz-26.5Gz)
	4.6dB (26GHz-40Gz)
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 CAMERA	
Model No.:	DH-IPC-WL46A	
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11a/n/ac: UNII-1: 5150 ~ 5250 MHz UNII-2A: 5250 ~ 5350 MHz UNII-2C: 5470 ~ 5725 MHz UNII-3: 5725 ~ 5850 MHz	
	For this report is just for 5G WIFI part	
Type of Modulation:	IEEE for 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n (HT20): OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11a/n: OFDM (BPSK, QPSK,16QAM, 64QAM) IEEE for 802.11ac: OFDM (BPSK, QPSK,16QAM, 64QAM, 256QAM)	
Channels Step:	Channels with 5MHz step	
Test software of EUT:	Secure CRT (manufacturer declare)	
Antenna Type:	Street-lamp-camera antenna	
Antenna Gain:	UNII-1 BAND	Antenna1: 0.17 dBi
		Antenna2: 0.17 dBi
	UNII-2A BAND	Antenna1: 0.92 dBi
		Antenna2: 0.92 dBi
	UNII-2C BAND	Antenna1: 3.48 dBi
		Antenna2: 3.48 dBi
UNII-3 BAND	Antenna1: 2.20 dBi	
	Antenna2: 2.20 dBi	
Remark: This data is provided by customer and our lab isn't responsible for this data		
Test Voltage	AC120V	

Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	DH-IPC-WL46A	2	IPC-WL46A	3	DH-IPC-WL46A-0280B
4	IPC-WL46A-0280B	5	IPC-L46N-USA	6	IPC-L46N-CAN
7	IPC-L46N	8	IPC-L46	9	IPC-L46-USA
10	IPC-L46-CAN				

Only the main model **DH-IPC-WL46A** was tested and only the data of this model is shown in this test report.

Since Their electrical circuit design, layout, components used and internal wiring are identical, only the name of the models.

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5.1. MAXIMUM OUTPUT POWER

UNII-1 BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power (dBm)
a	5150 ~ 5250	14.00
ac VHT20		16.14
ac VHT40		16.49
ac VHT80		17.31

UNII-2A BAND

IEEE Std. 802.11	Frequency (MHz)	Maximum Average Conducted Power(dBm)
a	5250 ~ 5350	14.24
ac VHT20		16.57
ac VHT40		16.83
ac VHT80		17.33

UNII-2C BAND

IEEE Std. 802.11	Frequency (MHz)	Max Power(dBm)
a	5470 ~ 5725	16.51
ac VHT20		18.71
ac VHT40		18.96
ac VHT80		16.72

UNII-3 BAND

IEEE Std. 802.11	Frequency (MHz)	Max Power(dBm)
a	5725 ~ 5850	15.60
ac VHT20		17.97
ac VHT40		18.41
ac VHT80		18.60



5.2. CHANNEL LIST

UNII-1 (For Bandwidth = 20 MHz)		UNII-1 (For Bandwidth = 40 MHz)		UNII-1 (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230		
44	5220				
48	5240				

UNII-2A (For Bandwidth = 20 MHz)		UNII-2A (For Bandwidth = 40 MHz)		UNII-2A (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	54	5270	58	5290
56	5280	62	5310		
60	5300				
64	5320				

UNII-2C (For Bandwidth = 20 MHz)		UNII-2C (For Bandwidth = 40 MHz)		UNII-2C (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	102	5510	106	5530
104	5520	110	5550	122	5610
108	5540	118	5590	138	5690
112	5560	126	5630		
116	5580	134	5670		
120	5580	142	5710		
124	5620				
128	5640				
132	5660				
136	5680				
140	5700				
144	5720				

UNII-3 (For Bandwidth = 20 MHz)		UNII-3 (For Bandwidth = 40 MHz)		UNII-3 (For Bandwidth = 80 MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	151	5755	155	5775
153	5765	159	5795		
157	5785				
161	5805				
165	5825				



5.3. TEST CHANNEL CONFIGURATION

UNII-1 Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11ac VHT20	CH 36(Low Channel), CH 40(MID Channel), CH 48(High Channel)	5180 MHz, 5200 MHz, 5240 MHz
802.11ac VHT40	CH 38(Low Channel), CH 46(High Channel)	5190 MHz, 5230 MHz
802.11ac VHT80	CH 42(Low Channel)	5210 MHz

UNII-2A Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11ac VHT20	CH 52(Low Channel), CH 56(MID Channel), CH 64(High Channel)	5260 MHz, 5280 MHz, 5320 MHz
802.11ac VHT40	CH 54(Low Channel), CH 62(High Channel)	5270 MHz, 5310 MHz
802.11ac VHT80	CH 58(Low Channel)	5290 MHz

UNII-2C Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 100(Low Channel), CH 120(MID Channel), CH 140(High Channel)	5500 MHz, 5580 MHz, 5700 MHz
802.11ac VHT20	CH 100(Low Channel), CH 120(MID Channel), CH 140(High Channel)	5500MHz, 5580 MHz, 5700MHz
802.11ac VHT40	CH 102(Low Channel), CH 118(MID Channel), CH 134(High Channel)	5510 MHz, 5590 MHz, 5670 MHz
802.11ac VHT80	CH 102(Low Channel), CH 122(High Channel)	5530 MHz, 5610 MHz

UNII-3 Test Channel Configuration		
IEEE Std.	Test Channel Number	Frequency
802.11a	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11ac VHT20	CH 149(Low Channel), CH 157(MID Channel), CH 165(High Channel)	5745 MHz, 5785 MHz, 5825 MHz
802.11ac VHT40	CH 151(Low Channel), CH 159(High Channel)	5755 MHz, 5795 MHz
802.11ac VHT80	CH 155(Low Channel)	5775 MHz



5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna	Frequency Band	Antenna Type	Maximum Antenna Gain	Directional Gain (dBi)
			(dBi)	MIMO Mode
1	UNII-1	Street-lamp-camera antenna	0.17	3.28
2	UNII-1		0.17	
1	UNII-2A		0.92	3.93
2	UNII-2A		0.92	
1	UNII-2C		3.48	6.49
2	UNII-2C		3.48	
1	UNII-3		2.20	5.21
2	UNII-3		2.20	

IEEE Std. 802.11	Transmit and Receive Mode	Description
a	☒1TX, 1RX	ANT 1 or 2 can be used as transmitting/receiving antenna.
ac VHT20	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT40	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT80	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.
ac VHT160	☒2TX, 2RX	ANT 1, 2 can be used as transmitting/receiving antenna.

Note: 1. Only 802.11n HT20/HT40 and 802.11ac HT20/40/80 support MIMO mode.

Note 1: CDD Mode Directional gain= $10 \log [(10^{G1/20} + 10^{G2/20})^2 / N_{ANT}]$
 G_{ANT} : Average of the Antenna Gain
 N_{ANT} : Antenna numbers



5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worst Case Power Setting Parameter	
Test Software	Secure CRT

UNII-1

IEEE Std. 802.11	Rate	Channel	Test Software Setting Value	
			ANT 1	ANT 2
a	6M	36	56	56
		40	56	56
		48	56	56
ac VHT20	MCS0	36	56	56
		40	56	56
		48	56	56
ac VHT40	MCS0	38	56	56
		46	56	56
ac VHT80	MCS0	42	56	56

UNII-2A

IEEE Std. 802.11	Rate	Channel	Soft set value	
			ANT 1	ANT 2
a	6M	52	56	56
		60	56	56
		64	56	56
ac VHT20	MCS0	52	56	56
		60	56	56
		64	56	56
ac VHT40	MCS0	54	56	56
		62	56	56
ac VHT80	MCS0	58	56	56

UNII-2C

IEEE Std. 802.11	Rate	Channel	Soft set value	
			ANT 1	ANT 2
a	6M	100	56	56
		120	56	56
		140	56	56
ac VHT20	MCS0	100	56	56
		120	56	56
		140	56	56
ac VHT40	MCS0	102	56	56
		118	56	56
		134	56	56
ac VHT80	MCS0	106	44	44
		122	44	44



UNII-3

IEEE Std. 802.11	Rate	Channel	Soft set value	
			ANT 1	ANT 2
a	6M	149	56	56
		157	56	56
		165	56	56
ac VHT20	MCS0	149	56	56
		157	56	56
		165	56	56
ac VHT40	MCS0	151	56	56
		159	56	56
ac VHT80	MCS0	155	56	56

Remark:

- 1) SISO mode and MIMO mode use the same power setting.
- 2) Since 802.11ac VHT20/VHT40 modes are different from 802.11n HT20/HT40 only in control messages, so all the tests are performed on the worst case (802.11ac VHT20/802.11ac VHT40) mode between these 4 modes and only the worst data was recorded in this report.

5.6. DESCRIPTION OF TEST SETUP


SUPPORT EQUIPMENT

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

I/O PORT

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

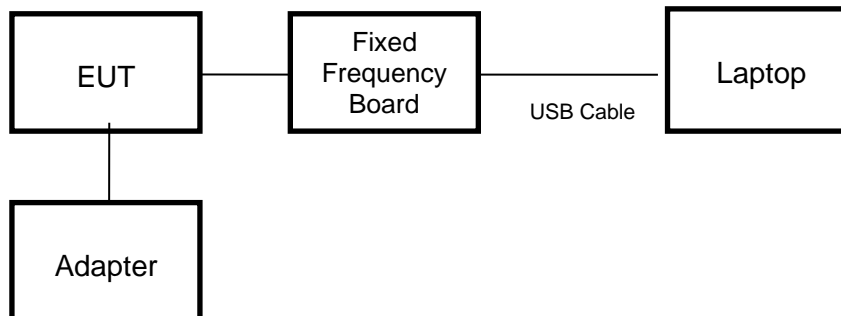
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	AC Adapter	AC POWER	ADS-12AM-12 12012-EPCU	INPUT:100-240V,50/60Hz, 0.3A OUTPUT:12V  1A

TEST SETUP

The EUT can work in engineering mode with a software through a Laptop.

SETUP DIAGRAM FOR TESTS



Remark: The SD Card is used during all testings.



5.7. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	126700	2020-12-05	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	126701	2020-12-05	2021-12-04	2022-12-03
Software							
Used	Description	Manufacturer	Name	Version			
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance	R&S	EMC32	Ver. 9.25			
Radiated Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9010B	155727	2020-05-10	2021-05-09	2022-05-08
<input checked="" type="checkbox"/>	EMI test receiver	R&S	ESR26	126703	2020-12-05	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-15	2021-06-03	2024-06-02
<input checked="" type="checkbox"/>	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	177821	N/A	2019-01-28	2022-01-27
<input checked="" type="checkbox"/>	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2018-01-29	2019-01-28	2022-01-27
<input checked="" type="checkbox"/>	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2018-01-06	2019-01-05	2022-01-04
<input checked="" type="checkbox"/>	Receiver Antenna with Pre-amplification (26.5GHz-40GHz)	TOYO	HAP 26-40W	155567	2020-07-22	2021-07-29	2022-07-28
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18-50	177825	2019-03-18	2020-12-05	2022-03-25
<input checked="" type="checkbox"/>	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2020-12-05	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCJV12-5120-5150-5350-5380-40SS	3	2020-05-10	2021-05-09	2022-05-08
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCJV16-5440-5470-5725-5755-40SS	4	2020-05-10	2021-05-09	2022-05-08
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCJV12-5695-5725-5850-5880-40SS	5	2020-05-10	2021-05-09	2022-05-08
<input checked="" type="checkbox"/>	Highpass Filter	Wainwright	WHKX10-5850-6500-1800-40SS	6	2020-05-10	2021-05-09	2022-05-08
Software							



Used	Description	Manufacturer	Name	Version			
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance	Tonscend	TS+	Ver. 2.5			
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9010B	155368	2020-05-10	2021-05-09	2022-05-08
<input checked="" type="checkbox"/>	Power Meter	Keysight	U2021XA	155370	2020-05-10	2021-05-09	2022-05-08

Remark: All relate Radiated Spurious Emissions are tested before Dec 30, 2021



6. ANTENNA PORT TEST RESULTS

6.1. TEST ENVIRONMENT

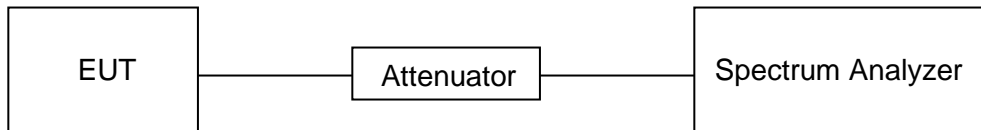
Environment Parameter	Selected Values During Tests
Relative Humidity	47.8%
Atmospheric Pressure:	103kPa
Temperature	20.2°C
Test Voltage	AC120V

6.2. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

TEST SETUP



RESULTS

ANTENNA 1

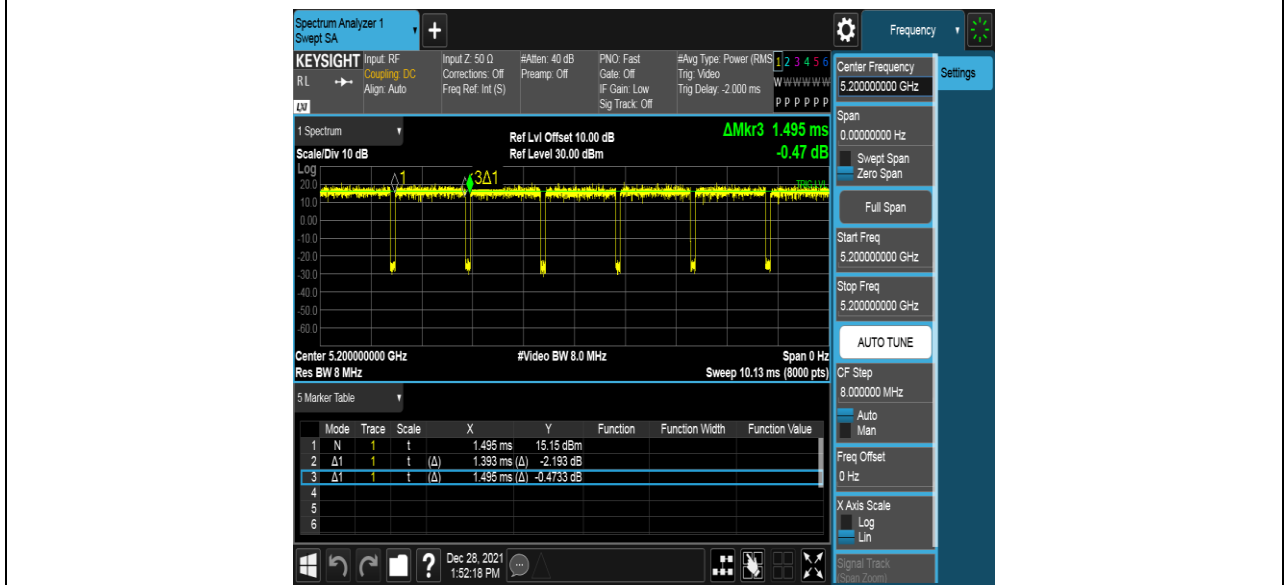
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (KHz)	Final setting For VBW (KHz)
11a	1.39	1.50	0.93	93	0.32	0.72	1
11ac HT20	1.31	1.42	0.92	92	0.36	0.76	1
11ac HT40	0.65	0.75	0.87	87	0.60	1.54	2
11ac HT80	0.32	0.42	0.76	76	1.19	3.13	4

Note:

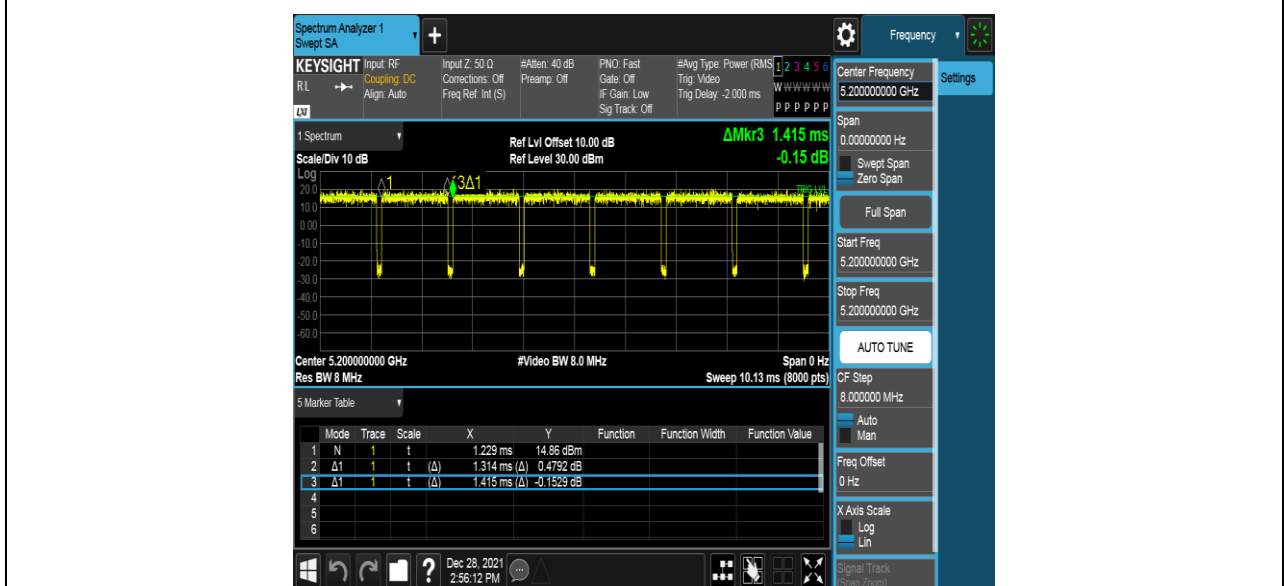
1. Duty Cycle Correction Factor=10log (1/x).
2. Where: x is Duty Cycle (Linear)
3. Where: T is On Time
4. If that calculated VBW is not available on the analyzer then the next higher value should be used.
5. Antenna 1 and Antenna 2 has the same duty cycle, only Antenna 1 data show here.



11a ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

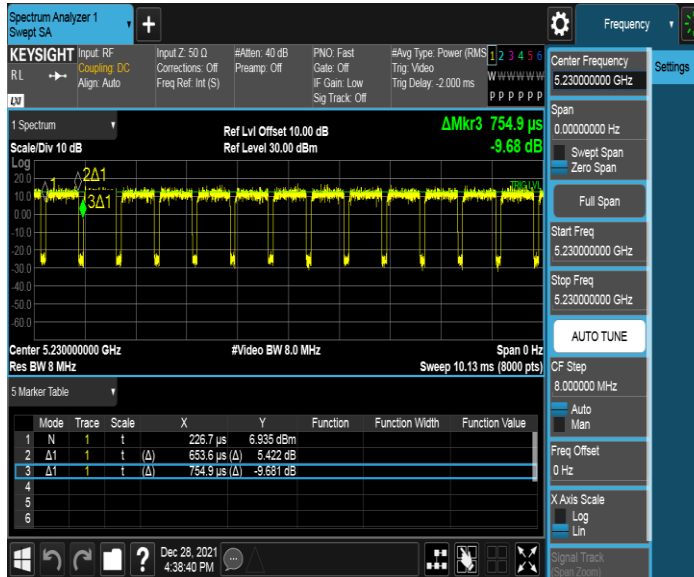


11ac20 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)

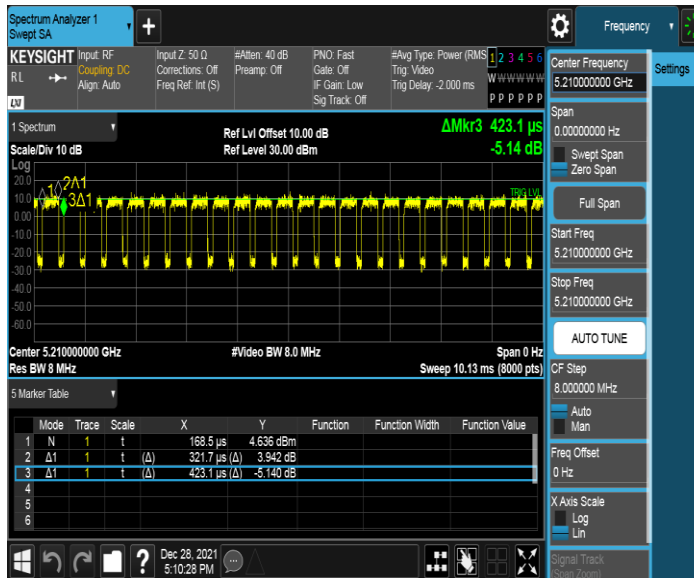




11ac40 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)



11ac80 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)





6.3. 6dB/26dB OCCUPIED BANDWIDTH

LIMITS

CFR 47 FCC Part15, Subpart E		
Test Item	Limit	Frequency Range (MHz)
26 dB Emission Bandwidth	For reporting purposes only.	5150 ~ 5250
26 dB Emission Bandwidth	For reporting purposes only.	5250 ~ 5350
26 dB Emission Bandwidth	For reporting purposes only.	5470 ~ 5725
6 dB Emission Bandwidth	The minimum 6 dB emission bandwidth shall be 500 kHz.	5725 ~ 5850

TEST PROCEDURE

Refer to KDB 789033 D02 General U-NII Test Procedures New Rules v02r01 section II.C1. for 26 dB Emission Bandwidth; section II.C2. for 6 dB Emission Bandwidth.

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

Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	For 6 dB Emission Bandwidth: RBW=100 kHz For 26 dB Emission bandwidth: approximately 1 % of the EBW.
VBW	For 6 dB Bandwidth: $\geq 3 \cdot \text{RBW}$ For 26 dB Bandwidth: $> \text{RBW}$
Trace	Max hold
Sweep	Auto couple

a) 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 6/26 dB relative to the maximum level measured in the fundamental emission.

Calculation for 26 dB Bandwidth of UNII-2C Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

26 dB BW: 20.00 MHz

FL: 5710.16 MHz

FH: 5730.16 MHz

Turning Frequency: 5725 MHz

26 dB Bandwidth of UNII-2C Band Portion = $5725 - 5710.16 = 14.84$ MHz

Calculation for 6dB Bandwidth of UNII-3 Straddle Channel:

For Example: Fundamental frequency: 5720 MHz

6 dB BW: 16.44 MHz



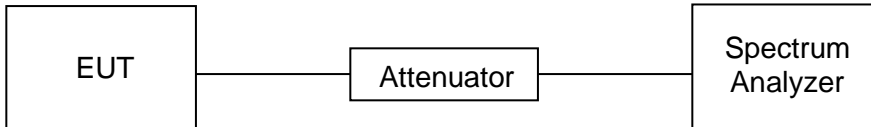
FL: 5711.76 MHz

FH: 5728.2 MHz

Turning Frequency: 5725 MHz

6 dB Bandwidth of UNII-3 band Portion = $5728.2 - 5725 = 3.2$ MHz

TEST SETUP





RESULTS TABLE ANTENNA 1 (WORST-CASE CONFIGURATION)

1) 26 dB Emission Bandwidth Part:

Test Mode	Antenna	Channel	26dB EBW [MHz]	FL[MHz]	FH[MHz]	Verdict
11A	Ant1	5180	20.880	5169.520	5190.400	PASS
		5200	20.840	5189.440	5210.280	PASS
		5240	21.160	5229.440	5250.600	PASS
		5260	20.800	5249.640	5270.440	PASS
		5280	20.440	5269.720	5290.160	PASS
		5320	21.120	5309.320	5330.440	PASS
		5500	20.760	5489.520	5510.280	PASS
		5580	20.680	5569.840	5590.520	PASS
		5700	21.240	5689.440	5710.680	PASS
		5720	20.920	5709.560	5730.480	PASS
		5720_UNII-2C	15.44	5709.560	5725	PASS
		5720_UNII-3	5.48	5725	5730.480	PASS
		5745	20.440	5734.720	5755.160	PASS
		5785	20.960	5774.400	5795.360	PASS
5825	20.880	5814.480	5835.360	PASS		
11AC20 MIMO	Ant1	5180	21.520	5169.120	5190.640	PASS
		5200	21.360	5189.480	5210.840	PASS
		5240	21.040	5229.520	5250.560	PASS
		5260	22.080	5249.080	5271.160	PASS
		5280	21.240	5269.400	5290.640	PASS
		5320	21.560	5309.000	5330.560	PASS
		5500	21.200	5489.320	5510.520	PASS
		5580	22.120	5569.120	5591.240	PASS
		5700	21.120	5689.320	5710.440	PASS
		5720	21.360	5709.320	5730.680	PASS
		5720_UNII-2C	15.68	5709.320	5725	PASS
		5720_UNII-3	5.68	5725	5730.680	PASS
		5745	21.200	5734.400	5755.600	PASS
		5785	22.000	5774.080	5796.080	PASS
5825	20.920	5814.560	5835.480	PASS		
11AC40 MIMO	Ant1	5190	39.600	5170.240	5209.840	PASS
		5230	41.120	5210.160	5251.280	PASS
		5270	43.360	5250.400	5293.760	PASS
		5310	42.480	5289.360	5331.840	PASS
		5510	39.600	5490.320	5529.920	PASS
		5550	42.320	5530.320	5572.640	PASS
		5670	47.360	5650.000	5697.360	PASS
		5710	44.320	5690.240	5734.560	PASS
		5710_UNII-2C	34.76	5690.240	5725	PASS
		5710_UNII-3	9.56	5725	5734.560	PASS
		5755	39.920	5734.680	5774.600	PASS
		5795	40.000	5774.840	5814.840	PASS
11AC80 MIMO	Ant1	5210	80.640	5169.680	5250.320	PASS
		5290	86.240	5249.360	5335.600	PASS
		5530	81.600	5489.520	5571.120	PASS
		5610	81.920	5569.200	5651.120	PASS
		5690	80.960	5649.680	5730.640	PASS
		5690_UNII-2C	75.32	5649.680	5725	PASS
		5690_UNII-3	5.64	5725	5730.640	PASS
		5775	82.240	5733.720	5815.960	PASS

Reamrk: Both of the two antennas had been tested, but only the worst data was recorded in the report.



2) 6dB Minimum Emission Bandwidth
For UNII-3 Band:

Test Mode	Antenna	Channel	6db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant2	5745	15.680	0.5	PASS
		5785	16.440	0.5	PASS
		5825	16.400	0.5	PASS
11AC20 MIMO	Ant2	5745	16.800	0.5	PASS
		5785	17.640	0.5	PASS
		5825	17.480	0.5	PASS
11AC40 MIMO	Ant2	5755	36.320	0.5	PASS
		5795	36.480	0.5	PASS
11AC80 MIMO	Ant2	5775	76.000	0.5	PASS

Reamrk: Both of the two antennas had been tested, but only the worst data was recorded in the report.

For UNII-2C Band:

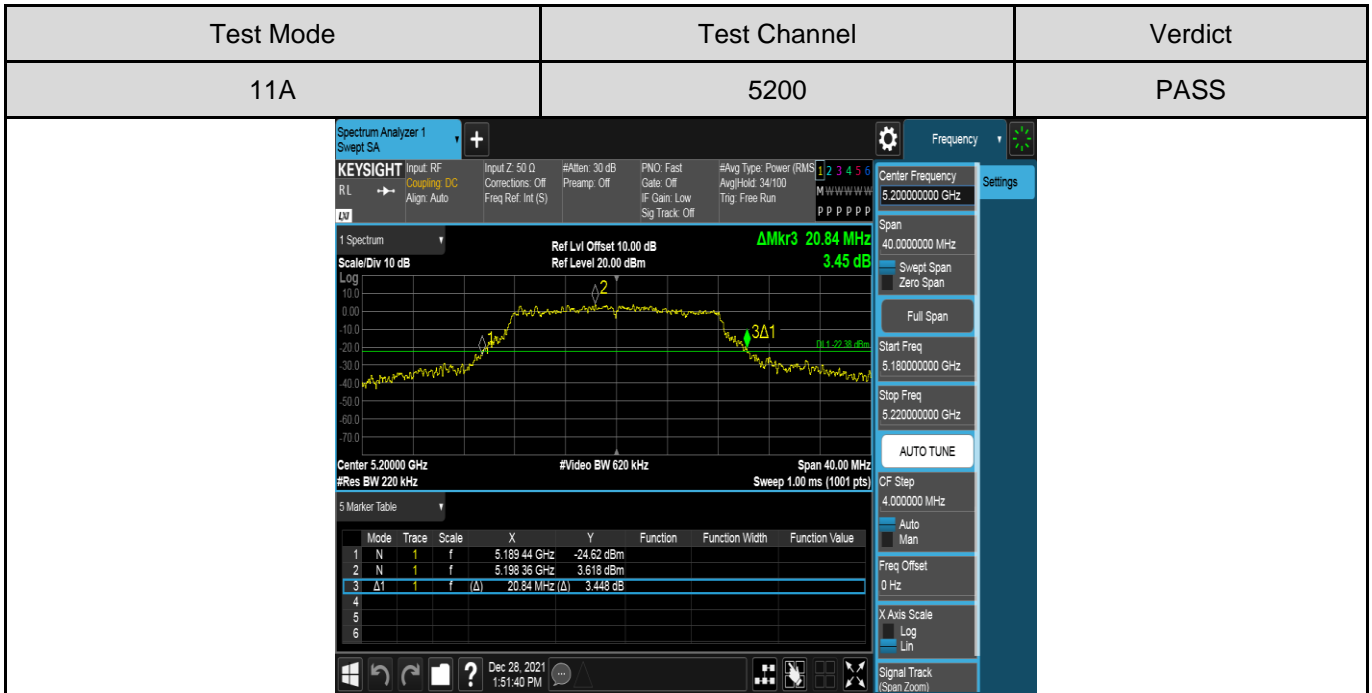
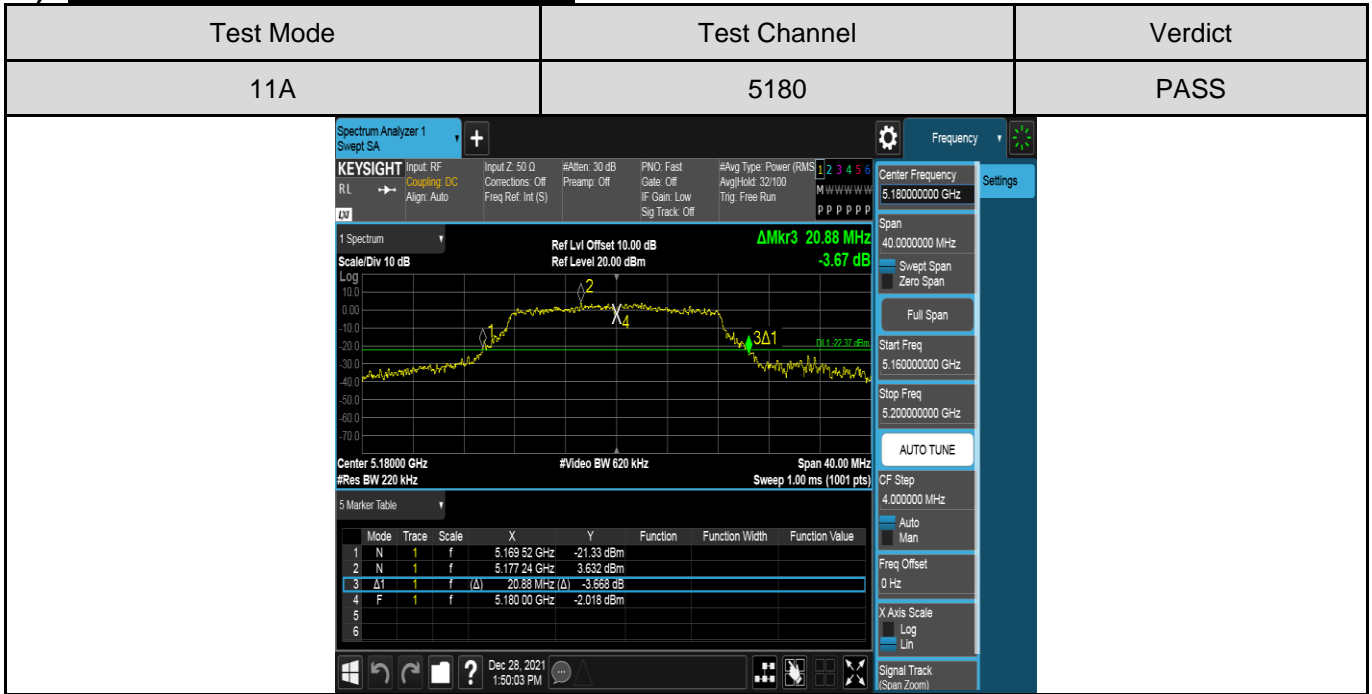
Test Mode	Antenna	Channel	6db EBW [MHz]	Limit[MHz]	Verdict
11A	Ant2	5720	3.120	0.5	PASS
11AC20 MIMO	Ant2	5720	3.760	0.5	PASS
11AC40 MIMO	Ant2	5710	3.240	0.5	PASS
11AC80 MIMO	Ant2	5690	3.240	0.5	PASS

Reamrk: Both of the two antennas had been tested, but only the worst data was recorded in the report.



Test Graphs

1) For 26 dB Emission Bandwidth Part:





Test Mode	Test Channel	Verdict
11A	5240	PASS

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	5.229 44 GHz	-25.58 dBm		
2	N	1	f	5.237 68 GHz	3.782 dBm		
3	Δ 1	1	f (Δ)	21.16 MHz (Δ)	2.405 dB		
4							
5							
6							

Test Mode	Test Channel	Verdict
11A	5260	PASS

5 Marker Table

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	5.249 64 GHz	-22.49 dBm		
2	N	1	f	5.268 23 GHz	4.247 dBm		
3	Δ 1	1	f (Δ)	20.80 MHz (Δ)	0.4226 dB		
4							
5							
6							



Test Mode	Test Channel	Verdict
11A	5280	PASS

Test Mode	Test Channel	Verdict
11A	5320	PASS



Test Mode	Test Channel	Verdict
11A	5500	PASS

Center Frequency: 5.50000000 GHz
Span: 40.0000000 MHz
Start Freq: 5.48000000 GHz
Stop Freq: 5.52000000 GHz
#Res BW 220 kHz
#Video BW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	5.489 52 GHz	-24.92 dBm		
2	N	1	f	5.498 48 GHz	4.081 dBm		
3	Δ	1	f (Δ)	20.76 MHz (Δ)	3.694 dB		

Test Mode	Test Channel	Verdict
11A	5580	PASS

Center Frequency: 5.58000000 GHz
Span: 40.0000000 MHz
Start Freq: 5.56000000 GHz
Stop Freq: 5.60000000 GHz
#Res BW 220 kHz
#Video BW 620 kHz
Span 40.00 MHz
Sweep 1.00 ms (1001 pts)

Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	N	1	f	5.569 84 GHz	-20.56 dBm		
2	N	1	f	5.581 40 GHz	6.248 dBm		
3	Δ	1	f (Δ)	20.88 MHz (Δ)	-1.650 dB		



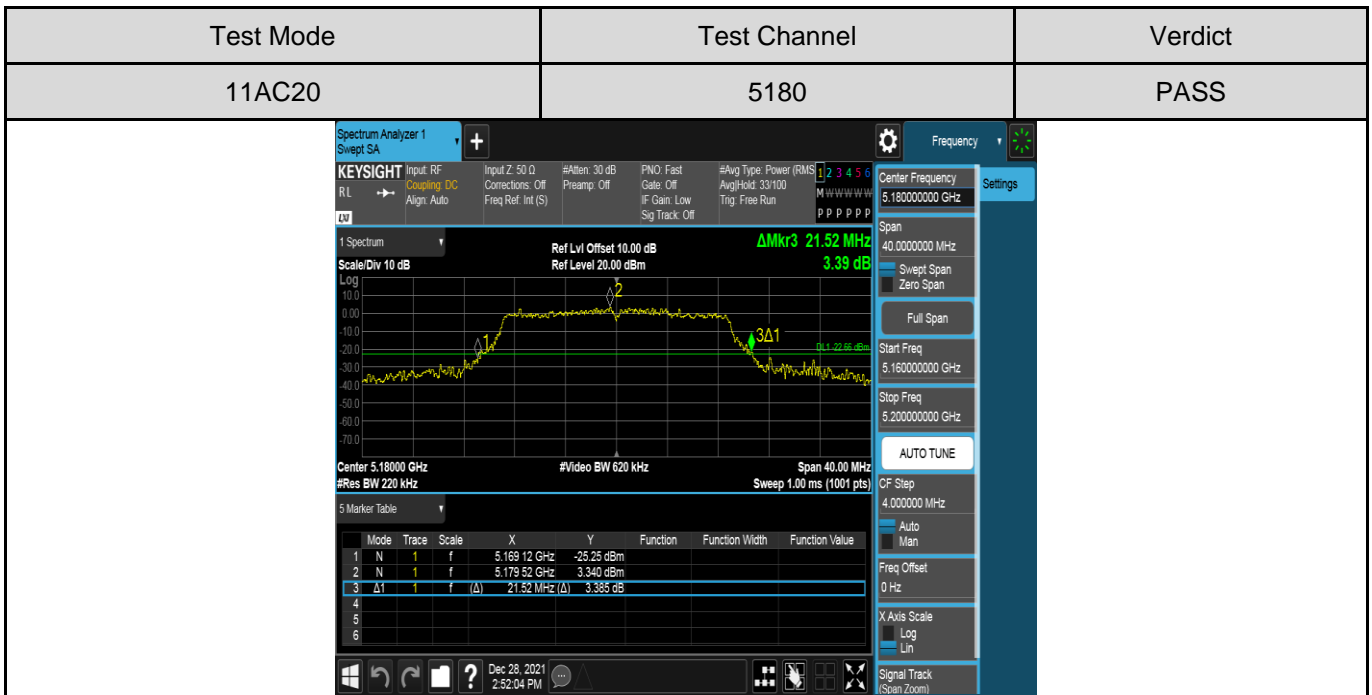
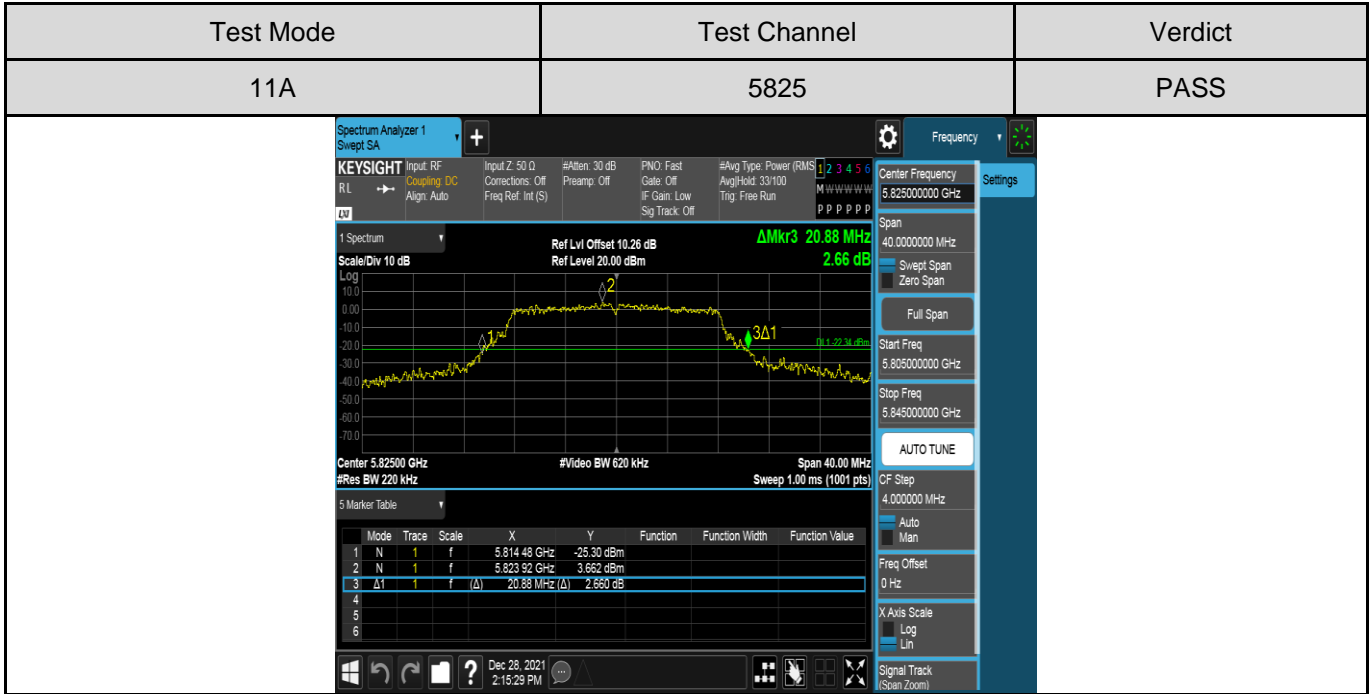
Test Mode	Test Channel	Verdict
11A	5700	PASS

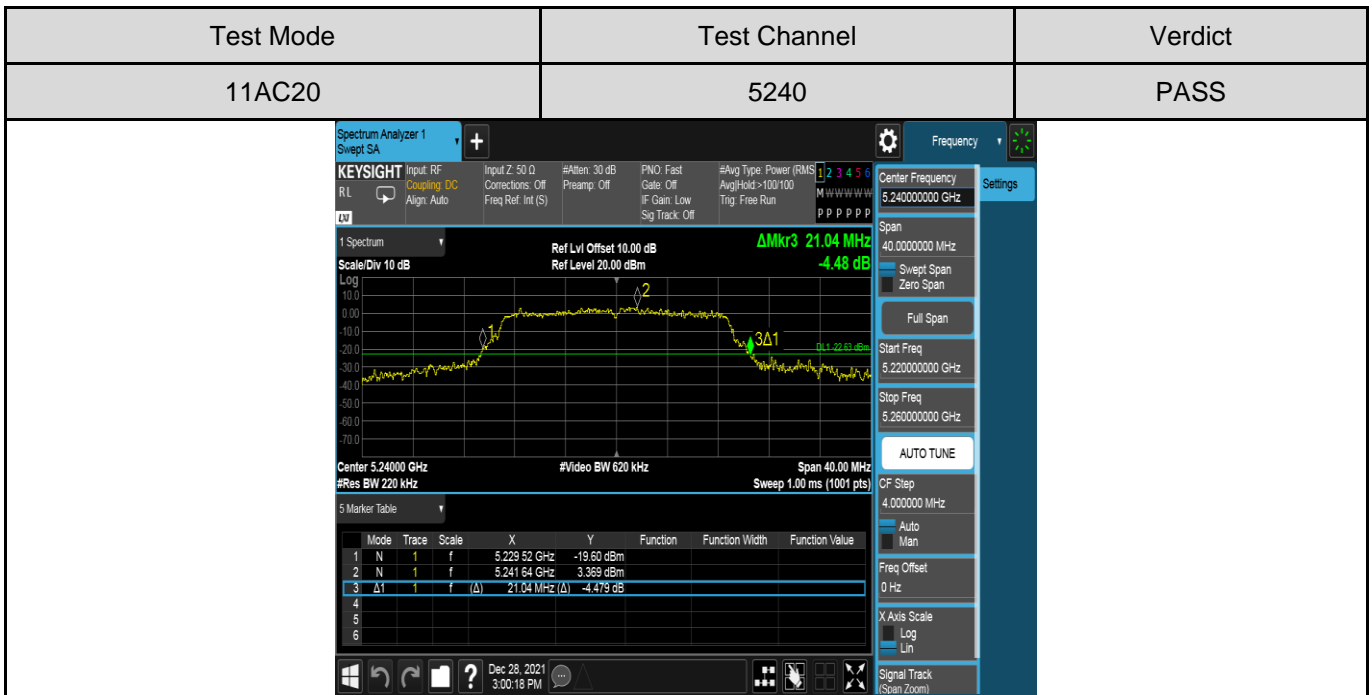
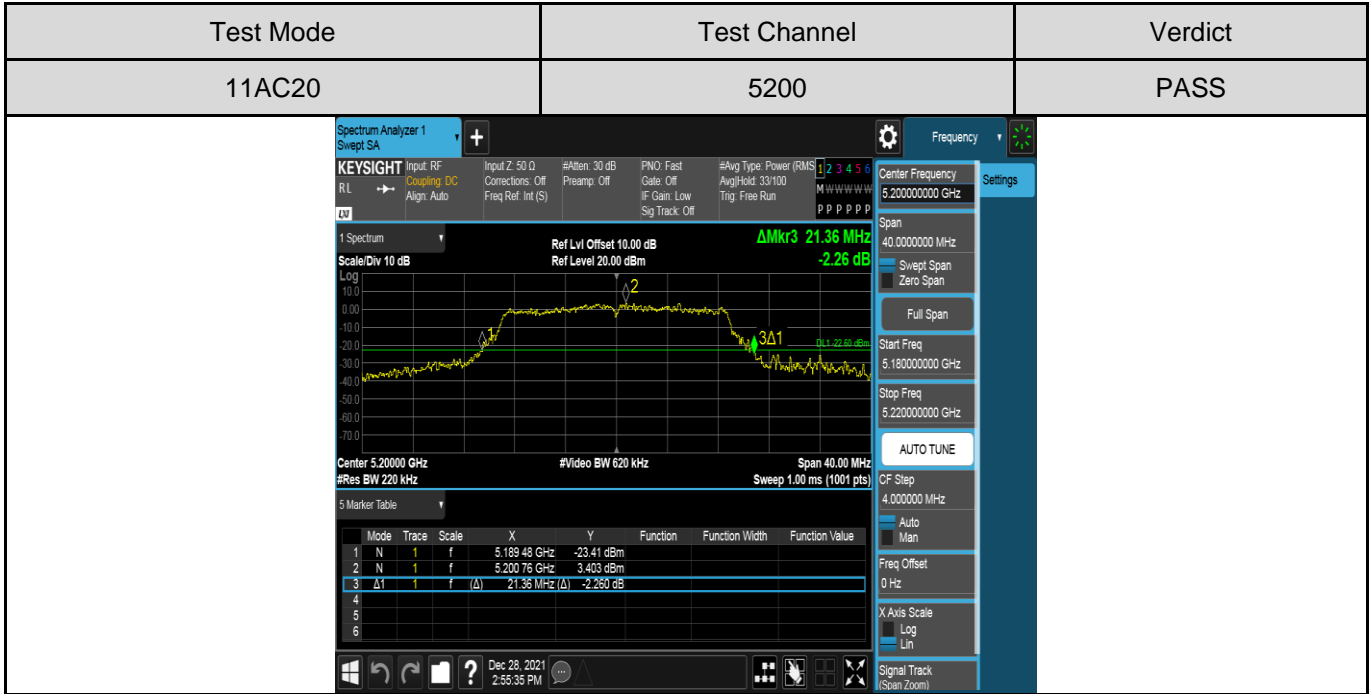
Test Mode	Test Channel	Verdict
11A	5720	PASS

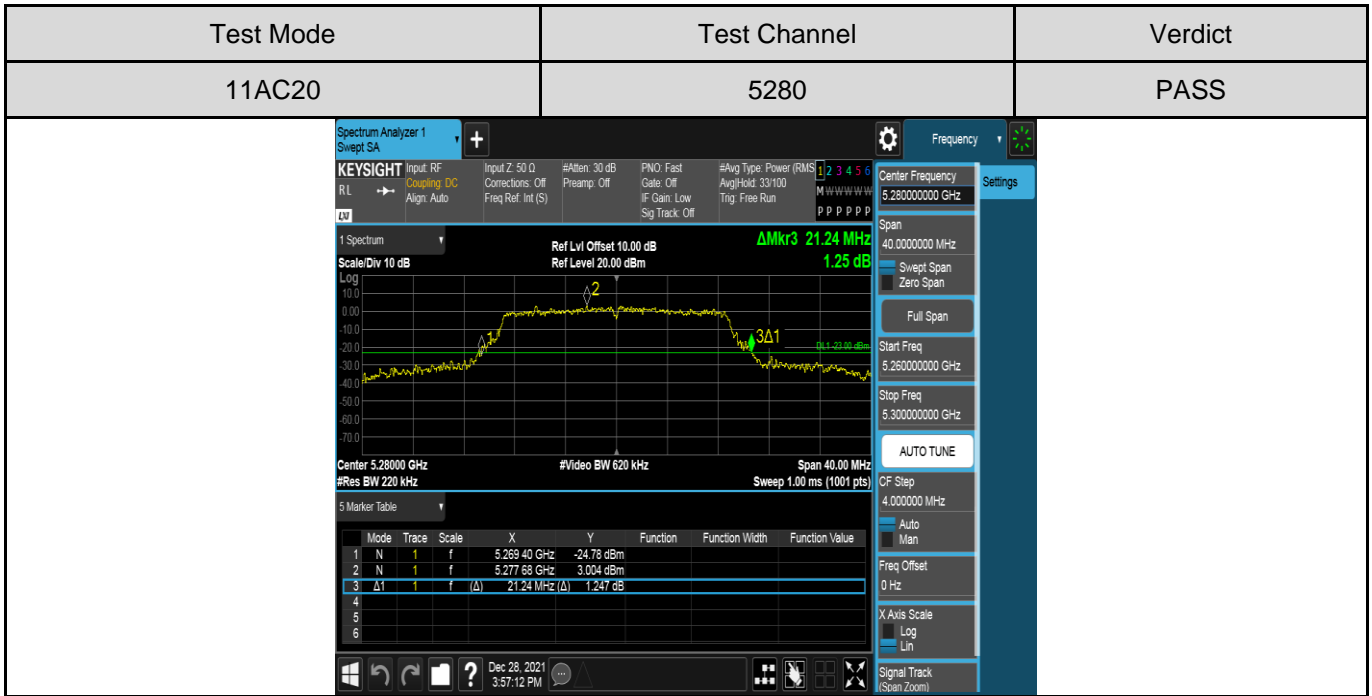
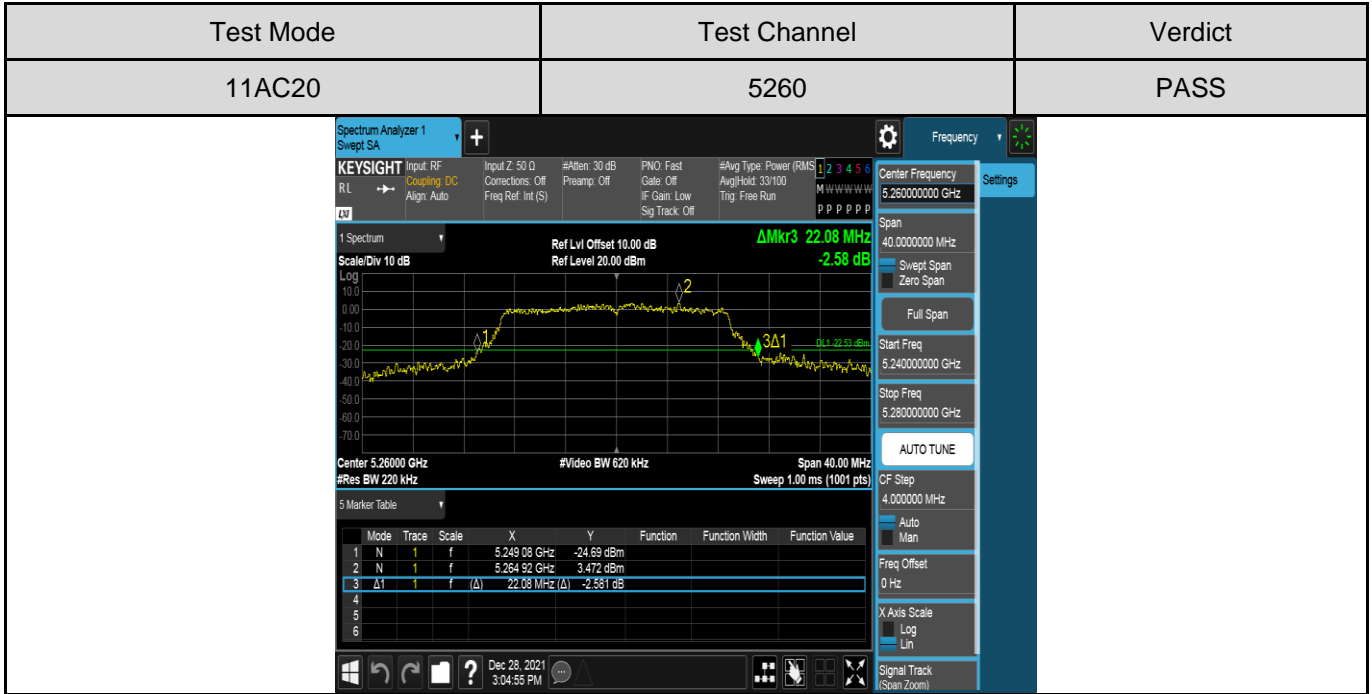


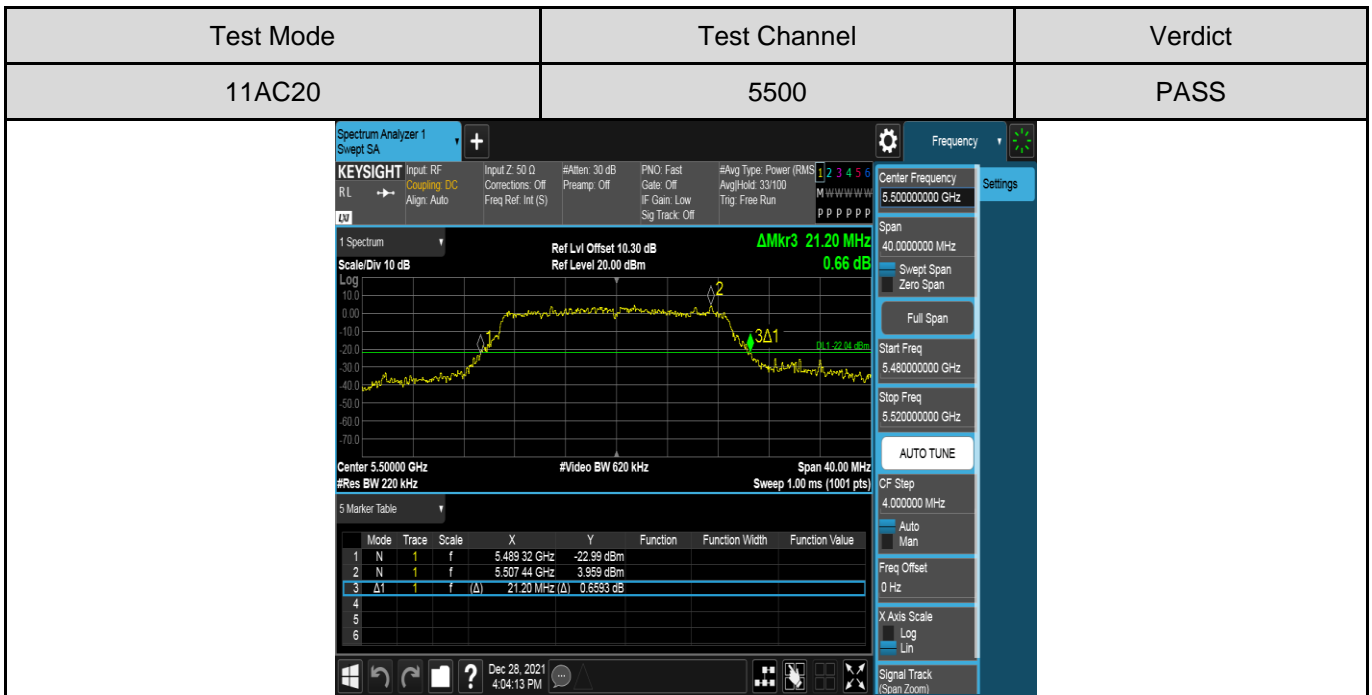
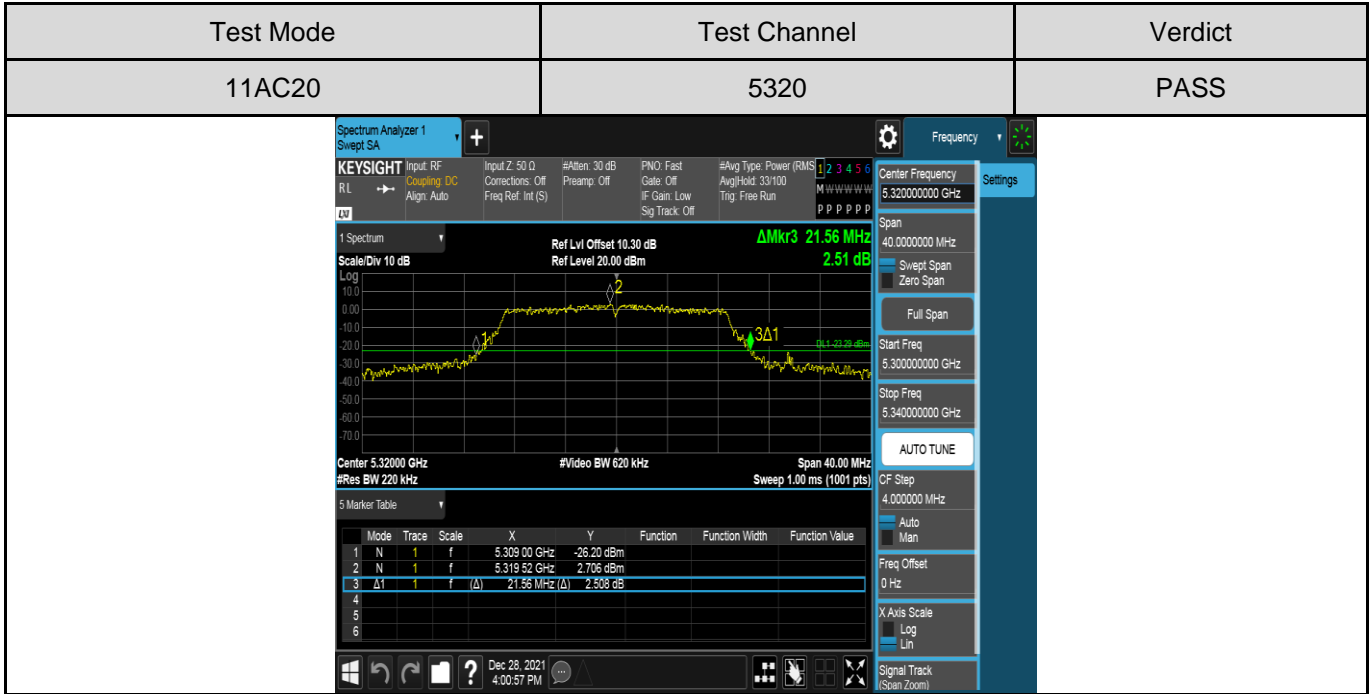
Test Mode	Test Channel	Verdict																																
11A	5745	PASS																																
<p>Center Frequency: 5.74500000 GHz</p> <p>Span: 40.0000000 MHz</p> <p>Start Freq: 5.725000000 GHz</p> <p>Stop Freq: 5.765000000 GHz</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.734 72 GHz</td> <td></td> <td></td> <td>-19.69 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.745 76 GHz</td> <td></td> <td></td> <td>6.772 dBm</td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f</td> <td>(Δ) 20.44 MHz</td> <td>(Δ)</td> <td></td> <td>-0.1437 dB</td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.734 72 GHz			-19.69 dBm	2	N	1	f	5.745 76 GHz			6.772 dBm	3	Δ 1	1	f	(Δ) 20.44 MHz	(Δ)		-0.1437 dB
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Test Mode	Test Channel	Verdict																																
11A	5785	PASS																																
<p>Center Frequency: 5.78500000 GHz</p> <p>Span: 40.0000000 MHz</p> <p>Start Freq: 5.765000000 GHz</p> <p>Stop Freq: 5.805000000 GHz</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.774 40 GHz</td> <td></td> <td></td> <td>-23.47 dBm</td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.785 36 GHz</td> <td></td> <td></td> <td>4.194 dBm</td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f</td> <td>(Δ) 20.96 MHz</td> <td>(Δ)</td> <td></td> <td>1.754 dB</td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.774 40 GHz			-23.47 dBm	2	N	1	f	5.785 36 GHz			4.194 dBm	3	Δ 1	1	f	(Δ) 20.96 MHz	(Δ)		1.754 dB
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3	Δ 1	1	f	(Δ) 20.96 MHz	(Δ)		1.754 dB																											





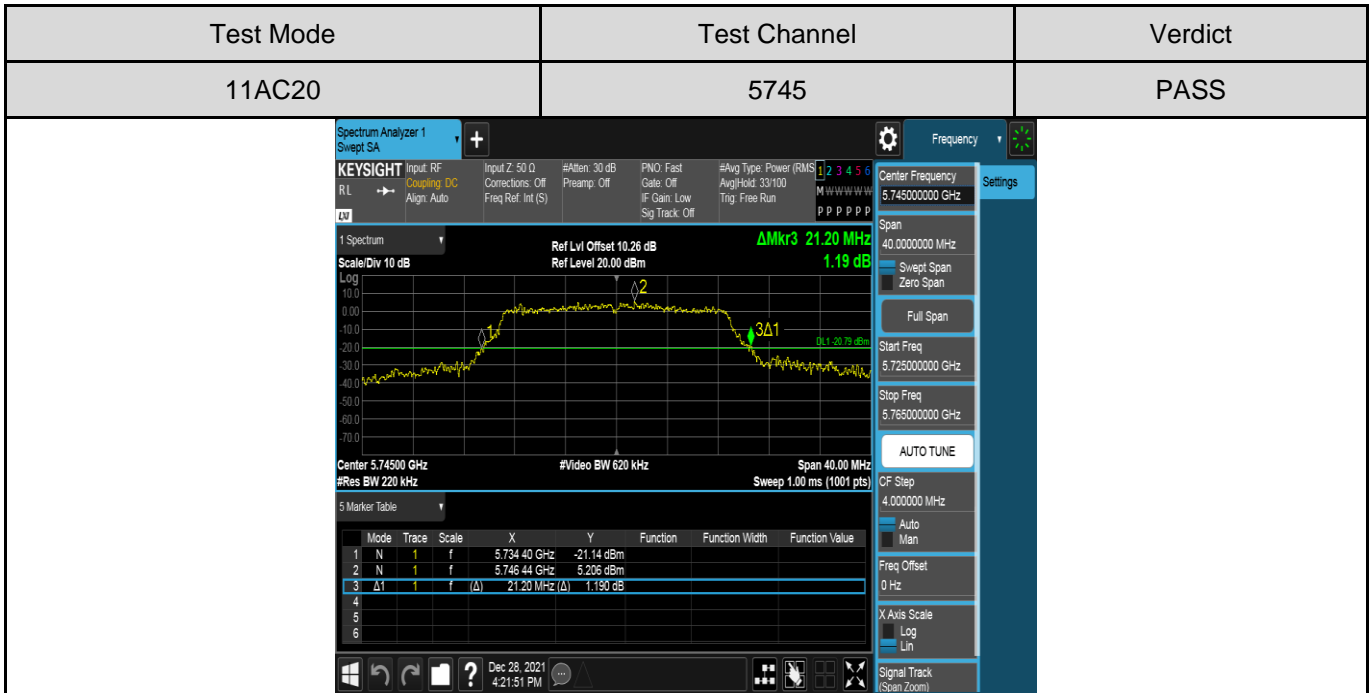
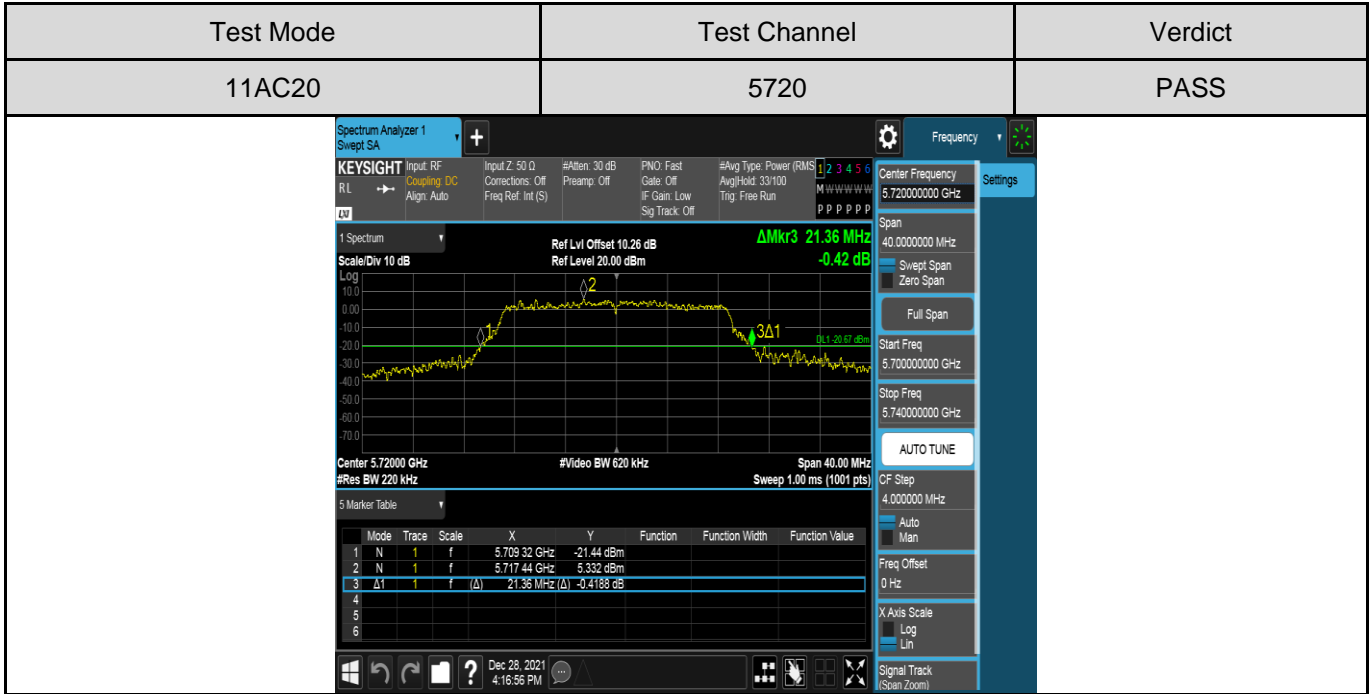






Test Mode	Test Channel	Verdict																																																								
11AC20	5580	PASS																																																								
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Test Mode	Test Channel	Verdict																																
11AC20	5785	PASS																																
<p>Spectrum Analyzer 1 Swept SA</p> <p>KEYSIGHT Input: RF Input Z: 50 Ω #Atten: 30 dB PNO: Fast #Avg Type: Power (RMS) 1 2 3 4 5 6 RL → Coupling: DC Corrections: Off Preamp: Off Gate: Off Avg/Hold: 33/100 M W W W W W W Align: Auto Freq Ref: Int (S) IF Gain: Low Trig: Free Run P P P P P P P</p> <p>1 Spectrum Ref Lvl Offset 10.26 dB ΔMkr3 22.00 MHz Scale/Div 10 dB Ref Level 20.00 dBm 2.31 dB</p> <p>Center 5.78500 GHz #Video BW 620 kHz Span 40.00 MHz #Res BW 220 kHz Sweep 1.00 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.774 08 GHz</td> <td>-25.40 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.792 44 GHz</td> <td>3.68 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>22.00 MHz (Δ)</td> <td>2.305 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.774 08 GHz	-25.40 dBm			2	N	1	f	5.792 44 GHz	3.68 dBm			3	Δ1	1	f (Δ)	22.00 MHz (Δ)	2.305 dB		
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Test Mode	Test Channel	Verdict																																
11AC20	5825	PASS																																
<p>Spectrum Analyzer 1 Swept SA</p> <p>KEYSIGHT Input: RF Input Z: 50 Ω #Atten: 30 dB PNO: Fast #Avg Type: Power (RMS) 1 2 3 4 5 6 RL → Coupling: DC Corrections: Off Preamp: Off Gate: Off Avg/Hold: 33/100 M W W W W W W Align: Auto Freq Ref: Int (S) IF Gain: Low Trig: Free Run P P P P P P P</p> <p>1 Spectrum Ref Lvl Offset 10.26 dB ΔMkr3 20.92 MHz Scale/Div 10 dB Ref Level 20.00 dBm 0.75 dB</p> <p>Center 5.82500 GHz #Video BW 620 kHz Span 40.00 MHz #Res BW 220 kHz Sweep 1.00 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.814 56 GHz</td> <td>-24.02 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.826 64 GHz</td> <td>2.930 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>20.92 MHz (Δ)</td> <td>0.7537 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.814 56 GHz	-24.02 dBm			2	N	1	f	5.826 64 GHz	2.930 dBm			3	Δ1	1	f (Δ)	20.92 MHz (Δ)	0.7537 dB		
Mode	Trace	Scale	X	Y	Function	Function Width	Function Value																											
1	N	1	f	5.814 56 GHz	-24.02 dBm																													
2	N	1	f	5.826 64 GHz	2.930 dBm																													
3	Δ1	1	f (Δ)	20.92 MHz (Δ)	0.7537 dB																													



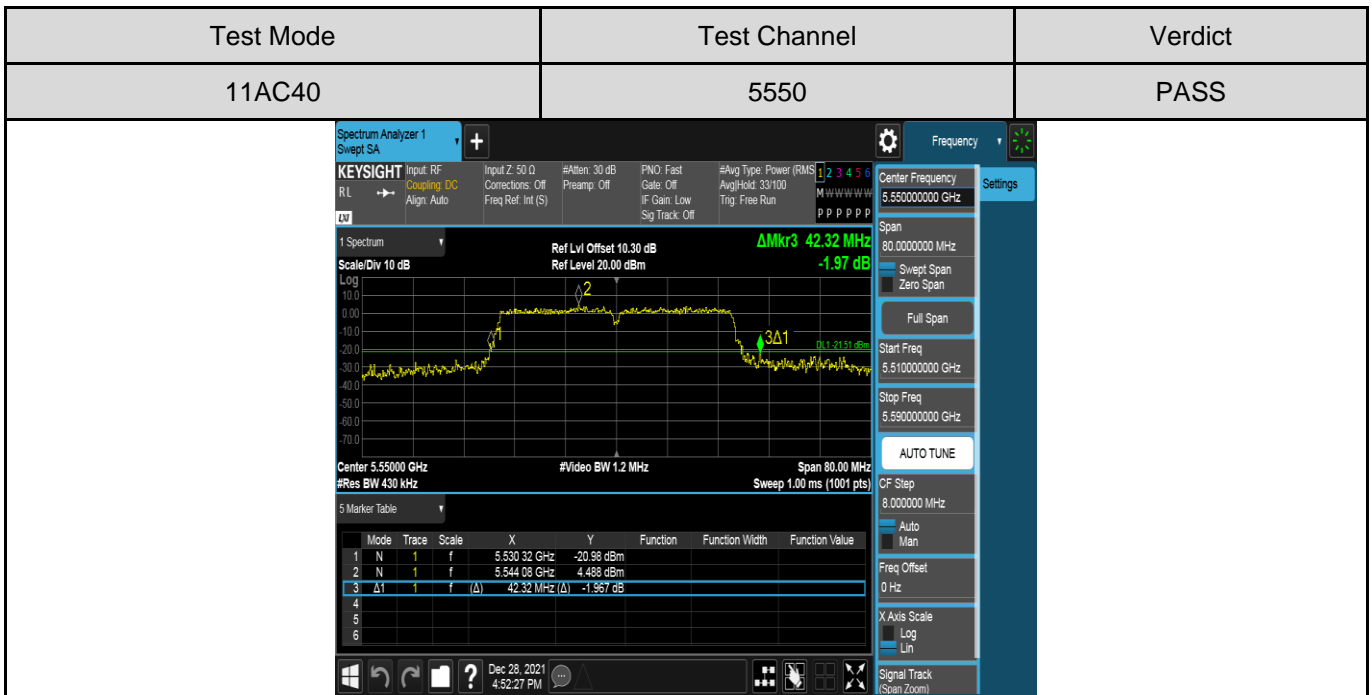
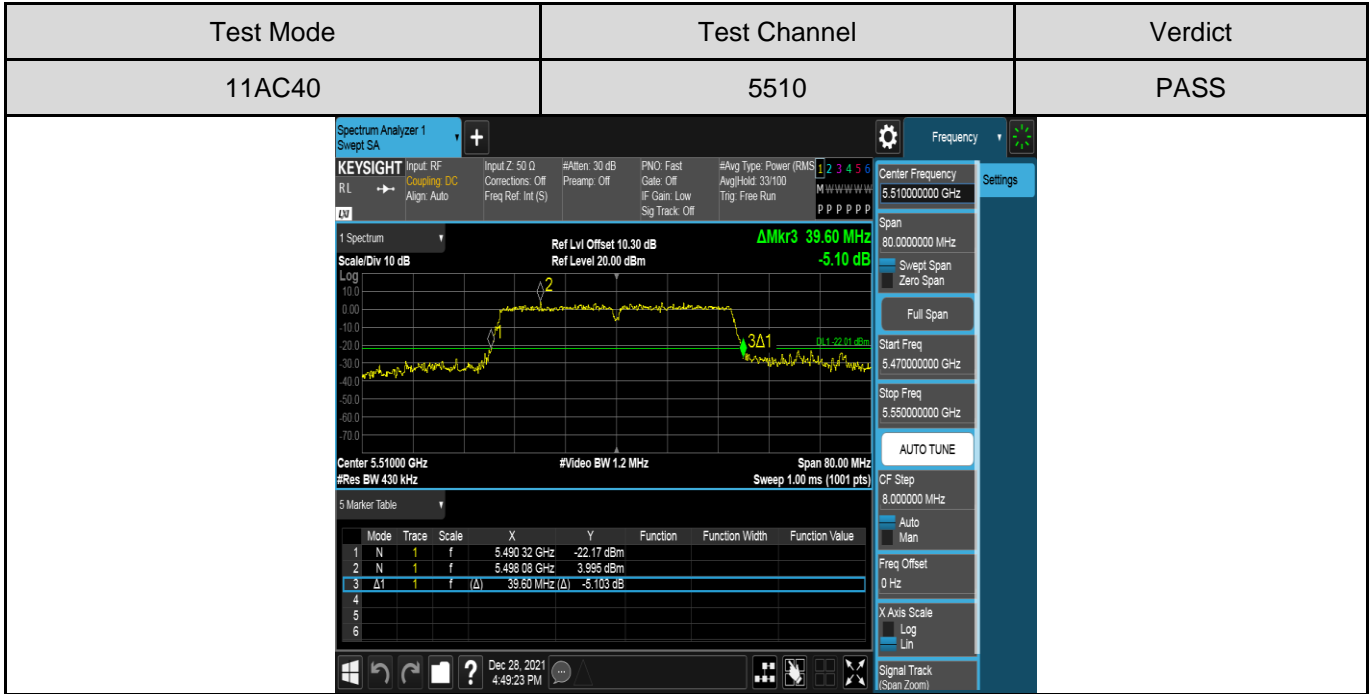
Test Mode	Test Channel	Verdict																																
11AC40	5190	PASS																																
<p>Center Frequency: 5.19000000 GHz Span: 80.000000 MHz Start Freq: 5.15000000 GHz Stop Freq: 5.23000000 GHz Center: 5.19000 GHz #Res BW 430 kHz #Video BW 1.2 MHz Span 80.00 MHz Sweep 1.00 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.170 24 GHz</td> <td>-24.03 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.182 64 GHz</td> <td>2.411 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>39.60 MHz (Δ)</td> <td>-1.696 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.170 24 GHz	-24.03 dBm			2	N	1	f	5.182 64 GHz	2.411 dBm			3	Δ1	1	f (Δ)	39.60 MHz (Δ)	-1.696 dB		
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Test Mode	Test Channel	Verdict																																
11AC40	5230	PASS																																
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Test Mode	Test Channel	Verdict																																
11AC40	5270	PASS																																
<p>Center Frequency: 5.27000000 GHz Span: 80.0000000 MHz Start Freq: 5.230000000 GHz Stop Freq: 5.310000000 GHz Center: 5.27000 GHz #Res BW 430 kHz #Video BW 1.2 MHz Span 80.00 MHz Sweep 1.00 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.260 40 GHz</td> <td>-23.14 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.275 52 GHz</td> <td>4.034 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>43.36 MHz (Δ)</td> <td>-1.381 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.260 40 GHz	-23.14 dBm			2	N	1	f	5.275 52 GHz	4.034 dBm			3	Δ1	1	f (Δ)	43.36 MHz (Δ)	-1.381 dB		
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Test Mode	Test Channel	Verdict																																
11AC40	5310	PASS																																
<p>Center Frequency: 5.31000000 GHz Span: 80.0000000 MHz Start Freq: 5.270000000 GHz Stop Freq: 5.350000000 GHz Center: 5.31000 GHz #Res BW 430 kHz #Video BW 1.2 MHz Span 80.00 MHz Sweep 1.00 ms (1001 pts)</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.289 36 GHz</td> <td>-27.84 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.306 72 GHz</td> <td>2.331 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>42.48 MHz (Δ)</td> <td>2.734 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.289 36 GHz	-27.84 dBm			2	N	1	f	5.306 72 GHz	2.331 dBm			3	Δ1	1	f (Δ)	42.48 MHz (Δ)	2.734 dB		
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Test Mode	Test Channel	Verdict
11AC40	5670	PASS

Test Mode	Test Channel	Verdict
11AC40	5710	PASS



Test Mode	Test Channel	Verdict																																
11AC40	5755	PASS																																
<p>The screenshot shows a Keysight Spectrum Analyzer interface. The main display shows a spectrum plot with a signal at 5.755 GHz. A marker is placed at 5.7948 GHz, showing a frequency offset of 39.92 MHz and a level of 2.36 dB. The center frequency is 5.7550 GHz, and the span is 80.00 MHz. The marker table below the plot lists the following data:</p> <table border="1"> <thead> <tr> <th>Mode</th> <th>Trace</th> <th>Scale</th> <th>X</th> <th>Y</th> <th>Function</th> <th>Function Width</th> <th>Function Value</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>N</td> <td>1</td> <td>f</td> <td>5.734 88 GHz</td> <td>-23.47 dBm</td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>N</td> <td>1</td> <td>f</td> <td>5.768 28 GHz</td> <td>4.135 dBm</td> <td></td> <td></td> </tr> <tr> <td>3</td> <td>Δ1</td> <td>1</td> <td>f (Δ)</td> <td>39.92 MHz (Δ)</td> <td>2.381 dB</td> <td></td> <td></td> </tr> </tbody> </table>			Mode	Trace	Scale	X	Y	Function	Function Width	Function Value	1	N	1	f	5.734 88 GHz	-23.47 dBm			2	N	1	f	5.768 28 GHz	4.135 dBm			3	Δ1	1	f (Δ)	39.92 MHz (Δ)	2.381 dB		
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11AC40	5795	PASS																																
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