



FCC ID: 2AX7S-LN313A Page: 1 / 94
Report No.: T200928D02-RP1 Rev.: 00

RADIO TEST REPORT FCC 47 CFR PART 15 SUBPART C

Test Standard FCC Part 15.247

Konil Tson

Product name Digital Paper System

Brand Name Avalue

Model No. EL313XX ($X = 0 \sim 9$ or $A \sim Z$)

Test Result Pass

Statements of Determination of compliance is based on the results of the

Conformity compliance measurement, not taking into account

measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc. (Wugu Laboratory).

Approved by:

Kevin Tsai

Deputy Manager

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	January 11, 2021	Initial Issue	ALL	Allison Chen



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1. GENERAL INFORMATION

1.1 EUT INFORMATION

Applicant	AlMobile Co., Ltd. 6F., No. 166, Sec.4, Chengde Rd., Shilin Dist., Taipei City 11167, Taiwan
Manufacturer	AlMobile Co., Ltd. 6F., No. 166, Sec.4, Chengde Rd., Shilin Dist., Taipei City 11167, Taiwan
Equipment	Digital Paper System
Model Name	EL313XX (X= 0~9 or A~Z)
Model Discrepancy	All the above models are identical except for the designation of model numbers. The suffix of (X= 0~9 or A~Z) on model number is just for marketing purpose only
Trade Name	Avalue
Received Date	September 28, 2020
Date of Test	October 23 ~ November 25, 2020
Power Supply	Power from Host System. Rechargeable Li-Polymer Battery / LIS1633RDPCA Rating: 2000mAh, 7.4Wh Power from Adapter.

Remark:

- 1. Disclaimer: The variant model numbers / trademarks are assessed as identical in hardware and software to each other, hence all variants are fully covered by the test results in this test report without further verification test.
- 2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.



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1.2 EUT CHANNEL INFORMATION

Frequency Range	802.11b/g/n HT 20: 2412MHz ~ 2462MHz
Modulation Type	1. IEEE 802.11b mode: CCK 2. IEEE 802.11g mode: OFDM 3. IEEE 802.11n HT 20 MHz mode : OFDM
Number of channel	1. IEEE 802.11b mode: 11 Channels 2. IEEE 802.11g mode: 11 Channels 3. IEEE 802.11n HT 20 MHz mode: 11 Channels

Remark:

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested					
Frequency range in Number of Location in frequency which device operates frequencies range of operation					
☐ 1 MHz or less	1	Middle			
1 MHz to 10 MHz 2 1 near top and 1 near bottom					
More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom			

1.3 ANTENNA INFORMATION

Antenna Specification	□ PIFA □ PCB □ Dipole □ Coils	
Antenna Gain	Chain 0: 2.6 dBi Chain 1: 2.58 dBi Power Directional Gain: 2.59 dBi	
Antenna connector	IPEX	

Notes:

^{1.} Power Directional Gain = $10*LOG(((10^(Ant1/10)+10^(Ant2/10))/2))$



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1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	+/- 1.2575
Emission bandwidth, 20dB bandwidth	+/- 0.0014
RF output power, conducted	+/- 1.14
Power density, conducted	+/- 1.40
3M Semi Anechoic Chamber / 30M~200M	+/- 4.12
3M Semi Anechoic Chamber / 200M~1000M	+/- 4.68
3M Semi Anechoic Chamber / 1G~8G	+/- 5.18
3M Semi Anechoic Chamber / 8G~18G	+/- 5.47
3M Semi Anechoic Chamber / 18G~26G	+/- 3.81
3M Semi Anechoic Chamber / 26G~40G	+/- 3.87

Remark:

^{1.} This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2

^{2.} ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.



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1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan. (R.O.C.)

Test site	Test Engineer	Remark
AC Conduction Room	Lance Chen	-
Radiation	Jerry Chang / Ray Li	-
RF Conducted	Rick Lee	-

Remark: The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.6 INSTRUMENT CALIBRATION

RF Conducted Test Site						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
Coaxial Cable	Woken	WC12	CC003	06/29/2020	06/28/2021	
Coaxial Cable	Woken	WC12	CC001	06/29/2020	06/28/2021	
Signal Analyzer	R&S	FSV 40	101073	09/17/2020	09/16/2021	
Power Meter	Anritsu	ML2487A	6K00003260	05/21/2020	05/20/2021	
Power Seneor	Anritsu	MA2490A	032910	05/21/2020	05/20/2021	
Software	N/A					

3M 966 Chamber Test Site							
Equipment	Manufacturer	Model	S/N	Cal Date	Cal Due		
Band Reject Filters	MICRO TRONICS	BRM 50702	120	02/25/2020	02/24/2021		
Bilog Antenna	Sunol Sciences	JB3	A030105	07/24/2020	07/23/2021		
Coaxial Cable	HUBER SUHNER	SUCOFLEX 104PEA	20995	02/25/2020	02/24/2021		
Coaxial Cable	EMCI	EMC105	190914+327109/4	09/19/2020	09/18/2021		
Digital Thermo-Hygro Meter	WISEWIND	1206	D07	01/15/2020	01/14/2021		
double Ridged Guide Horn Antenna	ETC	MCTD 1209	DRH13M02003	09/30/2020	09/29/2021		
Loop Ant	COM-POWER	AL-130	121051	03/27/2020	03/26/2021		
Pre-Amplifier	EMEC	EM330	060609	02/25/2020	02/24/2021		
Pre-Amplifier	EMEC	EM01G26G	060570	06/29/2020	06/28/2021		
PSA Series Spectrum Analyzer	Agilent	E4446A	MY46180323	07/24/2020	07/23/2021		
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R		
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R		
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R		
Software		e3 6	5.11-20180413				

Remark: Each piece of equipment is scheduled for calibration once a year.



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AC Power Line Conducted Emission Test Room						
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due	
CABLE	EMCI	CFD300-NL	CERF	06/29/2020	06/28/2021	
EMI Test Receiver	R&S	ESCI	100064	07/17/2020	07/16/2021	
LISN	SCHAFFNER	NNB 41	03/10013	02/13/2020	02/12/2021	
Software	EZ-EMC(CCS-3A1-CE)					

Remark: Each piece of equipment is scheduled for calibration once a year.

1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

	Support Equipment						
No. Equipment Brand Model Series No.							
	N/A						

	Support Equipment							
No.	No. Equipment Brand Model Series No. FCC ID							
1	Adapter	SAMSUNG	ETA-U90JWS	N/A	N/A			

1.8 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.247, KDB 662911 D01.



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2. TEST SUMMARY

FCC Standard Section	Report Section	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207(a)	4.1	AC Conducted Emission	Pass
15.247(a)(2)	4.2	6 dB Bandwidth	Pass
-	4.2	Occupied Bandwidth (99%)	Pass
15.247(b)	4.3	Output Power Measurement	Pass
15.247(e)	4.4	Power Spectral Density	Pass
15.247(d)	4.5	Conducted Band Edge	Pass
15.247(d)	4.5	Conducted Spurious Emission	Pass
15.247(d)	4.6	Radiation Band Edge	Pass
15.247(d)	4.6	Radiation Spurious Emission	Pass



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3. DESCRIPTION OF TEST MODES

3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	IEEE 802.11b mode :1Mbps IEEE 802.11g mode :6Mbps IEEE 802.11n HT20 mode :MCS8
Test Channel Frequencies	IEEE 802.11b mode: 1. Lowest Channel: 2412MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462MHz IEEE 802.11g mode: 1. Lowest Channel: 2412MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2462MHz IEEE 802.11n HT20 mode: 1. Lowest Channel: 2412MHz 2. Middle Channel: 2437MHz 3. Highest Channel: 2437MHz 3. Highest Channel: 2462MHz
Operation Transmitter	IEEE 802.11b mode : 2T2R IEEE 802.11g mode : 2T2R IEEE 802.11n HT20 mode : 2T2R

Remark:

^{1.} EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.



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3.2 THE WORST MODE OF MEASUREMENT

R	Radiated Emission Measurement Above 1G				
Test Condition	Radiated Emission Above 1G				
Power supply Mode	Mode 1: EUT power by Host System				
Worst Mode					
Worst Position	 □ Placed in fixed position. □ Placed in fixed position at X-Plane (E2-Plane) □ Placed in fixed position at Y-Plane (E1-Plane) □ Placed in fixed position at Z-Plane (H-Plane) 				
R	adiated Emission Measurement Below 1G				
Test Condition	Radiated Emission Below 1G				
Power supply Mode	Mode 1: EUT power by Host System				
Worst Mode	Mode 1				
AC Power Line Conducted Emission					
Test Condition	Test Condition AC Power line conducted emission for line and neutral				
Power supply Mode	Power supply Mode Mode 1: EUT power by Adapter				
Worst Mode	Mode 1				

Remark:

- 1. The worst mode was record in this test report.
- 2. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report
- 3. AC power line conducted emission and for below 1G radiation emission were performed the EUT transmit at the highest output power channel as worse case.



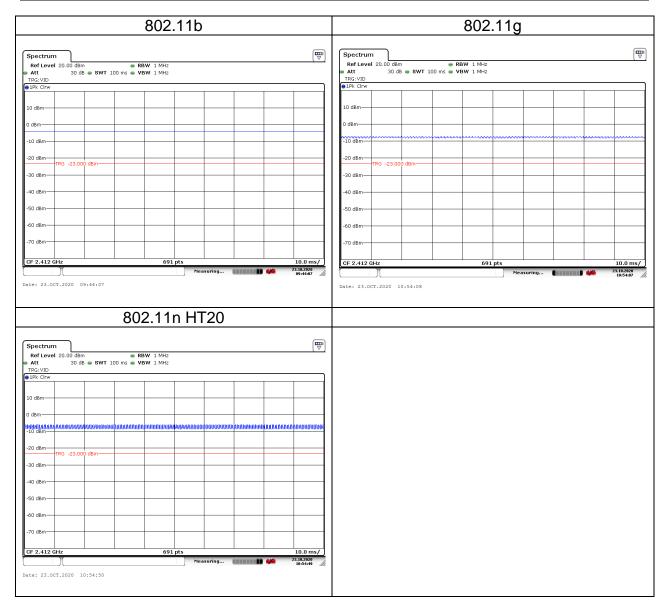
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3.3 EUT DUTY CYCLE

Temperature: 25.9°C **Humidity:** 50% RH

Tested by: Rick Lee **Test date:** October 23, 2020

	Duty Cycle							
Configuration	Duty Cycle (%)	Duty Factor (dB) =10*log (1/Duty Cycle)	1/T (kHz)	VBW setting (kHz)				
802.11b	100.00%	0.00	N/A	0.01				
802.11g	100.00%	0.00	N/A	0.01				
802.11n HT20	100.00%	0.00	N/A	0.01				





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4. TEST RESULT

4.1 AC POWER LINE CONDUCTED EMISSION

4.1.1 Test Limit

According to §15.207(a)(2),

Frequency Range	Limits(dE	βμV)
(MHz)	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

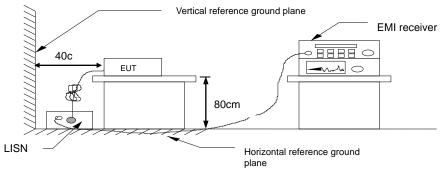
^{*} Decreases with the logarithm of the frequency.

4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

- The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
- 2. EUT connected to the line impedance stabilization network (LISN)
- Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. Recorded Line for Neutral and Line.

4.1.3 Test Setup



4.1.4 Test Result

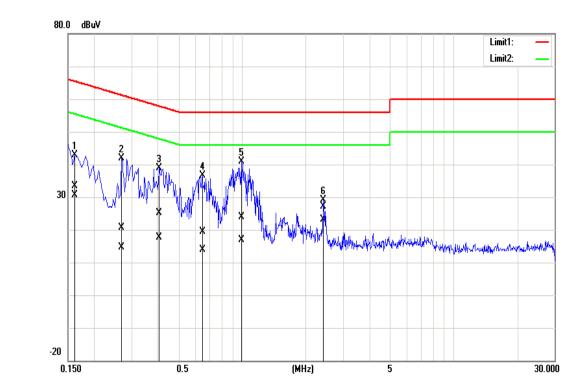
Pass.



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Test Data

Test Mode:	Mode 1	Temp/Hum	23.6(°C)/ 48%RH
Phase:	Line	Test Date	November 25, 2020
Test Voltage:	120Vac, 60Hz	Test Engineer	Lance Chen



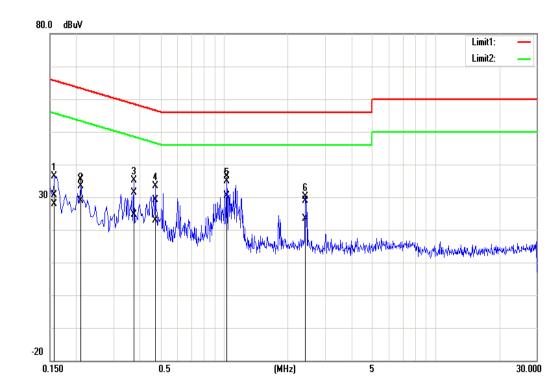
Frequency (MHz)	Quasi Peak reading (dBuV)	Average reading (d uV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak Iimit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1620	23.06	20.54	10.21	33.27	30.75	65.36	55.36	-32.09	-24.61	Pass
0.2700	10.43	4.53	10.21	20.64	14.74	61.12	51.12	-40.48	-36.38	Pass
0.4060	14.86	7.49	10.22	25.08	17.71	57.73	47.73	-32.65	-30.02	Pass
0.6500	9.19	3.57	10.22	19.41	13.79	56.00	46.00	-36.59	-32.21	Pass
0.9940	13.56	6.59	10.24	23.80	16.83	56.00	46.00	-32.20	-29.17	Pass
2.4220	16.76	12.91	10.26	27.02	23.17	56.00	46.00	-28.98	-22.83	Pass



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Test Mode:	Mode 1	Temp/Hum	23.6(°C)/ 48%RH
Phase:	Neutral	Test Date	November 25, 2020
Test Voltage:	120Vac, 60Hz	Test Engineer	Lance Chen



Frequency (MHz)	Quasi Peak reading dBuV)	Average reading (dBuV)	Correction factor (dB)	Quasi Peak result (dBuV)	Average result (dBuV)	Quasi Peak Iimit (dBuV)	Average limit (dBuV)	Quasi Peak margin (dB)	Average margin (dB)	Remark
0.1580	20.57	17.81	10.18	30.75	27.99	65.57	55.57	-34.82	-27.58	Pass
0.2100	25.09	18.68	10.19	35.28	28.87	63.21	53.21	-27.93	-24.34	Pass
0.3740	21.07	14.46	10.19	31.26	24.65	58.41	48.41	-27.15	-23.76	Pass
0.4740	19.00	12.75	10.19	29.19	22.94	56.44	46.44	-27.25	-23.50	Pass
1.0300	26.16	20.09	10.21	36.37	30.30	56.00	46.00	-19.63	-15.70	Pass
2.4140	18.56	13.13	10.23	28.79	23.36	56.00	46.00	-27.21	-22.64	Pass



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4.26dB BANDWIDTH AND OCCUPIED BANDWIDTH (99%)

4.2.1 Test Limit

According to §15.247(a)(2),

6 dB Bandwidth :

Limit	Shall be at least 500kHz
Limit	Shall be at least 500kHz

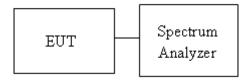
Occupied Bandwidth(99%) : For reporting purposes only.

4.2.2 Test Procedure

Test method Refer as ANSI C63.10: 2013,

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT
- 3. SA set RBW = 100kHz, VBW = 300kHz and Detector = Peak, to measurement 6 dB Bandwidth.
- 4. SA set RBW = 1% ~ 5% OBW, VBW = three times the RBW and Detector = Peak, to measurement 99% Bandwidth
- 5. Measure and record the result of 6 dB Bandwidth and 99% Bandwidth. in the test report.

4.2.3 Test Setup





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4.2.4 Test Result

Chain 0:

Temperature: 24.7°C **Humidity:** 55.5% RH

Tested by: Rick Lee **Test date:** November 11, 2020

Chain 1:

Temperature: 25.9°C **Humidity:** 50% RH

Tested by: Rick Lee Test date: November 24, 2020

Test mode: IEEE 802.11b mode / 2412-2462 MHz									
Channel Frequency (MHz) Chain 0 Chain 1 Chain 0 Chain 1 6dB BW (MHz) (MHz) (MHz) (MHz) (MHz) (MHz) 6dB BW (MHz)									
Low	2412	13.532	13.504	10.07	10.06				
Mid	2437	13.533	13.506	10.06	10.06	≥500			
High	2462	13.531	13.512	10.06	10.06				

Test mode: IEEE 802.11g mode / 2412-2462 MHz							
Channel	Frequency (MHz) Chain 0 OBW(99%) (MHz) Chain 1 Chain 0 6dB BW (MHz) 6dB BW (KHz) 6dB limit (kHz)						
Low	2412	16.804	16.710	16.60	16.60		
Mid	2437	16.802	16.718	16.60	16.60	≥500	
High	2462	16.799	16.711	16.60	16.61		

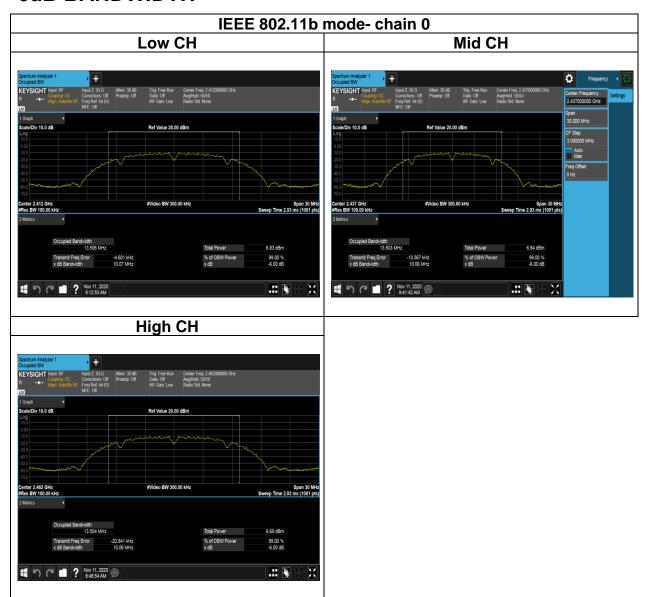
Test mode: IEEE 802.11n HT 20 MHz mode / 2412-2462 MHz							
Channel	Chain 0						
Low	2412	17.685	17.665	17.75	17.72		
Mid	2437	17.679	17.662	17.75	17.72	≥500	
High	2462	17.667	17.657	17.72	17.72		



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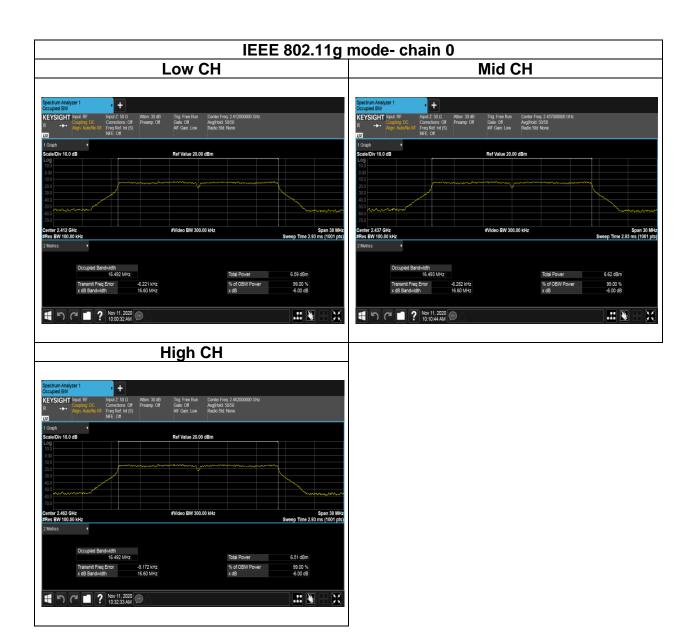
Test Data

6dB BANDWIDTH



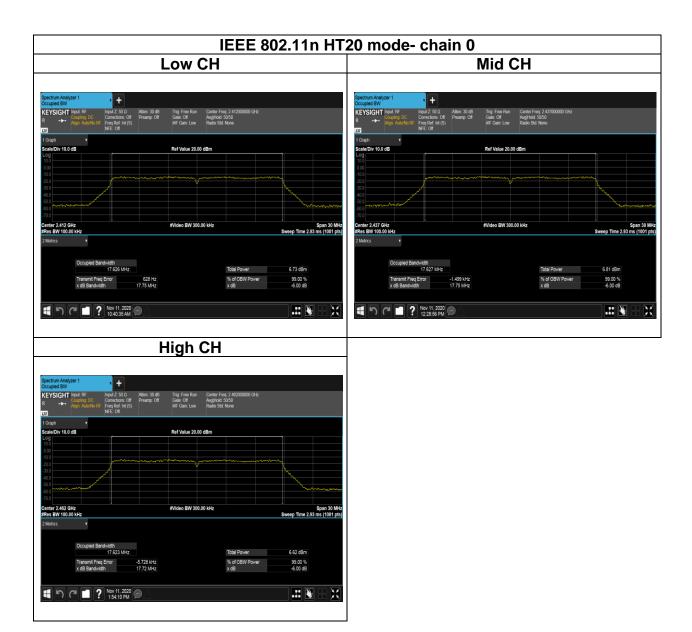


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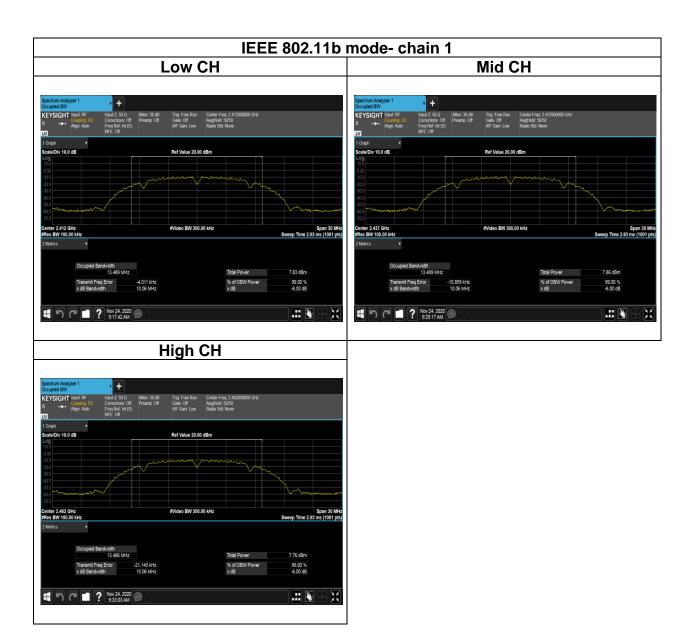


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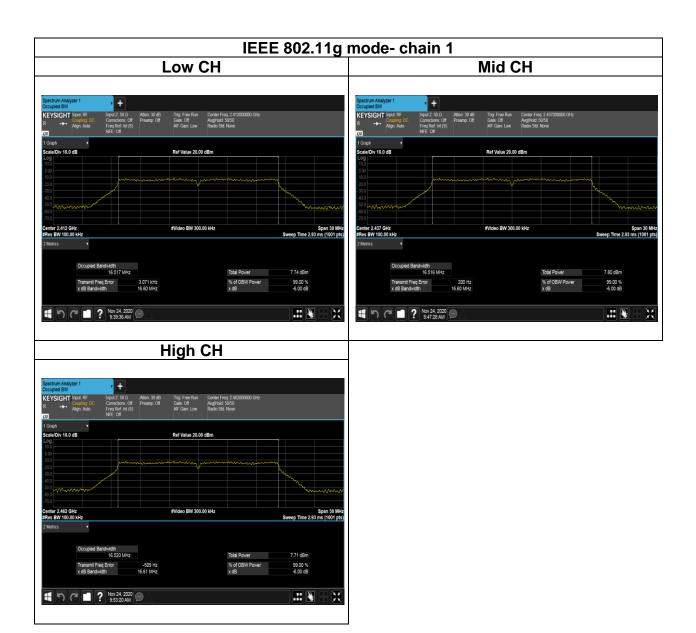


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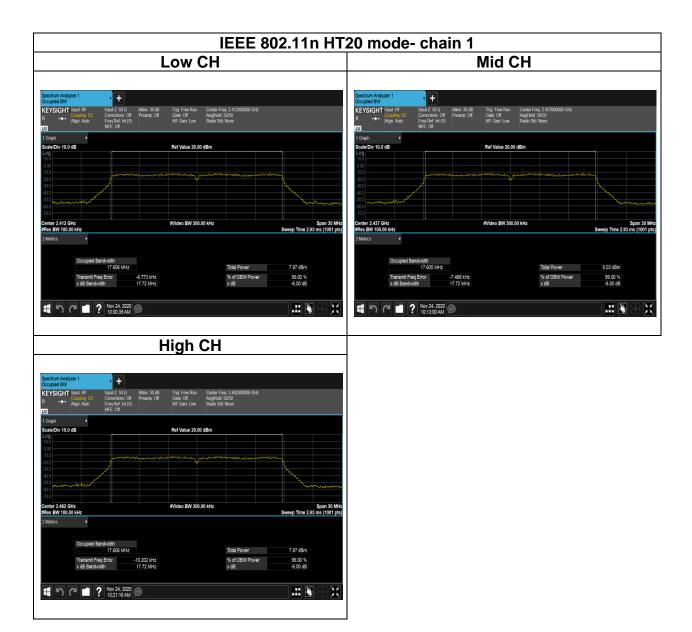


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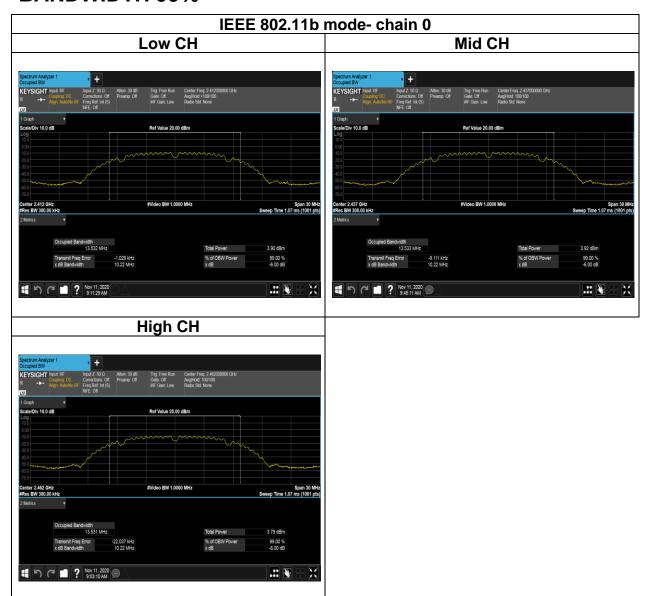




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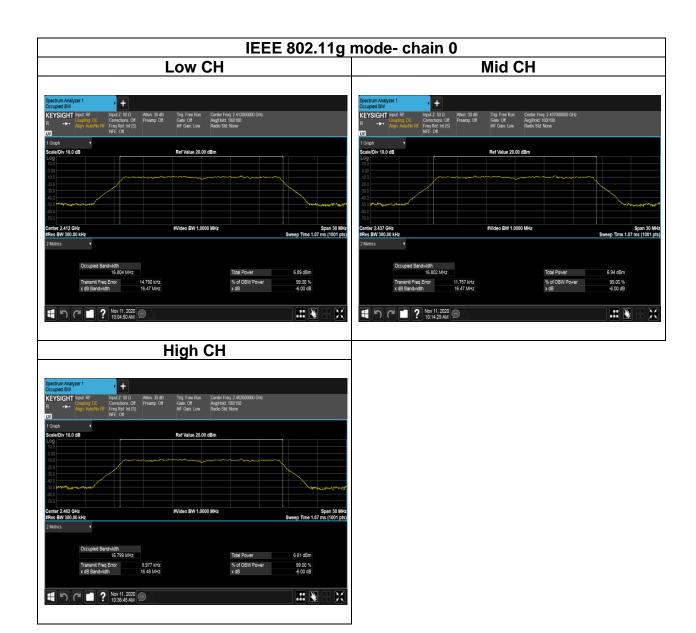
Test Data

BANDWIDTH 99%



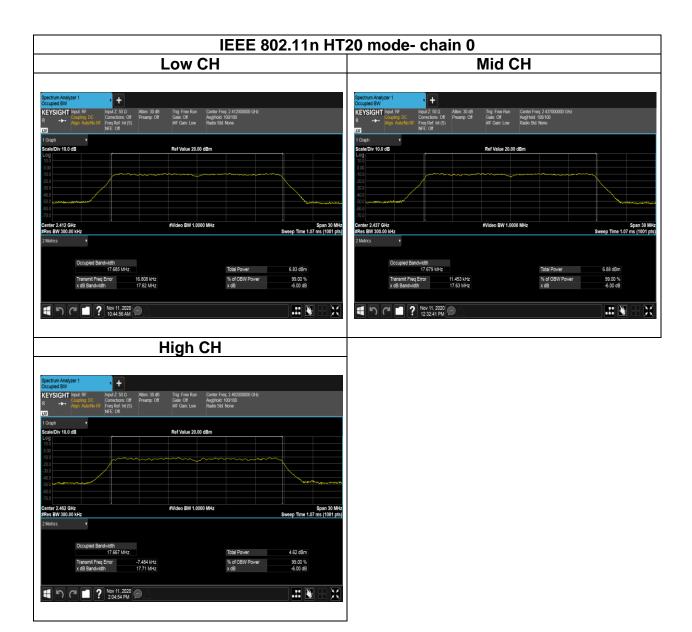


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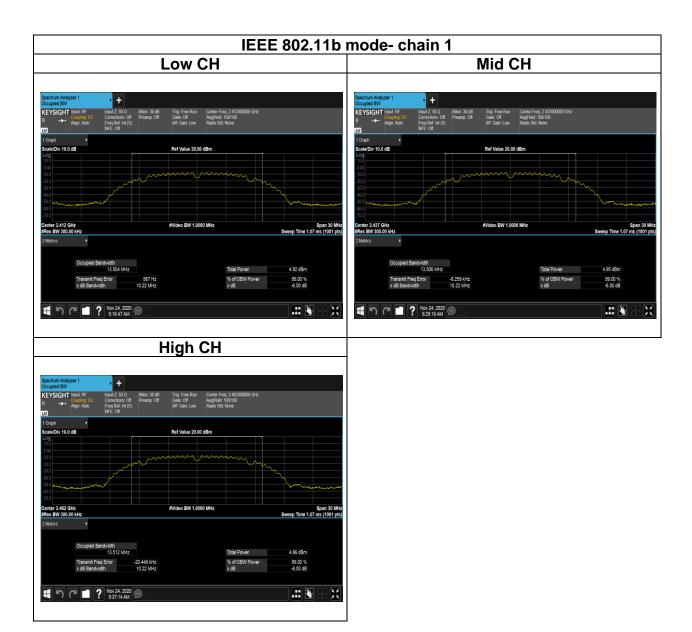


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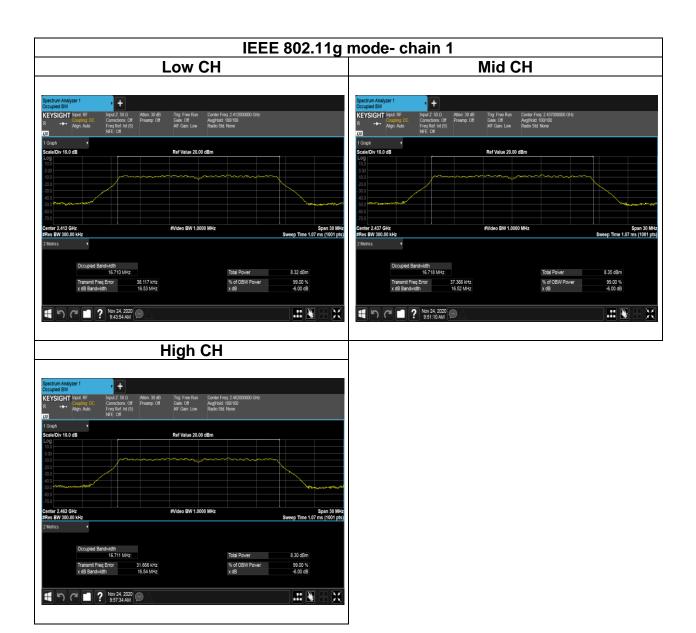


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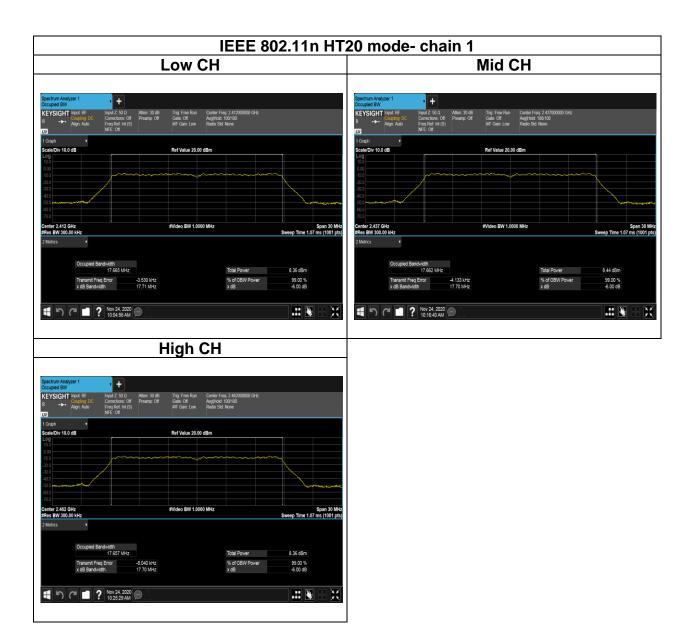


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4.3 OUTPUT POWER MEASUREMENT

4.3.1 Test Limit

According to §15.247(b),

Peak output power:

For systems using digital modulation in the 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt(30 dBm) and the e.i.r.p. shall not exceed 4Watt(36 dBm), base on the use of antennas with directional gain not exceed 6 dBi If transmitting antennas of directional gain greater than 6dBi are used the peak output power the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

Limit	 ✓ Antenna not exceed 6 dBi : 30dBm ✓ Antenna with DG greater than 6 dBi : [Limit = 30 - (DG - 6)] ✓ Point-to-point operation :

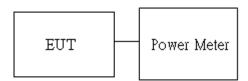
Average output power: For reporting purposes only.

4.3.2 Test Procedure

Test method Refer as ANSI C63.10:2013.

- 1. The EUT RF output connected to the power meter by RF cable.
- 2. Setting maximum power transmit of EUT.
- 3. The path loss was compensated to the results for each measurement.
- 4. Measure and record the result of Peak output power and Average output power. in the test report.

4.3.3 Test Setup





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4.3.4 Test Result

Temperature: 25.9°C **Humidity**: 50% RH

Tested by: Rick Lee Test date: November 24, 2020

Peak output power:

can output power										
Wifi 2.4G										
Config	CH Freq		power set Freq.			ower Bm)	PK Total Power	PK Total Power	DG	Limit
comig	011	(MHz)	Chain 0	Chain 1	Chain 0	Chain 1	(dBm)	(W)	(dBi)	(dBm)
IEEE	Low	2412	10	10	14.52	14.50	17.52	0.0565		
802.11b Data rate: 1Mbps	Mid	2437	10	10	14.49	14.46	17.49	0.0561		
	High	2462	10	10	14.42	14.46	17.45	0.0556		
IEEE	Low	2412	10	10	22.62	22.53	25.59	0.3622		
802.11g Data rate:	Mid	2437	10	10	21.76	21.71	24.75	0.2985	2.59	30
6Mbps	High	2462	10	10	21.62	21.59	24.62	0.2897		
IEEE 802.11n HT20 Data rate: MCS8	Low	2412	11	11	20.49	20.37	23.44	0.2208		
	Mid	2437	11	11	20.56	20.34	23.46	0.2218		
	High	2462	11	11	20.47	20.39	23.44	0.2208		

Average output power:

Wifi 2.4G								
Config	СН	Freq.	Power	AV P	ower	AV Total Power		
Coming	Cli	(MHz)	Setting	Chain 0	Chain 1	(dBm)		
IEEE	Low	2412	10	11.83	11.79	14.82		
802.11b Data rate:	Mid	2437	10	11.79	11.71	14.76		
1Mbps	High	2462	10	11.72	11.68	14.71		
IEEE	Low	2412	10	11.83	11.79	14.82		
802.11g Data rate:	Mid	2437	10	11.58	11.53	14.57		
6Mbps	High	2462	10	11.54	11.52	14.54		
IEEE 802.11n HT20	Low	2412	11	10.96	10.84	13.91		
	Mid	2437	11	10.86	10.72	13.80		
Data rate: MCS8	High	2462	11	10.89	10.83	13.87		



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4.4 POWER SPECTRAL DENSITY

4.4.1 Test Limit

According to §15.247(e),

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

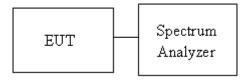
	Antenna not exceed 6 dBi : 8dBm Antenna with DG greater than 6 dBi :
Limit	

4.4.2 Test Procedure

Test method Refer as ANSI C63.10:2013,

- 1. The EUT RF output connected to the spectrum analyzer by RF cable.
- 2. Setting maximum power transmit of EUT
- 3. SA set RBW = 3kHz, VBW = 30kHz, Span = 1.5 times DTS Bandwidth (6 dB BW), Detector = Peak, Sweep Time = Auto and Trace = Max hold.
- 4. The path loss and Duty Factor were compensated to the results for each measurement by SA.
- 5. Mark the maximum level.
- 6. Measure and record the result of power spectral density. in the test report.

4.4.3 Test Setup





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4.4.4 Test Result

Chain 0:

Temperature: 24.7°C **Humidity:** 55.5% RH

Tested by: Rick Lee **Test date:** November 11, 2020

Chain 1:

Temperature: 25.9°C **Humidity:** 50% RH

Tested by: Rick Lee Test date: November 24, 2020

Test mode: IEEE 802.11b mode / 2412-2462 MHz							
Channel	Frequency (MHz) Chain 0 PPSD PPSD PPSD PPSD (dBm) Chain 1 PPSD PPSD (dBm) Limit (dBm)						
Low	2412	-18.46	-18.50	-15.47			
Mid	2437	-18.48	-18.52	-15.49	8		
High	2462	-18.62	-18.68	-15.64			

	Test mode: IEEE 802.11g mode / 2412-2462 MHz							
Channel	Frequency (MHz)							
Low	2412	-16.49	-16.49	-13.48				
Mid	2437	-16.68	-16.56	-13.61	8			
High	2462	-16.75	-16.80	-13.76				

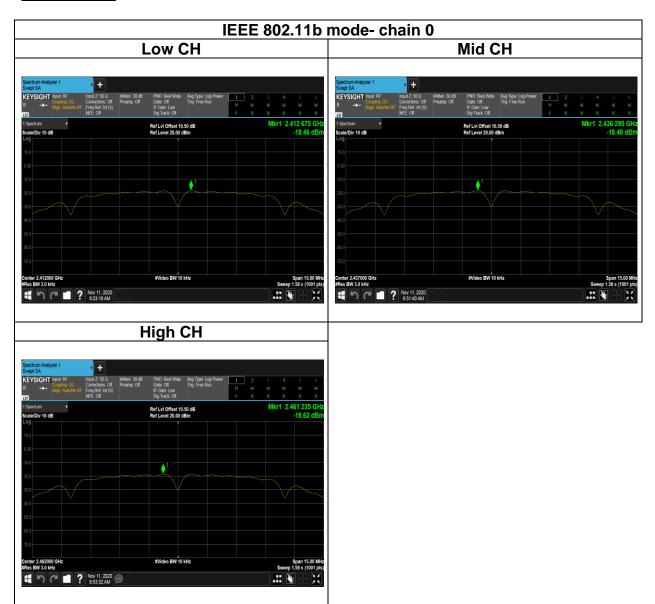
1	Test mode: IEEE 802.11n HT 20 MHz mode / 2412-2462 MHz							
Channel	Frequency (MHz)							
Low	2412	-17.12	-17.27	-14.18				
Mid	2437	-17.25	-17.13	-14.18	8			
High	2462	-16.82	-17.46	-14.12				



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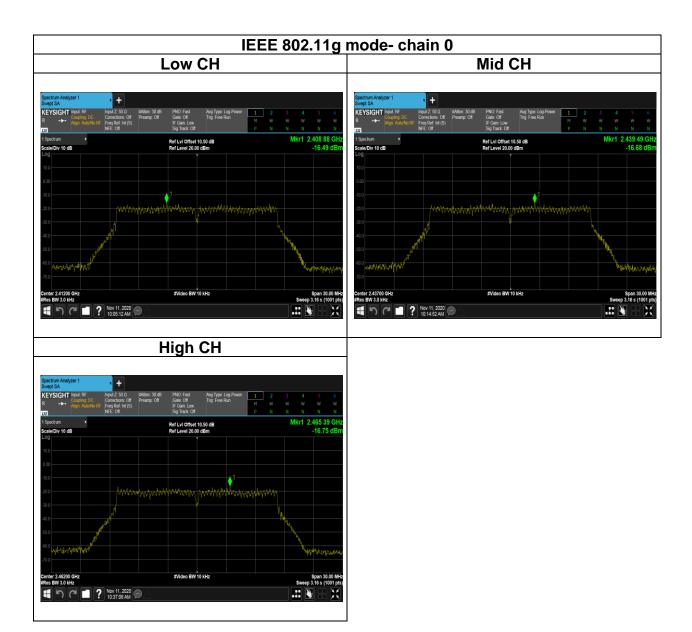
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Test Data



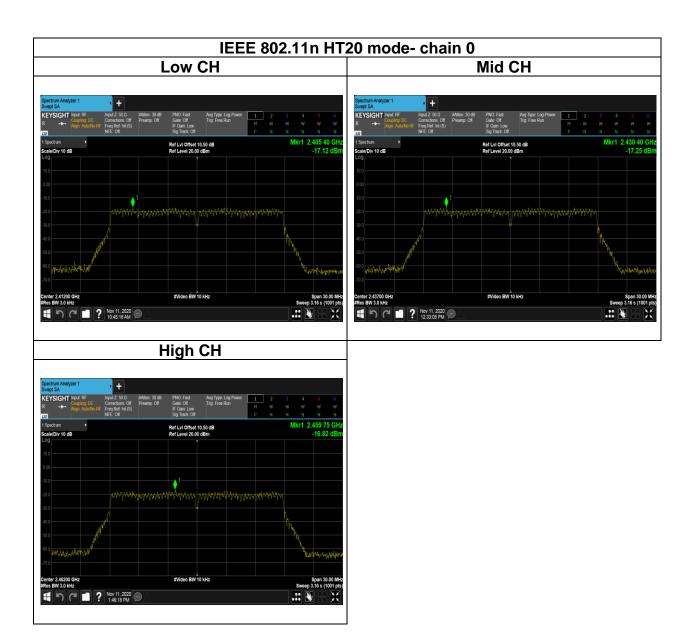


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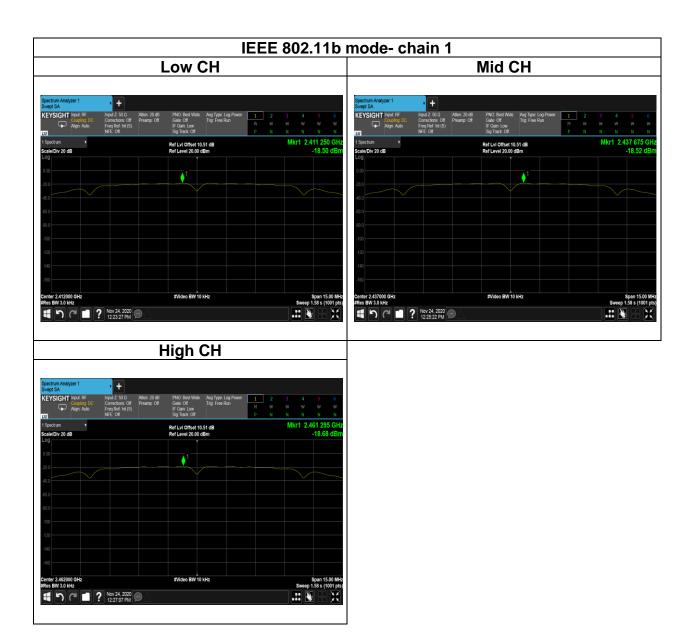


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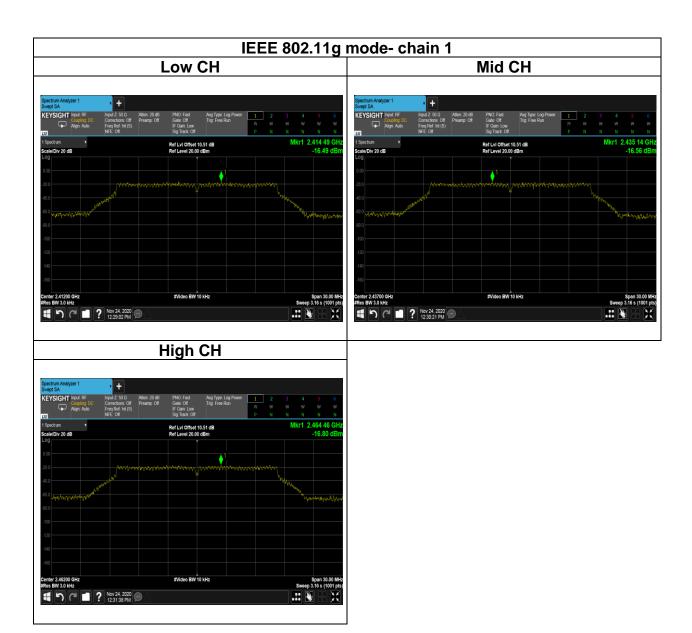


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