FCC CFR47 PART 15 SUBPART C

DTS Wireless LAN

CERTIFICATION TEST REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC

MODEL NUMBER : SM-G889A

FCC ID: A3LSMG889A

REPORT NUMBER: 4788768228-E2V2

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ACCREDITED
Testing Laboratory

TL-637

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	04/26/19	Initial issue	Junwhan Lee
V2	06/20/19	Updated to address TCB's question	Junwhan Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SAMSUNG ELECTRONICS CO., LTD.
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC
MODEL NUMBER:	SM-G889A
SERIAL NUMBER:	R38M109WB4F, R38M109WC2T (RADIATED); R38KC03K3LM (CONDUCTED)
DATE TESTED:	DEC 10, 2018 - APR 03, 2019

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart C	Pass

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:

SungGil Park
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:

Junwhan Lee
Suwon Lab Engineer
UL Korea, Ltd.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with following methods.

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 15.247 Meas Guidance v05r01.
4. ANSI C63.10-2013.
5. KDB 662911 D01 v02r01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro
☒ Chamber 1
☒ Chamber 2
☐ Chamber 3

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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. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	2.32 dB
Radiated Disturbance, Below 1GHz	3.86 dB
Radiated Disturbance, Above 1 GHz	5.97 dB

Uncertainty figures are valid to a confidence level of 95%.

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n/ac, ANT+ and NFC.
This test report addresses the DTS (WLAN) operational mode.

WiFi MIMO Condition

Frequency	Mode	Antenna 1	Antenna 2
2.4GHz	802.11g	TX / RX	TX / RX
	802.11g MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
5 GHz	802.11a	TX / RX	TX / RX
	802.11a MIMO	TX / RX	TX / RX
	802.11n	TX / RX	TX / RX
	802.11n MIMO	TX / RX	TX / RX
	802.11ac	TX / RX	TX / RX
	802.11ac MIMO	TX / RX	TX / RX

Simultaneous TX Condition

Frequency	Supported	Comments
2.4 GHz Antenna 1 + 5 GHz Antenna 2	No	
2.4 GHz Antenna 2 + 5 GHz Antenna 1	No	
2.4 GHz Antenna 1 + 5 GHz Antenna 1	No	
2.4 GHz Antenna 2 + 5 GHz Antenna 2	No	
2.4 GHz Antenna 1 + 5 GHz MIMO	Yes	802.11b Tx + 5GHz MIMO
2.4 GHz Antenna 2 + 5 GHz MIMO	Yes	802.11b Tx + 5GHz MIMO
2.4 GHz MIMO + 5 GHz Antenna 1	No	
2.4 GHz MIMO + 5 GHz Antenna 2	No	
2.4 GHz MIMO + 5 GHz MIMO	Yes	RSDB MIMO
2.4 GHz Bluetooth Antenna 2 + 5 GHz MIMO	Yes	

Spurious Emissions for Simultaneous Transmission results were reported on the UNII test report(4788768228-E5) section 11.5.

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5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		Antenna1	Antenna2	Antenna1	Antenna2
2412 - 2462	802.11b	18.91	19.06	77.80	80.54
	802.11g MIMO	17.75	17.61	59.57	57.68
		20.69		117.22	
	802.11n20 MIMO	16.61	16.24	45.81	42.07
		19.43		87.70	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an internal antennas, with antenna1's maximum gain of -3.88 dBi and antenna2's maximum gain of -3.94 dBi.

5.4. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/High Channels.

For ANT2 and MIMO, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Y it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

For ANT1, the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Y orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Y orientation.

Based on the baseline scan, the worst-case data rates were:

802.11b mode: 1 Mbps
802.11g mode: 6 Mbps
802.11n HT20 mode: MCS0

Note : All radiated and power line conducted tests were performed connected with charger for evaluation of worst case mode.

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5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA300	R37K7EC7HL3SE3	N/A
Data Cable	SAMSUNG	EP-DN930CWE	N/A	N/A
Earphone	SAMSUNG	GH59-15097A	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.1m	N/A
2	Audio	2	Mini-Jack	Unshielded	1.2m	N/A

TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable DTS mode.

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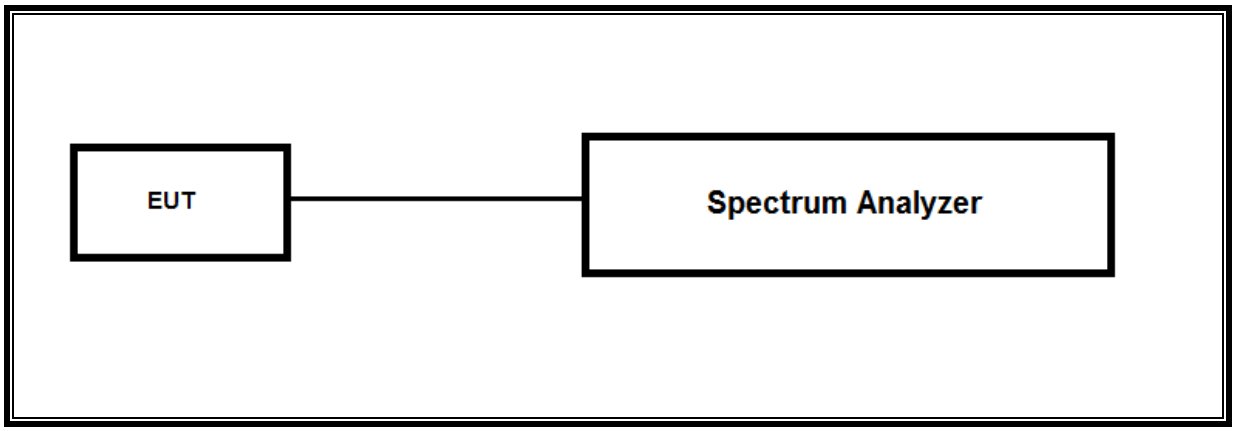
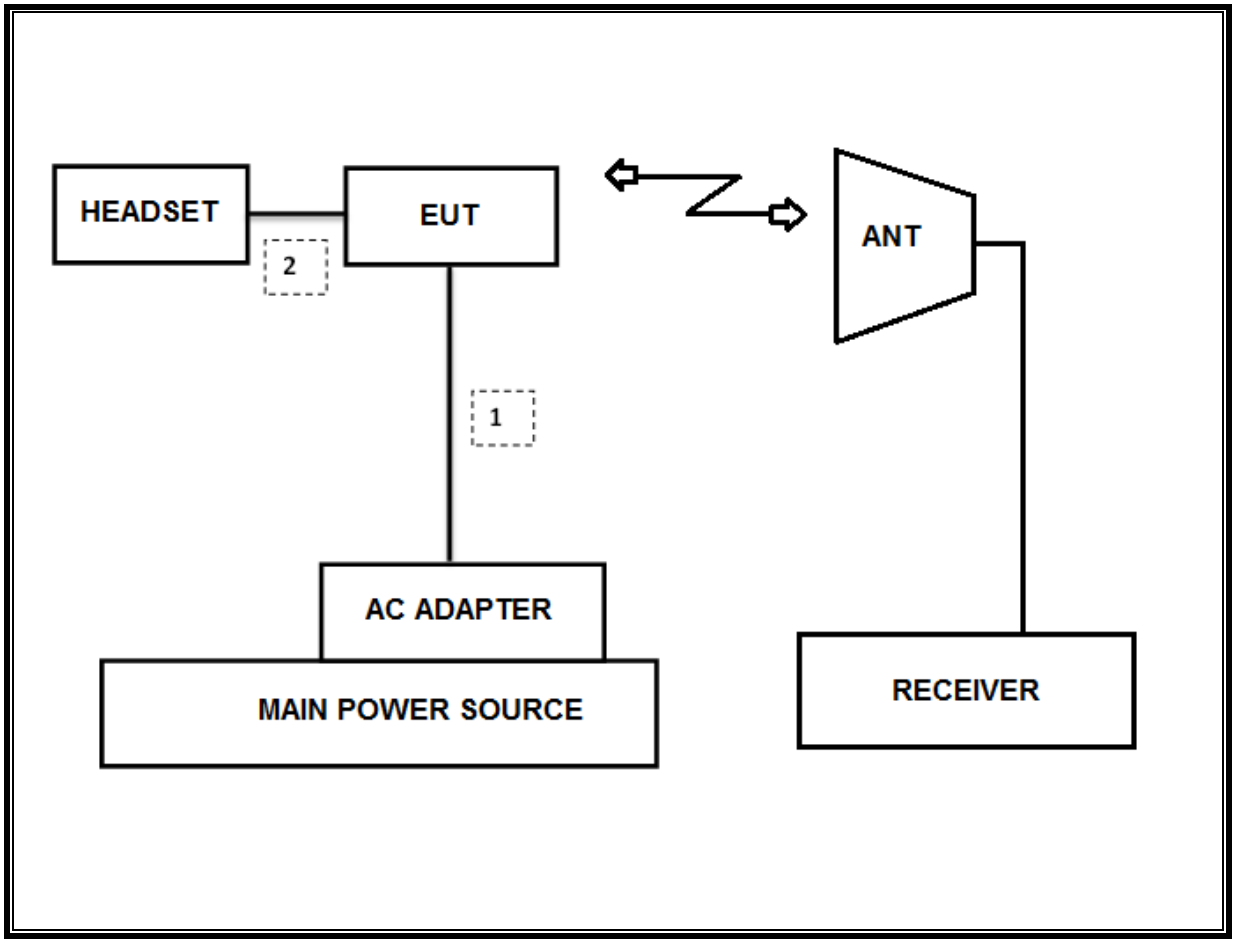
SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



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6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N**	**Cal Due**
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00167211	08-04-20
Antenna, Horn, 18 GHz	ETS	3115	00161451	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	12-04-19
Antenna, Horn, 40 GHz	ETS	3116C-PA	00168841	08-09-19
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-07-19
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-06-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-07-19
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-07-19
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	08-06-19
Spectrum Analyzer, 43.5 GHz	R&S	FSW43	104089	08-06-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	08-07-19
Attenuator	PASTERNACK	PE7087-10	A001	08-08-19
Attenuator	PASTERNACK	PE7087-10	A008	08-08-19
Attenuator	PASTERNACK	PE7004-10	2	08-07-19
Attenuator	PASTERNACK	PE7087-10	A009	08-08-19
EMI Test Receive, 40 GHz	R&S	ESU40	100439	08-06-19
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-19
EMI Test Receive, 44 GHz	R&S	ESW44	101590	08-06-19
EMI Test Receive, 3 GHz	R&S	ESR3	101832	08-06-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	08-07-19
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	020	08-06-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	08-07-19
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	08-06-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	08-07-19
High Pass Filter 6GHz	Micro-Tronics	HPS17542	021	08-06-19
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-26-19
LISN	R&S	ENV-216	101837	08-09-19

UL Software			
Description	**Manufacturer**	**Model**	**Version**
Radiated software	UL	UL EMC	Ver 9.5
AC Line Conducted software	UL	UL EMC	Ver 9.5

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7. REFERENCE MEASUREMENT RESULTS

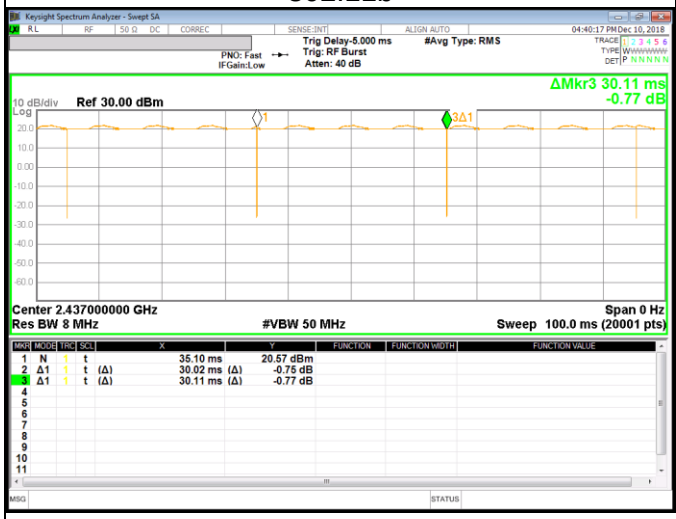
7.1. ON TIME AND DUTY CYCLE RESULTS

LIMITS

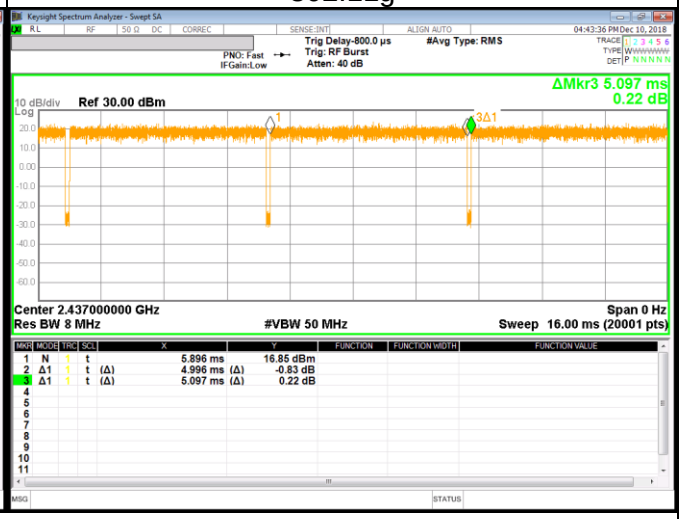
None; for reporting purposes only.

Mode	On Time B [mS]	Period [mS]	Duty Cycle X [linear]	Duty Cycle X [%]	Duty Cycle Correction Factor [dB]
802.11b	30.020	30.110	0.99701096	99.70109598	0
802.11g	4.996	5.097	0.980184422	98.01844222	0
802.11n HT20	4.627	4.728	0.978637902	97.86379019	0.093779684

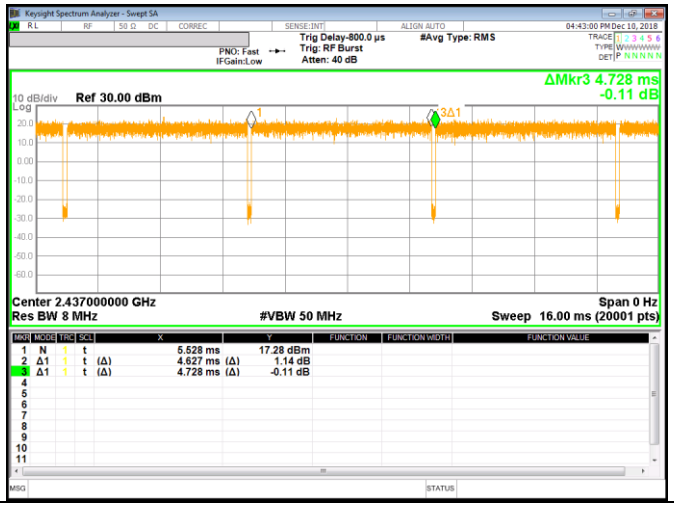
802.11b



802.11g



802.11n



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8. MEASUREMENT METHODS

6 dB BW : KDB 558074 D01 v05r01, Section 8.2.

OUTPUT POWER : KDB 558074 D01 v05r01, Section 8.3.2.3.

POWER SPECTRAL DENSITY : KDB 558074 D01 v05r01, Section 8.4.

Out-of-band EMISSIONS (Conducted) : KDB 558074 D01 v05r01, Section 8.5, 8.7.

Out-of-band EMISSIONS IN NON-RESTRICTED BANDS: KDB 558074 D01 v05r01, Section 8.5.

Out-of-band EMISSIONS IN RESTRICTED BANDS : KDB 558074 D01 v05r01, Section 8.6.

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2.

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9. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Band width (6dB)	>500KHz	Conducted	Pass
2.1051, 15.247 (d)	Band Edge / Conducted Spurious Emission	-30dBc		Pass
15.247 (b)(3)	TX conducted output power	<30dBm		Pass
15.247 (e)	PSD	<8dBm		Pass
15.207 (a)	AC Power Line conducted emissions	Section 10	Power Line conducted	Pass
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m	Radiated	Pass

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10. ANTENNA PORT TEST RESULTS

10.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to100KHz, the VBW >= 3 x RBW, peak detector and max hold.

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RESULTS

10.1.1. 802.11b MODE IN THE 2.4 GHz BAND

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	Low	2412	7.513	0.5
	Mid	2437	7.998	0.5
	High	2462	7.069	0.5
	Worst		**7.069**	0.5
2	Low	2412	7.542	0.5
	Mid	2437	8.012	0.5
	High	2462	7.076	0.5
	Worst		**7.076**	0.5

10.1.2. 802.11g MODE IN THE 2.4 GHz BAND

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	1	2412	15.38	0.5
	2	2417	15.77	0.5
	3	2422	15.78	0.5
	4	2427	15.79	0.5
	6	2437	15.65	0.5
	8	2447	15.64	0.5
	9	2452	15.79	0.5
	10	2457	16.03	0.5
	11	2462	16.01	0.5
	Worst		**15.38**	0.5
2	1	2412	15.71	0.5
	2	2417	15.98	0.5
	3	2422	15.30	0.5
	4	2427	15.46	0.5
	6	2437	15.67	0.5
	8	2447	15.64	0.5
	9	2452	15.14	0.5
	10	2457	15.70	0.5
	11	2462	15.46	0.5
	Worst		**15.14**	0.5

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10.1.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

ANTENNA	Channel	Frequency [MHz]	6 dB Bandwidth [MHz]	Minimum Limit [MHz]
1	1	2412	15.93	0.5
	2	2417	16.02	0.5
	3	2422	16.28	0.5
	6	2437	15.90	0.5
	9	2452	15.38	0.5
	10	2457	15.65	0.5
	11	2462	16.09	0.5
	Worst		**15.38**	0.5
2	1	2412	16.05	0.5
	2	2417	15.97	0.5
	3	2422	15.34	0.5
	6	2437	16.52	0.5
	9	2452	16.13	0.5
	10	2457	16.10	0.5
	11	2462	16.11	0.5
	Worst		**15.34**	0.5

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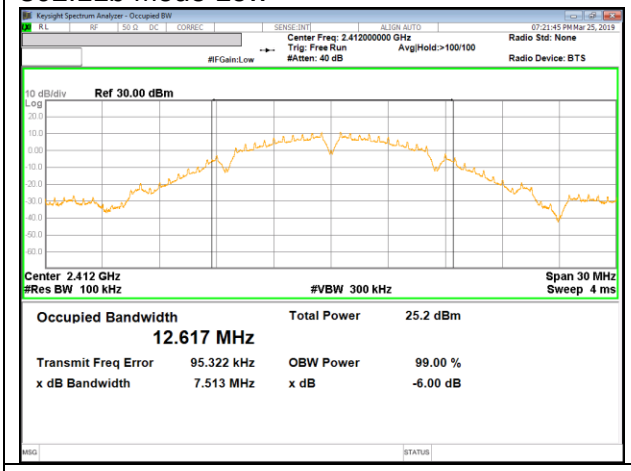
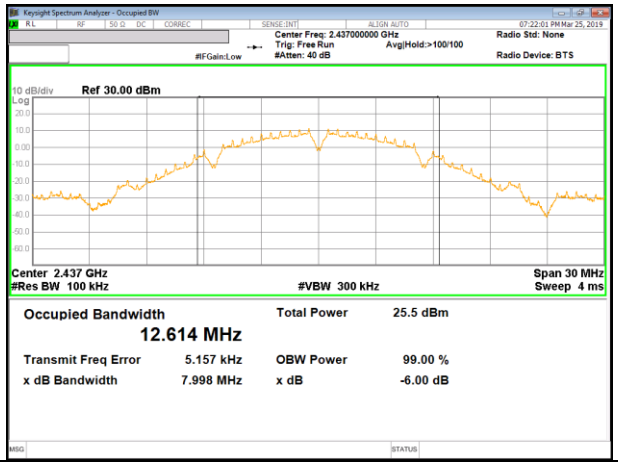
10.1.4. 6 dB BANDWIDTH PLOTS

1TX_ANTENNA 1

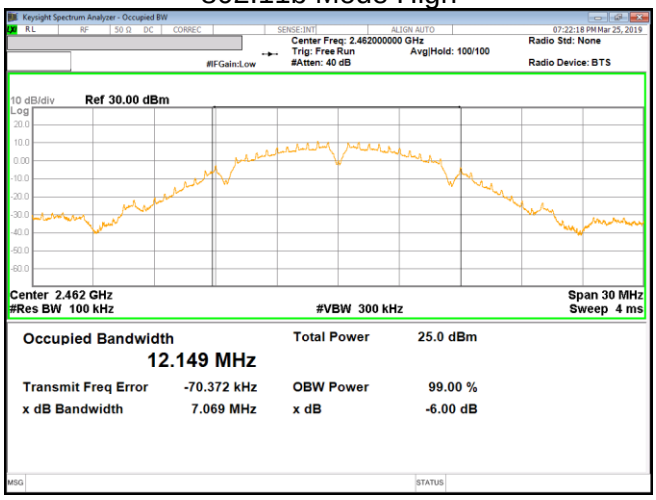
802.11b Mode Low



802.11b Mode Mid



802.11b Mode High



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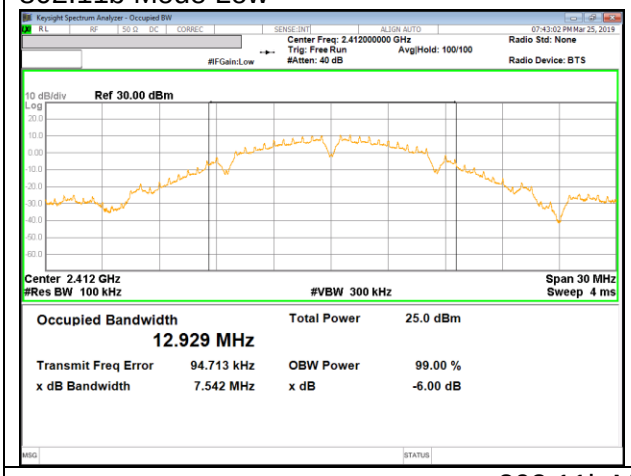
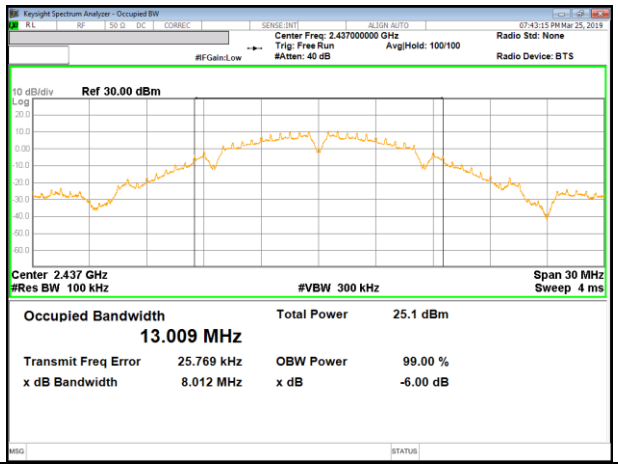
1TX_ANTENNA 2

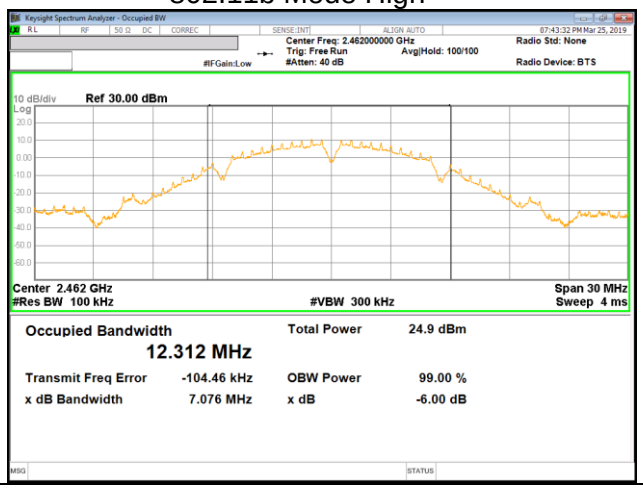
802.11b Mode Low



802.11b Mode Mid



802.11b Mode High



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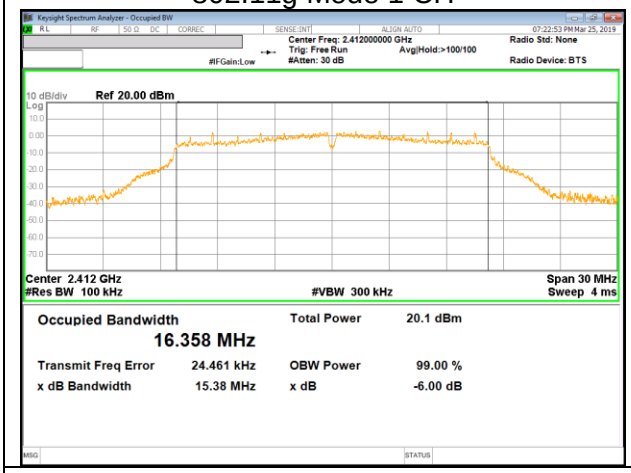
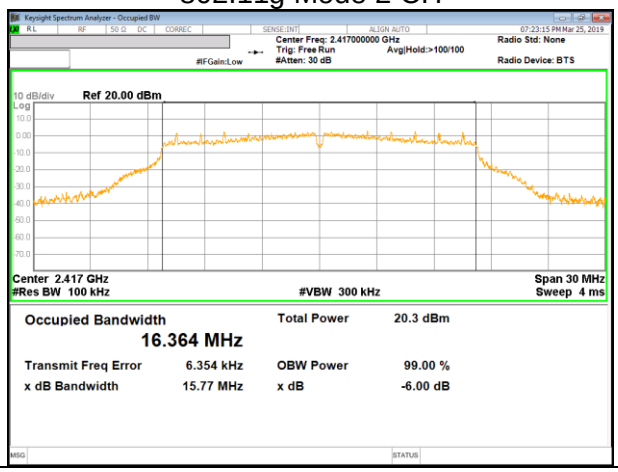
1TX_ANTENNA 1

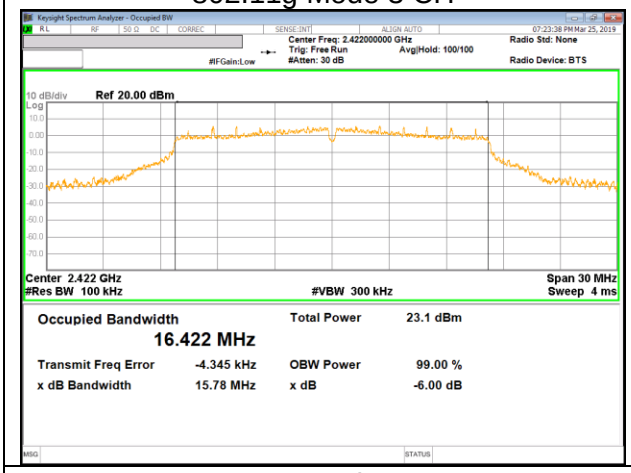
802.11g Mode 1 CH



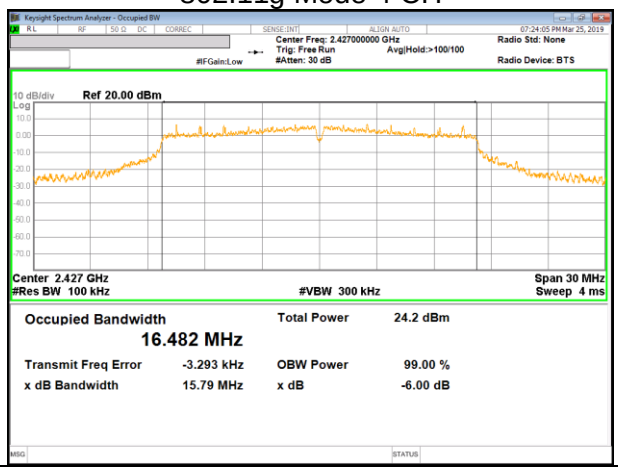
802.11g Mode 2 CH



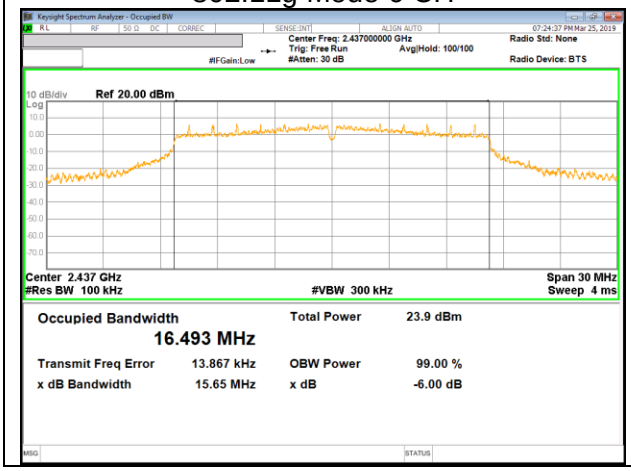
802.11g Mode 3 CH



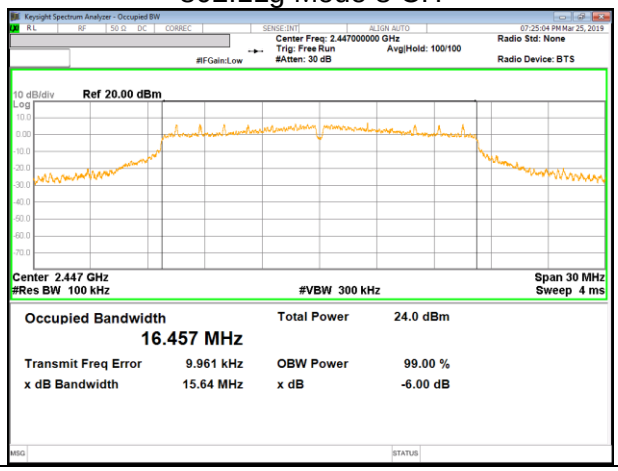
802.11g Mode 4 CH



802.11g Mode 6 CH



802.11g Mode 8 CH



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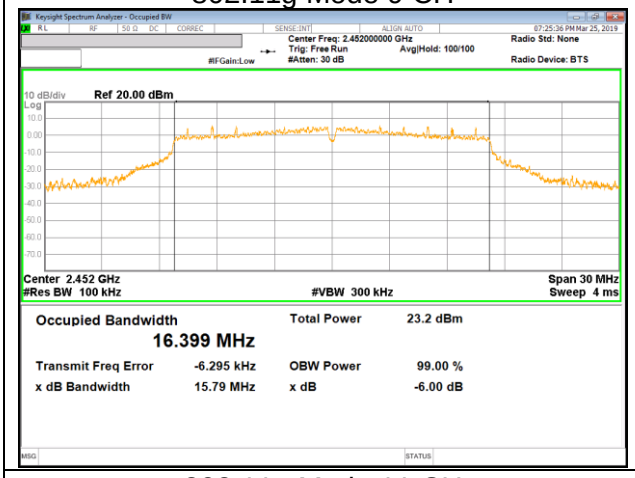
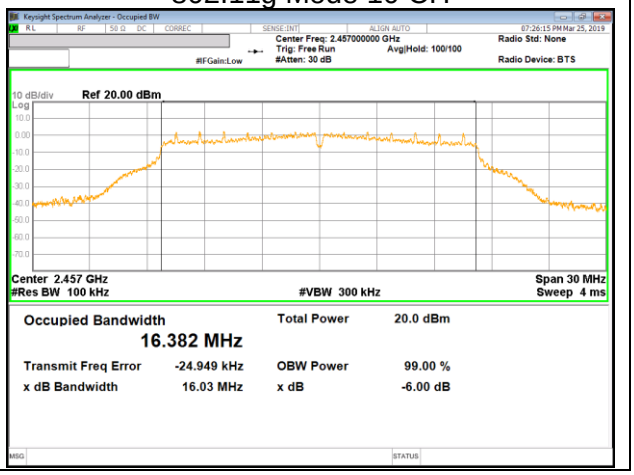
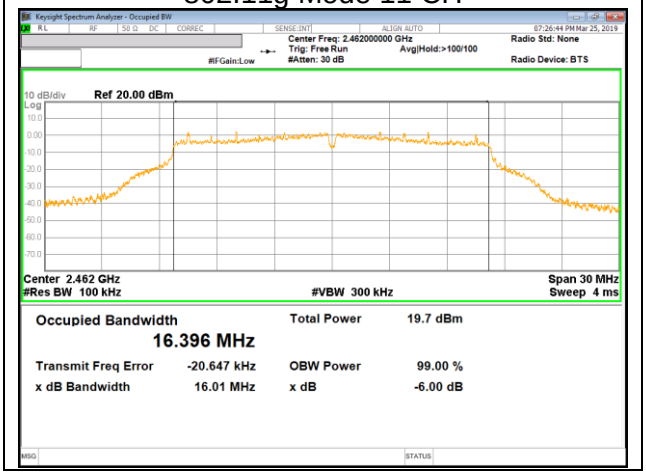
802.11g Mode 9 CH



802.11g Mode 10 CH



802.11g Mode 11 CH



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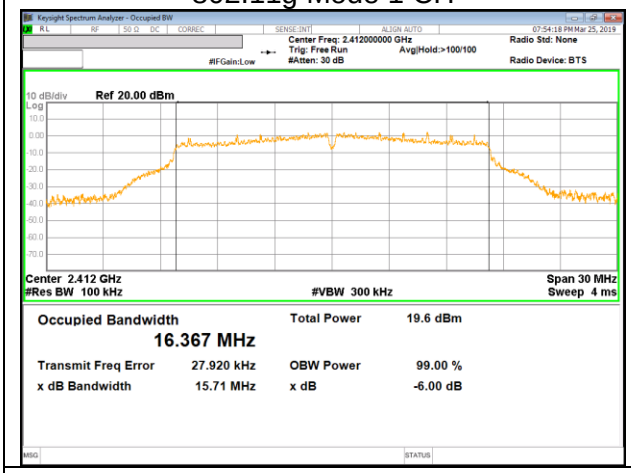
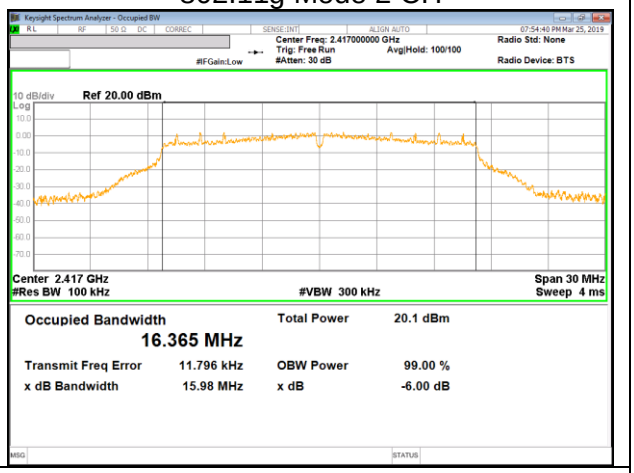
1TX_ANTENNA 2

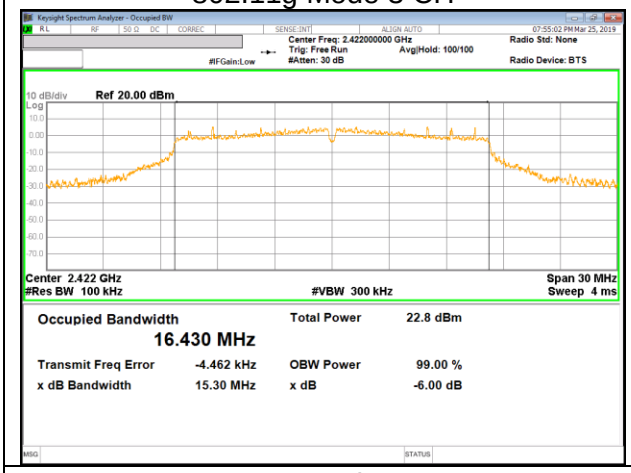
802.11g Mode 1 CH



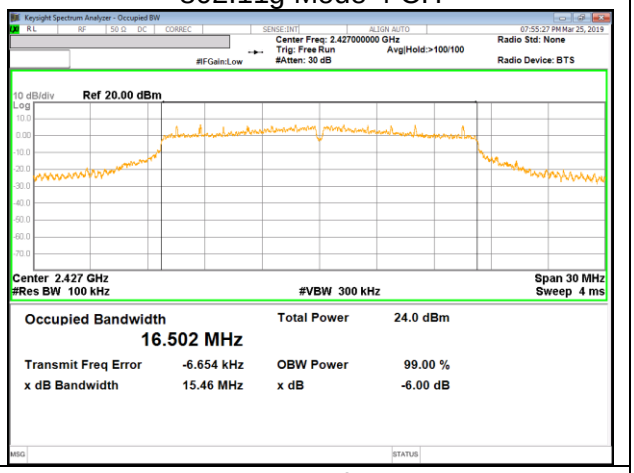
802.11g Mode 2 CH



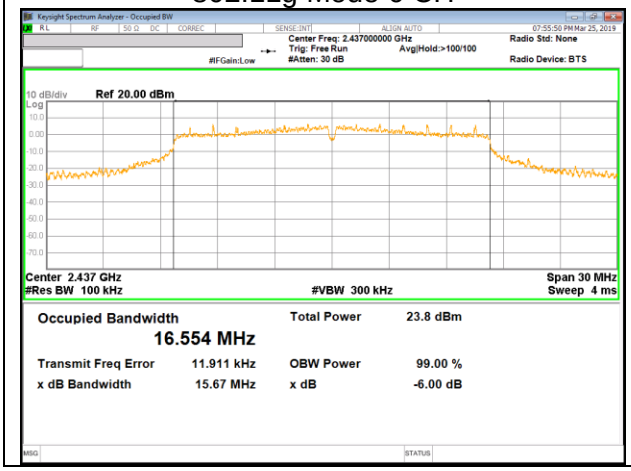
802.11g Mode 3 CH



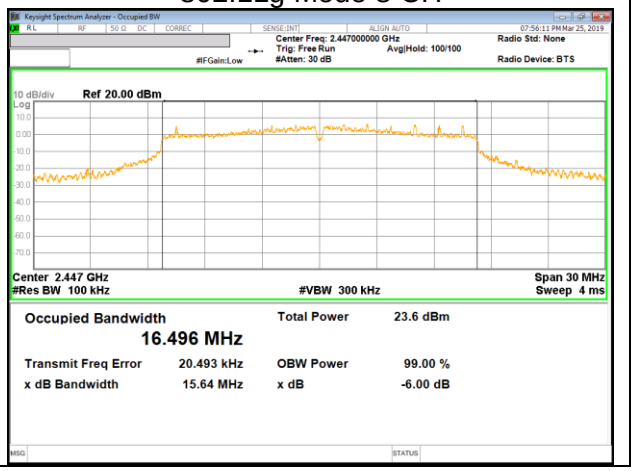
802.11g Mode 4 CH



802.11g Mode 6 CH



802.11g Mode 8 CH



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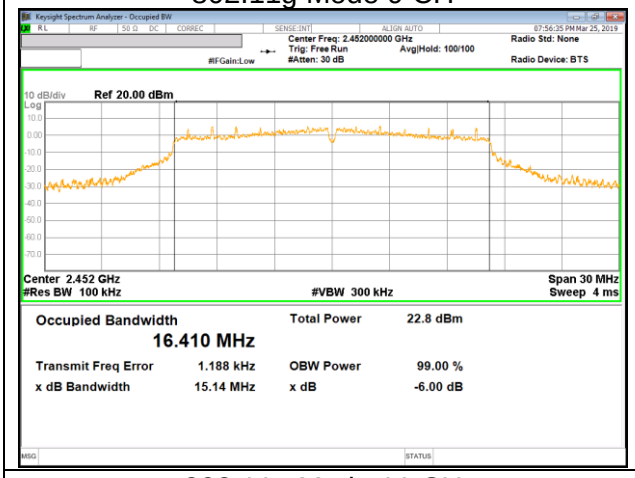
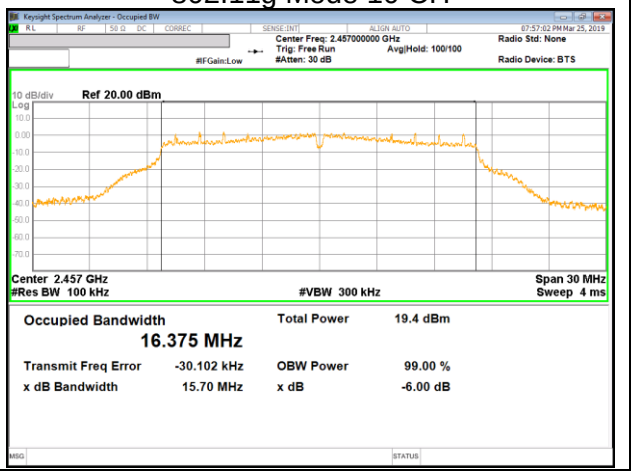
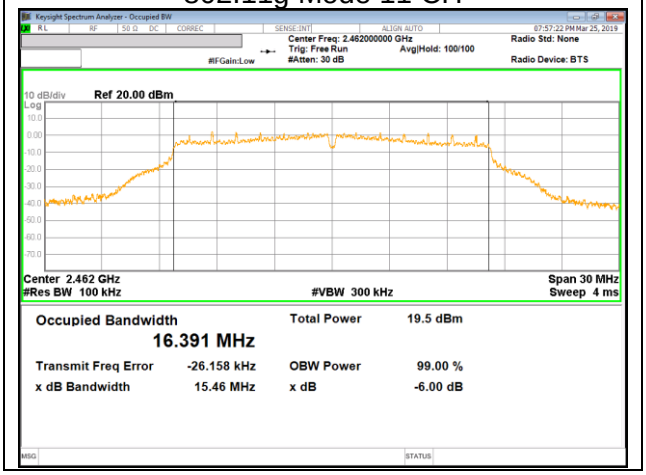
802.11g Mode 9 CH



802.11g Mode 10 CH



802.11g Mode 11 CH



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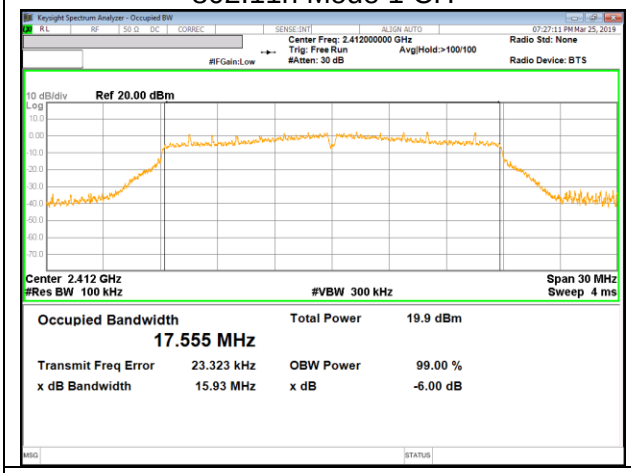
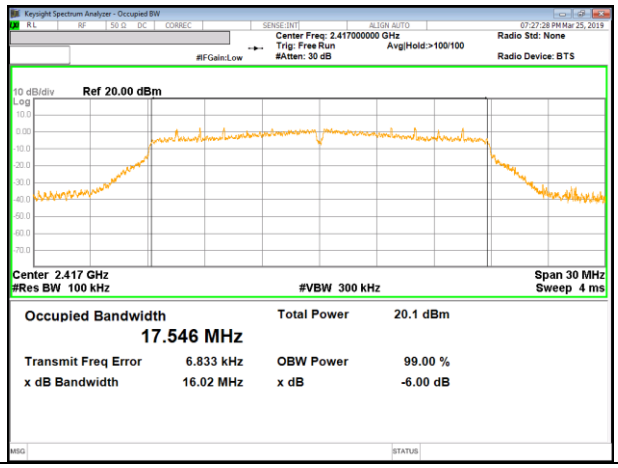
1TX_ANTENNA 1

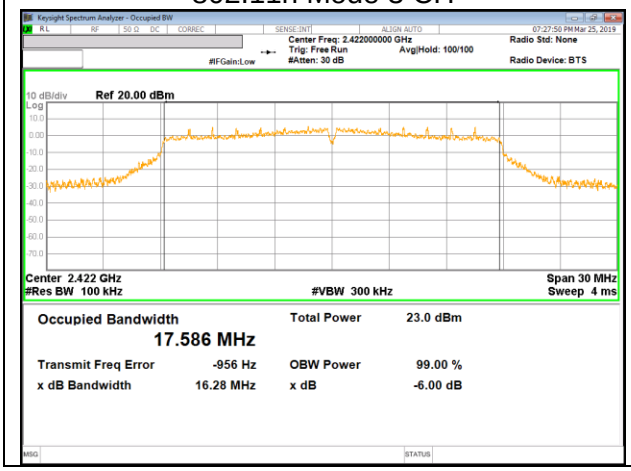
802.11n Mode 1 CH



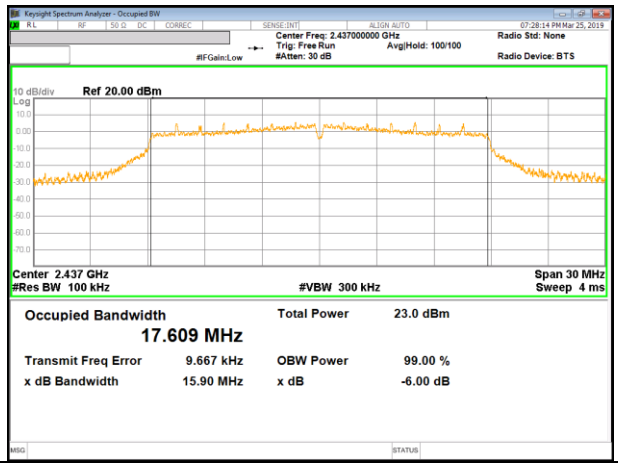
802.11n Mode 2 CH



802.11n Mode 3 CH



802.11n Mode 6 CH



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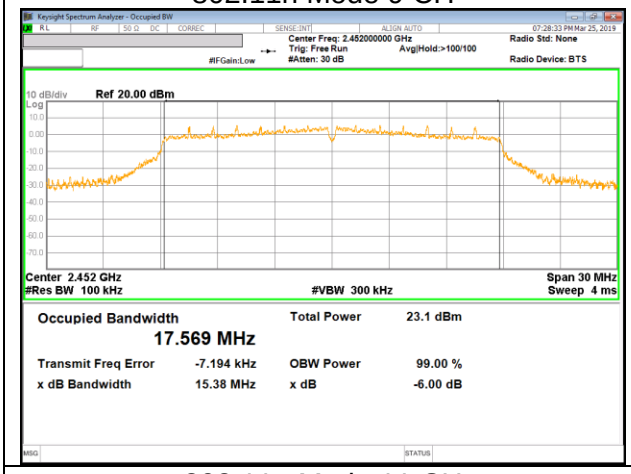
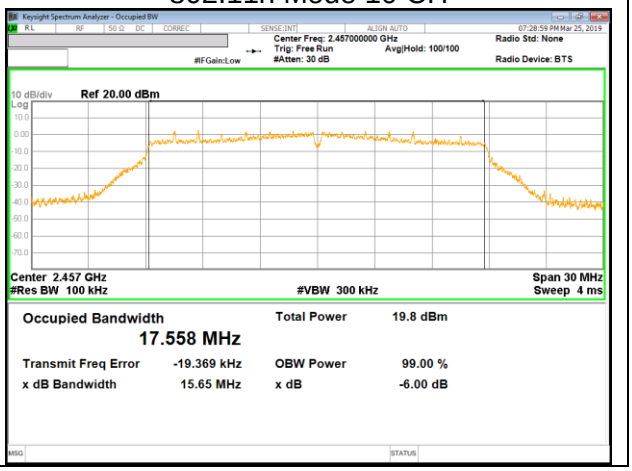
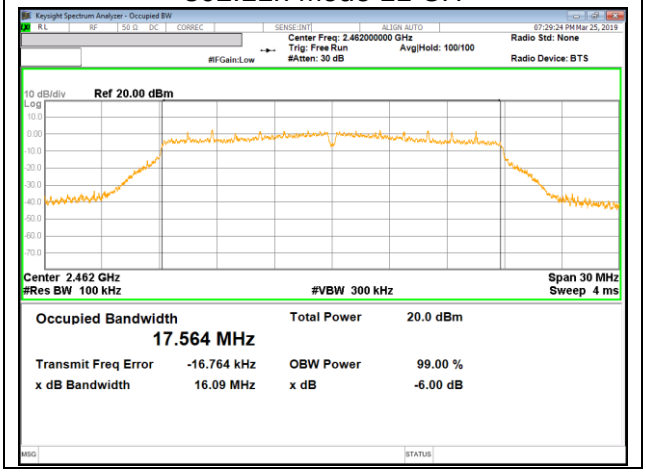
802.11n Mode 9 CH



802.11n Mode 10 CH



802.11n Mode 11 CH



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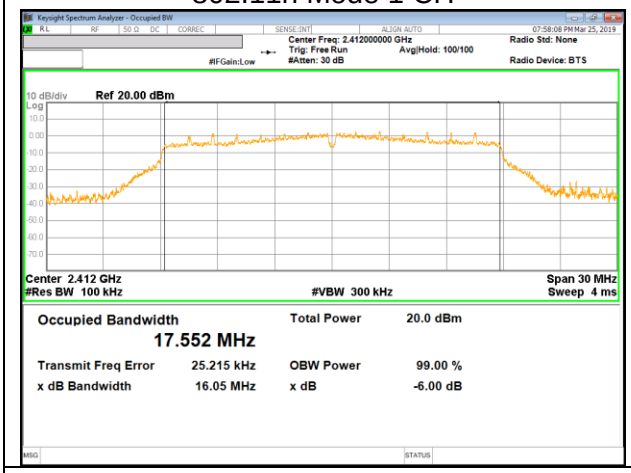
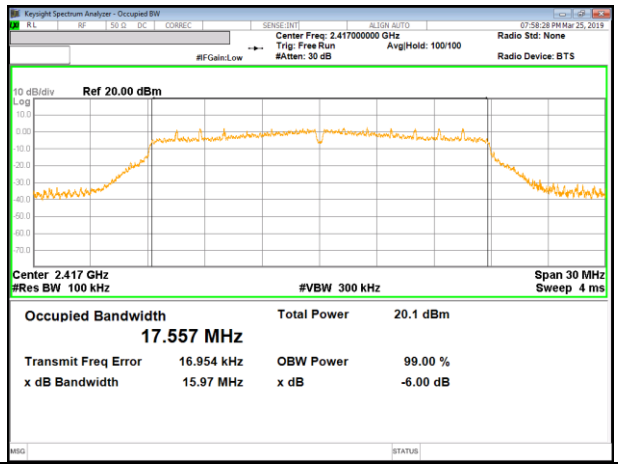
1TX_ANTENNA 2

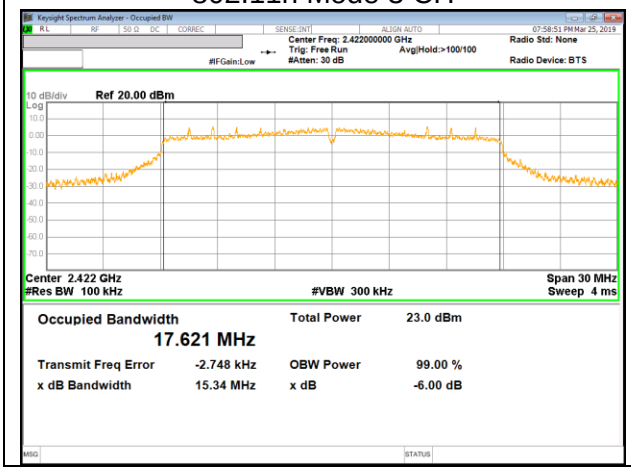
802.11n Mode 1 CH



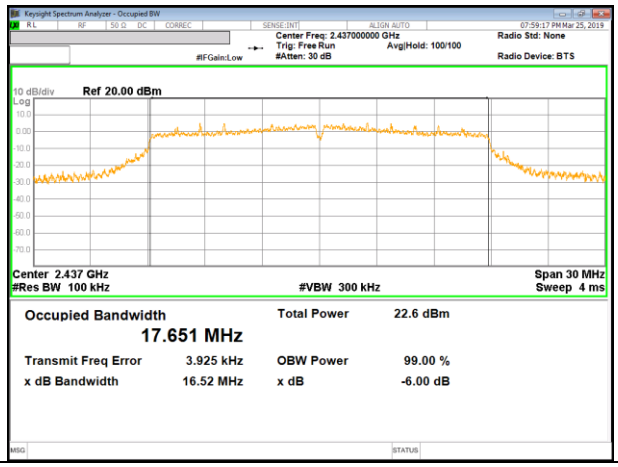
802.11n Mode 2 CH



802.11n Mode 3 CH



802.11n Mode 6 CH



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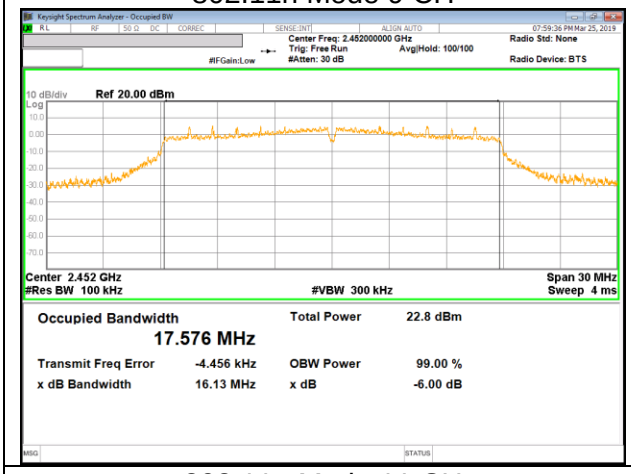
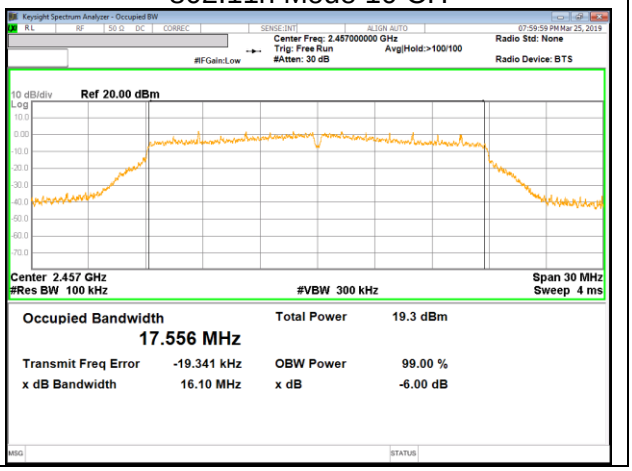
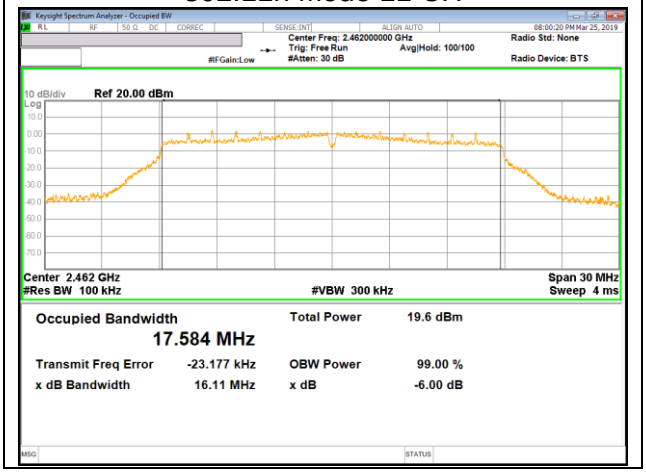
802.11n Mode 9 CH



802.11n Mode 10 CH



802.11n Mode 11 CH



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10.2. OUTPUT POWER

LIMITS

FCC §15.247

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, 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.

TEST PROCEDURE

The transmitter output is connected to a power meter.

The cable assembly insertion loss was entered as an offset in the power meter to allow for direct reading of power.

Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

Duty cycle correction factor is not added to the average output power results for duty cycle factor > 98%. (802.11b, 802.11g mode)

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains.
The directional gain is:

Antenna 1 Gain [dBi]	Antenna 2 Gain [dBi]	Correlated Chains Directional Gain [dBi]
-3.88	-3.94	-0.90

- IEEE 802.11b Mode is not supported MIMO operation. So can’t transmit on two antennas as the same time.

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RESULTS

10.2.1. 802.11b MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain ANTENNA1 [dBi]	Directional Gain ANTENNA2 [dBi]	FCC Power Limit [dBm]	Max Power [dBm]
1	2412	-3.88	-3.94	30.00	30.00
6	2437	-3.88	-3.94	30.00	30.00
11	2462	-3.88	-3.94	30.00	30.00

Duty Cycle CF [dB]	0.00	**Included in Calculations of Corr'd Power**

Results

Channel	Frequency [MHz]	ANTENNA1 Meas Power [dBm]	ANTENNA2 Meas Power [dBm]	Maximum Power [dBm]	Power Limit [dBm]	Margin [dB]
1	2412	18.56	18.51	18.56	30.00	-11.44
6	2437	18.91	19.06	19.06	30.00	-10.94
11	2462	18.41	18.24	18.41	30.00	-11.59
Worst		18.91	19.06	19.06	30.00	-10.94

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10.2.2. 802.11g MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power EIRP Limit [dBm]
1	2412	-0.9	30.00	30.00
2	2417	-0.9	30.00	30.00
3	2422	-0.9	30.00	30.00
4	2427	-0.9	30.00	30.00
6	2437	-0.9	30.00	30.00
8	2447	-0.9	30.00	30.00
9	2452	-0.9	30.00	30.00
10	2457	-0.9	30.00	30.00
11	2462	-0.9	30.00	30.00

Duty Cycle CF [dB]	0.00	Included in Calculations of Corr'd Power

Results

Channel	Frequency [MHz]	ANTENNA1 Meas Power [dBm]	ANTENNA2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
1	2412	13.66	13.34	16.51	30.00	-13.49
2	2417	13.90	13.47	16.70	30.00	-13.30
3	2422	16.73	16.50	19.63	30.00	-10.37
4	2427	17.75	17.61	20.69	30.00	-9.31
6	2437	17.47	17.27	20.38	30.00	-9.62
8	2447	17.43	17.25	20.35	30.00	-9.65
9	2452	16.70	16.42	19.57	30.00	-10.43
10	2457	13.48	12.92	16.22	30.00	-13.78
11	2462	13.45	12.97	16.23	30.00	-13.77
Worst		17.75	17.61	20.69	30.00	-9.31

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10.2.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Limits

Channel	Frequency [MHz]	Directional Gain [dBi]	FCC Power Limit [dBm]	Max Power EIRP Limit [dBm]
1	2412	-0.9	30.00	30.00
2	2417	-0.9	30.00	30.00
3	2422	-0.9	30.00	30.00
6	2437	-0.9	30.00	30.00
9	2452	-0.9	30.00	30.00
10	2457	-0.9	30.00	30.00
11	2462	-0.9	30.00	30.00

Duty Cycle CF [dB]	0.09	**Included in Calculations of Corr'd Power**

Results

Channel	Frequency [MHz]	ANTENNA1 Meas Power [dBm]	ANTENNA2 Meas Power [dBm]	Total Corr'd Power [dBm]	Power Limit [dBm]	Margin [dB]
1	2412	13.47	13.15	16.32	30.00	-13.68
2	2417	13.73	13.31	16.54	30.00	-13.46
3	2422	16.61	16.22	19.43	30.00	-10.57
6	2437	16.35	16.14	19.26	30.00	-10.74
9	2452	16.55	16.24	19.41	30.00	-10.59
10	2457	13.23	12.77	16.02	30.00	-13.98
11	2462	13.27	12.84	16.07	30.00	-13.93
Worst		16.61	16.24	19.43	30.00	-10.57

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10.3. PSD

LIMITS

FCC §15.247

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

Power Spectral Density was performed utilizing the section8.4 under KDB558074 D01 15.247 Meas Guidance.

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RESULTS

10.3.1. 802.11b MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	Antenna 1 [dBm]	Antenna 2 [dBm]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
1	2412	-12.24	-12.52	-12.24	8.00	-20.24
6	2437	-11.98	-12.40	-11.98	8.00	-19.98
11	2462	-12.57	-12.55	-12.55	8.00	-20.55

Duty Cycle CF [dB]	0.00	**Included in Calculations of PPSD**

10.3.2. 802.11g MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	Antenna 1 [dBm]	Antenna 2 [dBm]	Total PSD [dBm]	Limit [dBm]	Margin [dB]
1	2412	-16.39	-16.65	-13.51	8.00	-21.51
2	2417	-16.27	-16.62	-13.43	8.00	-21.43
3	2422	-12.89	-13.82	-10.32	8.00	-18.32
4	2427	-12.40	-13.13	-9.74	8.00	-17.74
6	2437	-12.80	-12.95	-9.86	8.00	-17.86
8	2447	-12.36	-12.95	-9.63	8.00	-17.63
9	2452	-13.35	-13.65	-10.49	8.00	-18.49
10	2457	-16.74	-16.92	-13.82	8.00	-21.82
11	2462	-16.59	-17.37	-13.95	8.00	-21.95

Duty Cycle CF [dB]	0.00	**Included in Calculations of PPSD**

10.3.3. 802.11n HT20 MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	Antenna 1 [dBm]	Antenna 2 [dBm]	Total PSD [dBm]	Limit [dBm]	Margin [dB]
1	2412	-18.37	-18.07	-15.11	8.00	-23.11
2	2417	-18.11	-18.28	-15.09	8.00	-23.09
3	2422	-14.55	-14.97	-11.65	8.00	-19.65
6	2437	-15.52	-15.55	-12.43	8.00	-20.43
9	2452	-14.93	-15.29	-12.00	8.00	-20.00
10	2457	-18.31	-18.81	-15.45	8.00	-23.45
11	2462	-18.53	-18.60	-15.46	8.00	-23.46

Duty Cycle CF [dB]	0.09	**Included in Calculations of PPSD**

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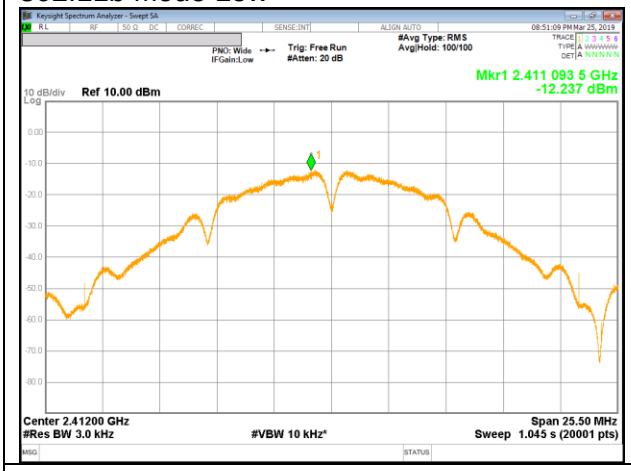
10.3.4. PSD PLOTS

ANTENNA1

802.11b Mode Low



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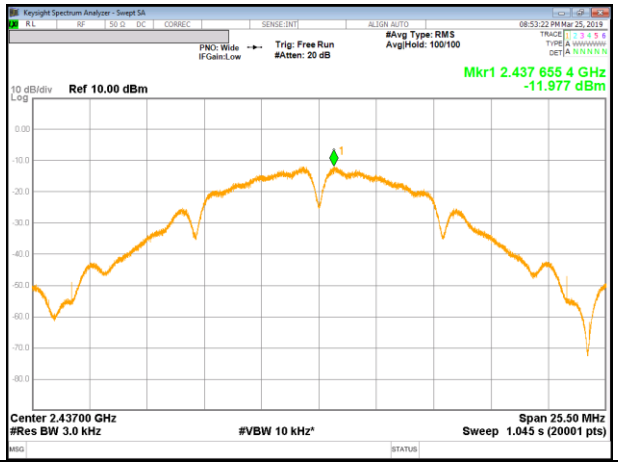

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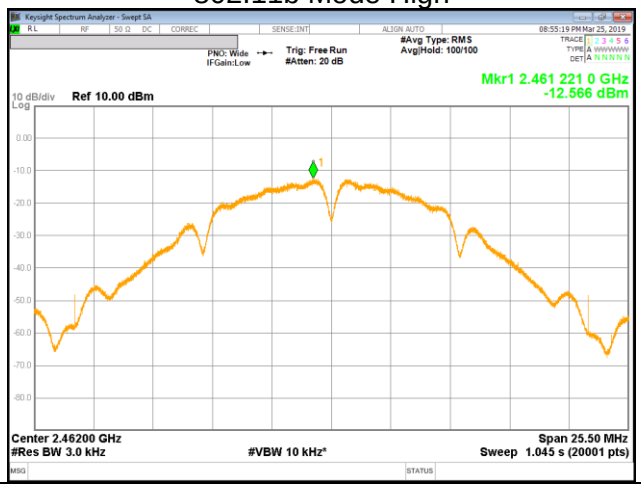

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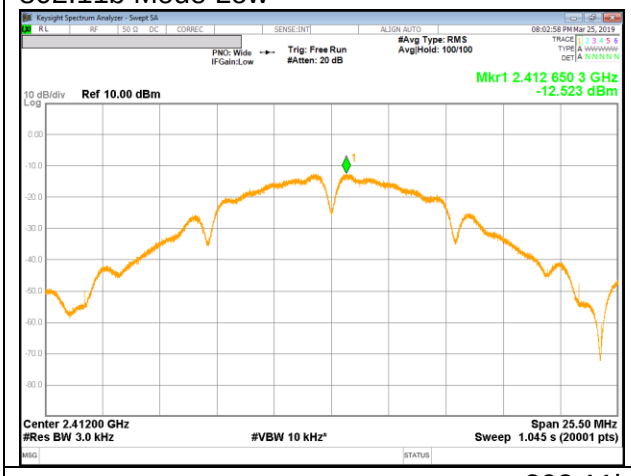
ANTENNA 2

802.11b Mode Low



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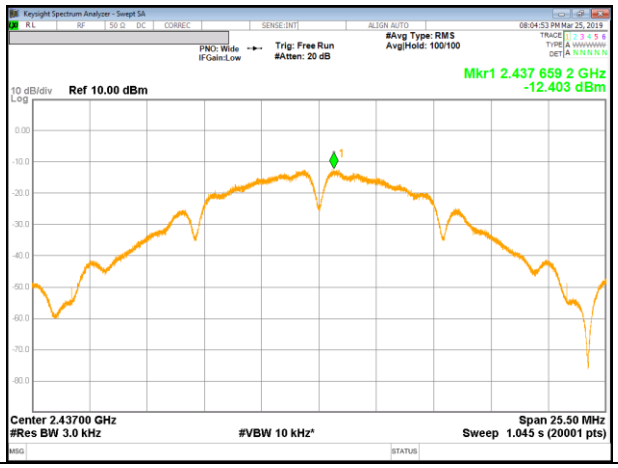

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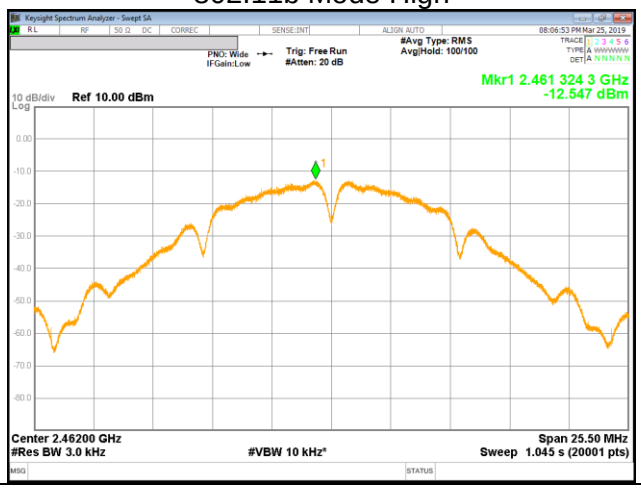

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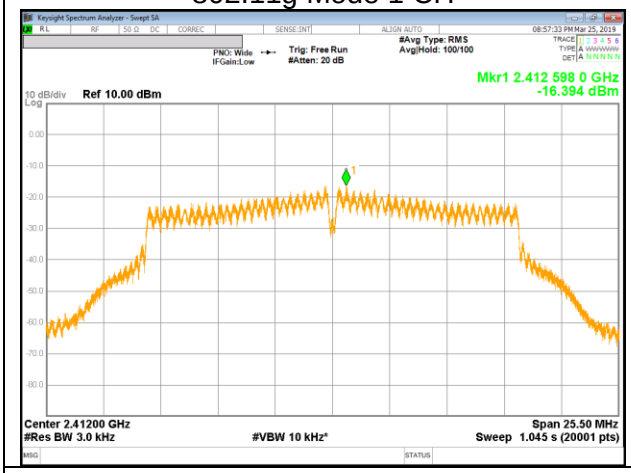
1TX_ANTENNA 1

802.11g Mode 1 CH



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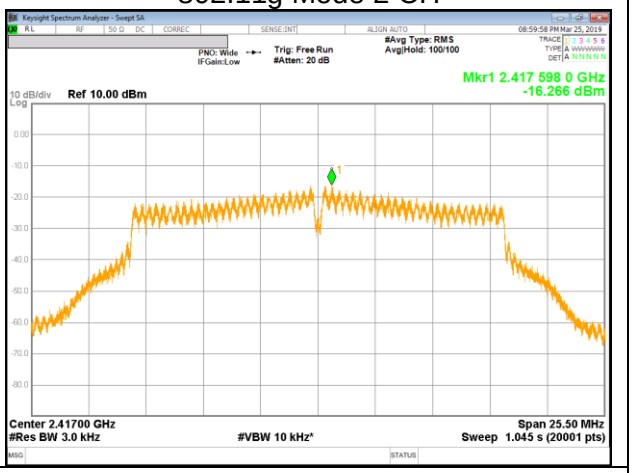

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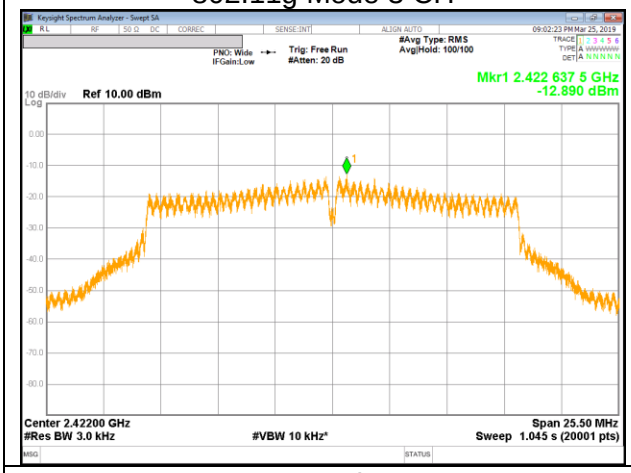
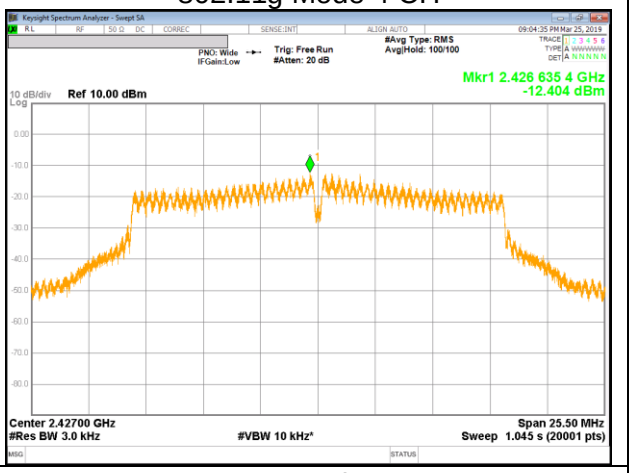
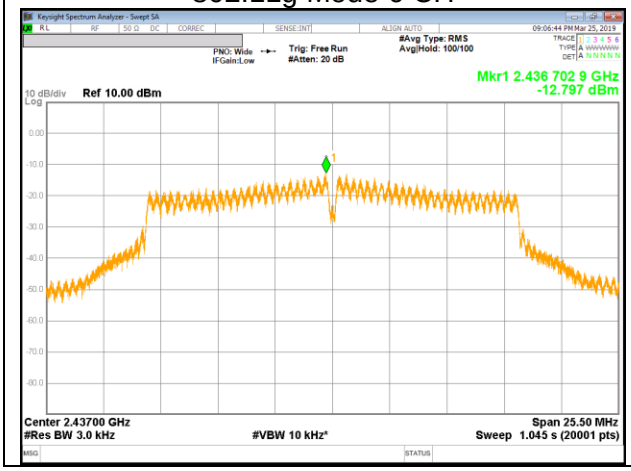


802.11g Mode 4 CH



802.11g Mode 6 CH



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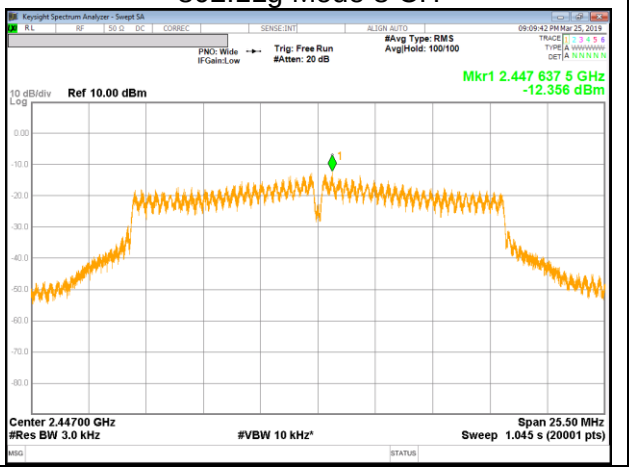

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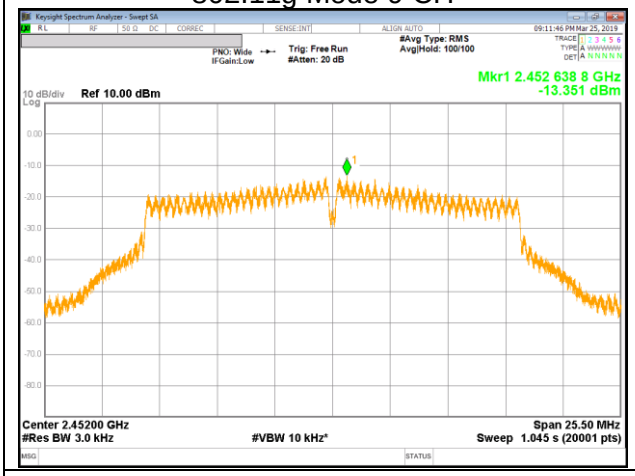
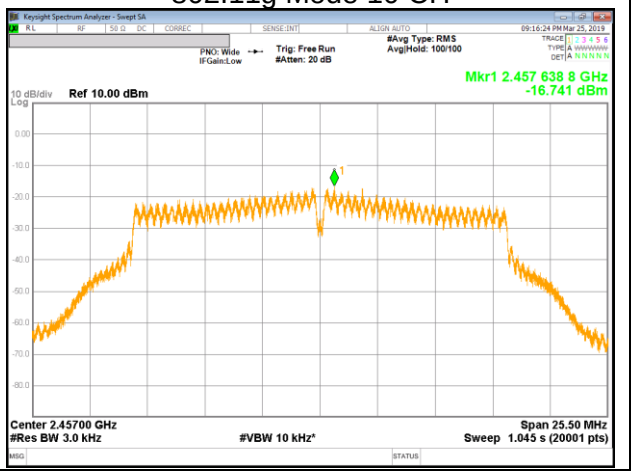
802.11g Mode 9 CH



802.11g Mode 10 CH



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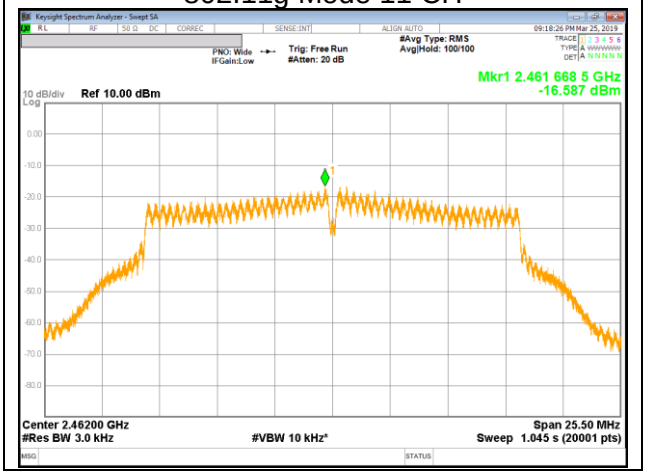

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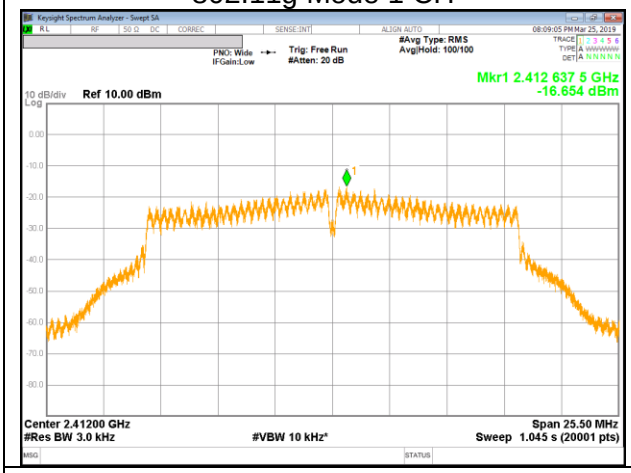
1TX_ANTENNA 2

802.11g Mode 1 CH



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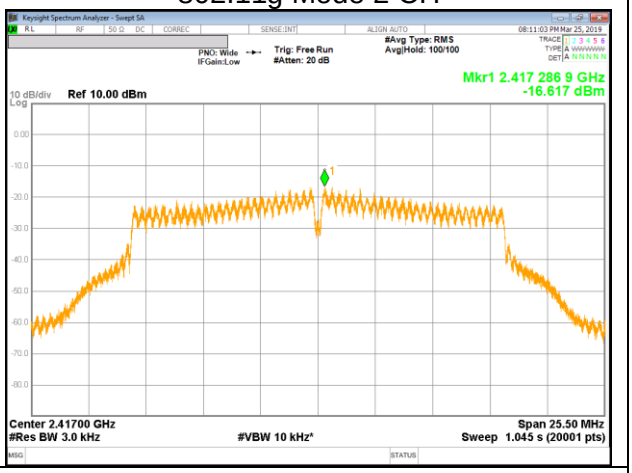

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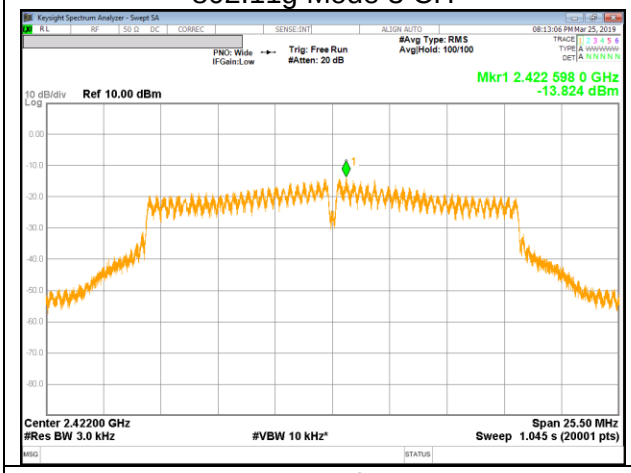

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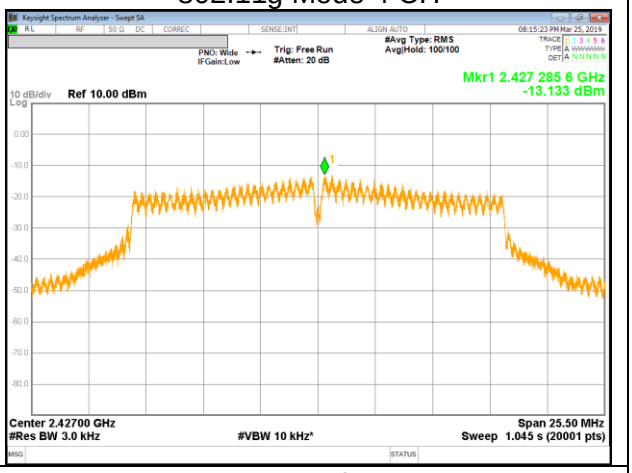

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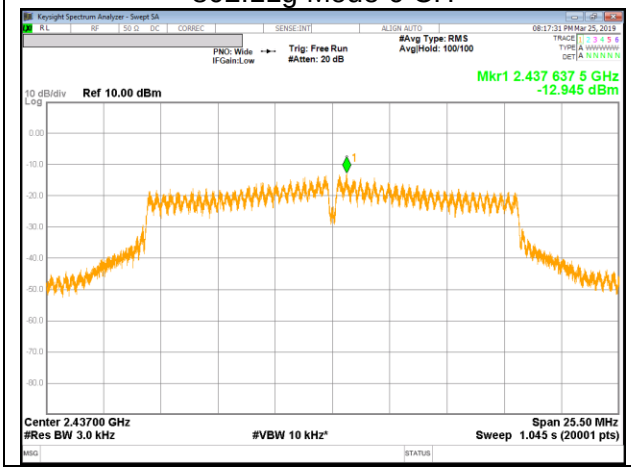

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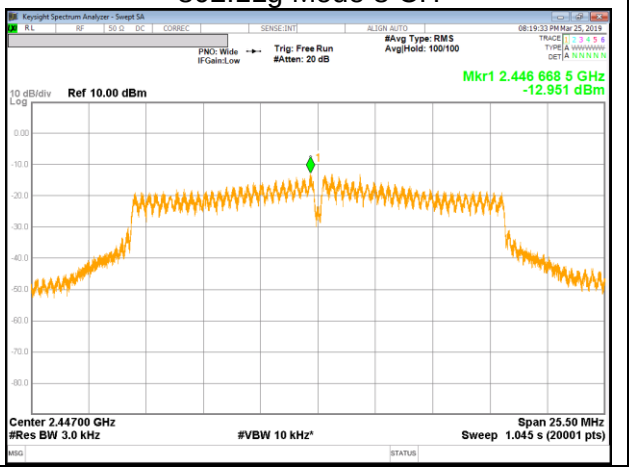

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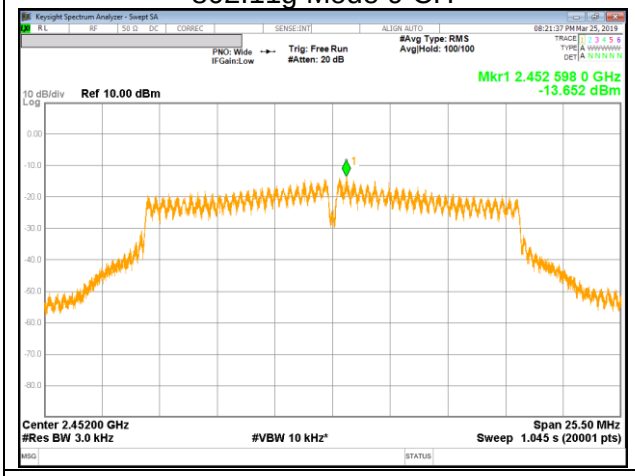
802.11g Mode 9 CH



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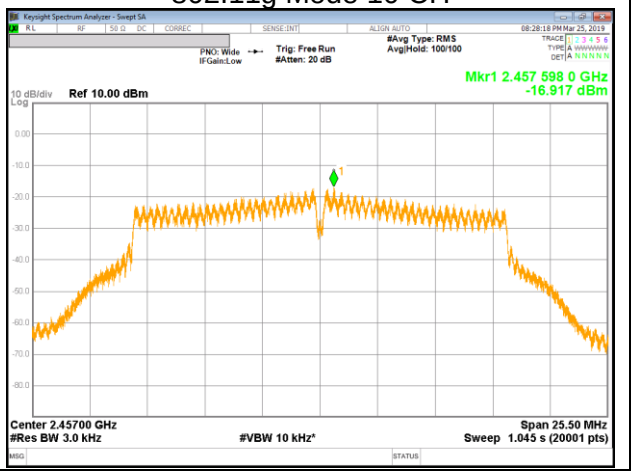

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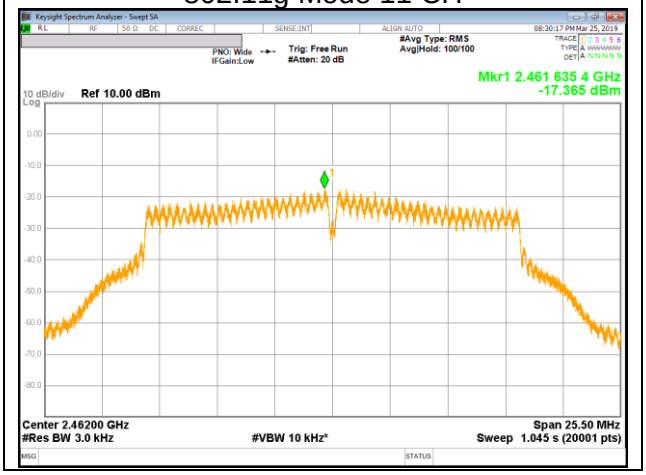

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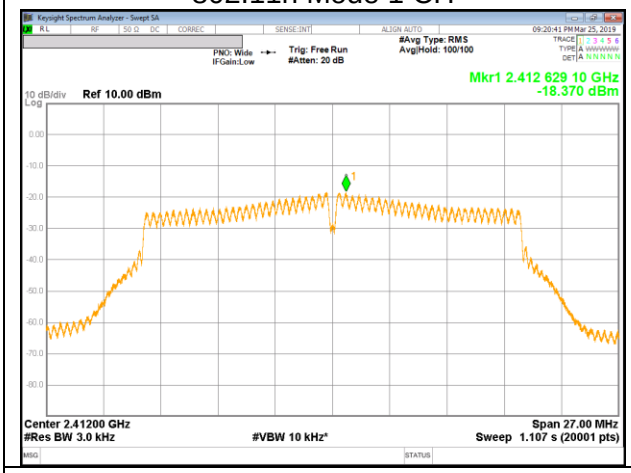
1TX_ANTENNA 1

802.11n Mode 1 CH



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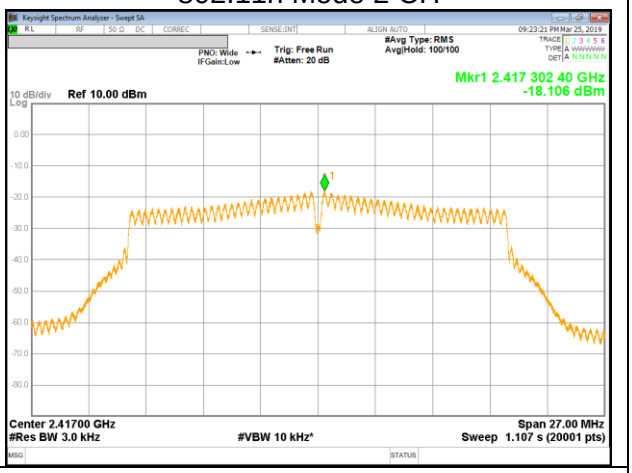

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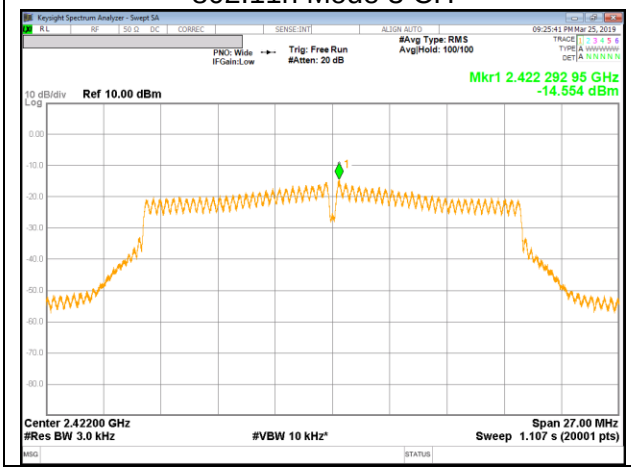

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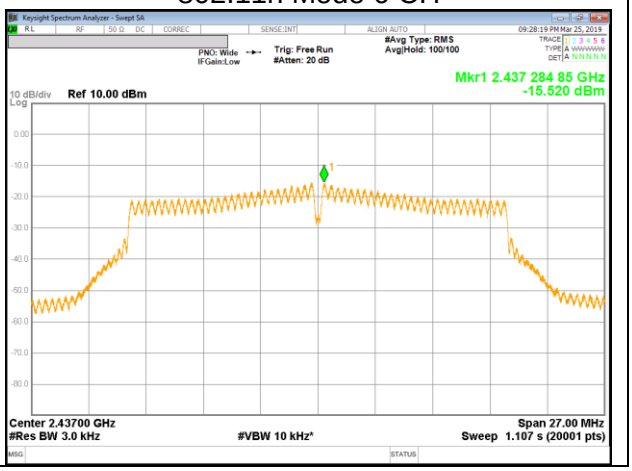

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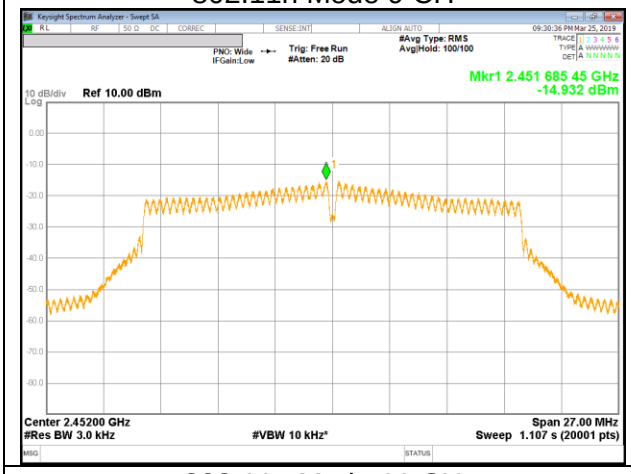
802.11n Mode 9 CH



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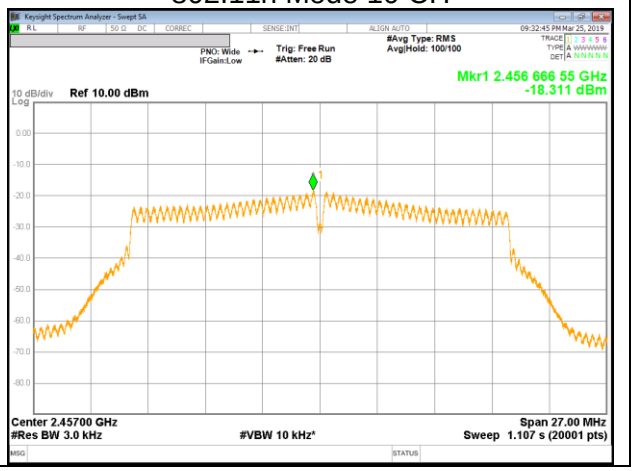

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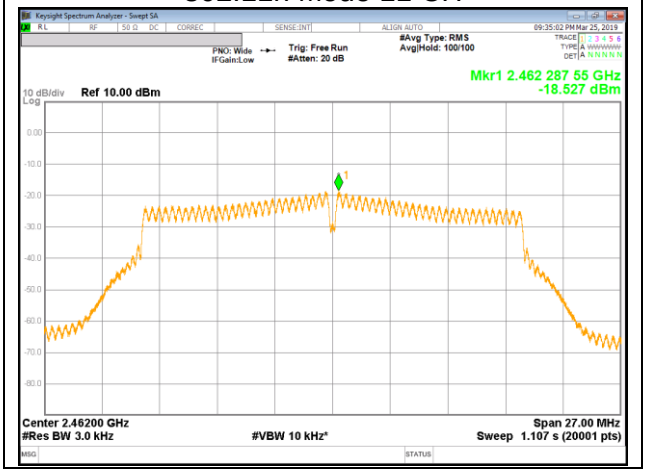

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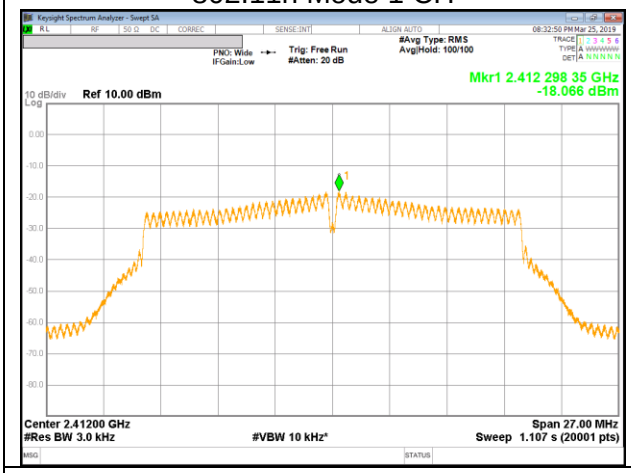
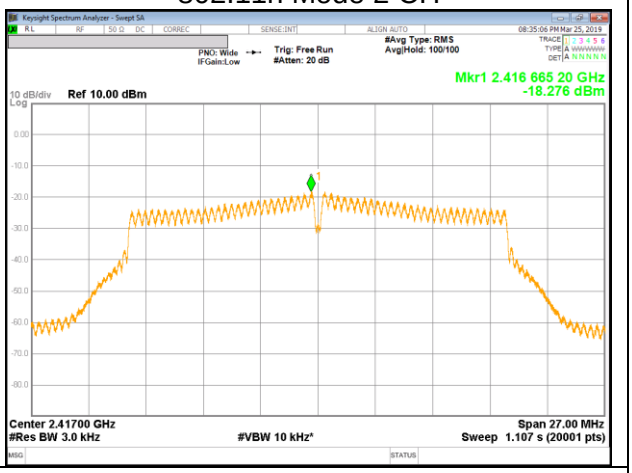
1TX_ANTENNA 2

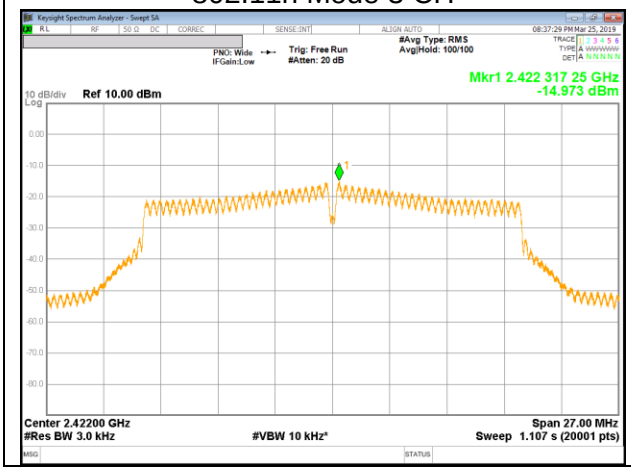
802.11n Mode 1 CH



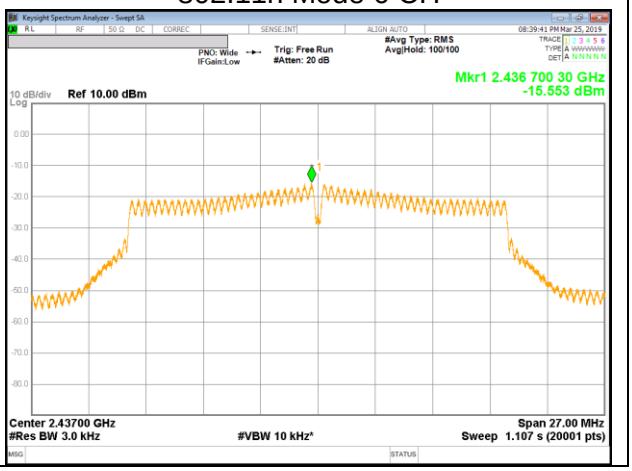
802.11n Mode 2 CH



802.11n Mode 3 CH



802.11n Mode 6 CH



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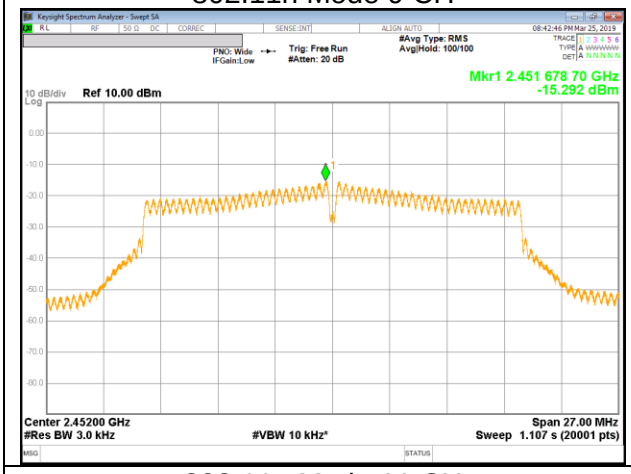
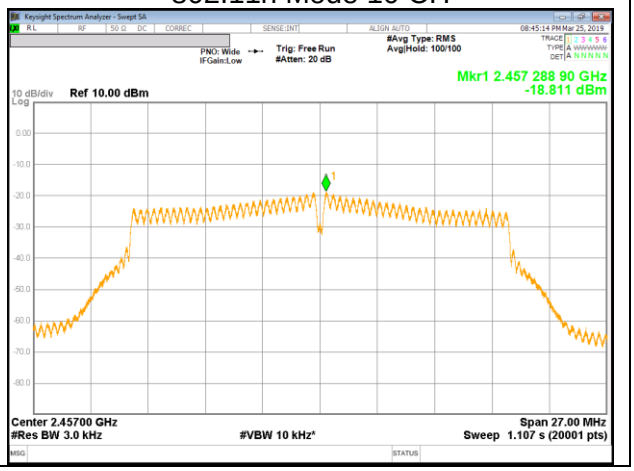
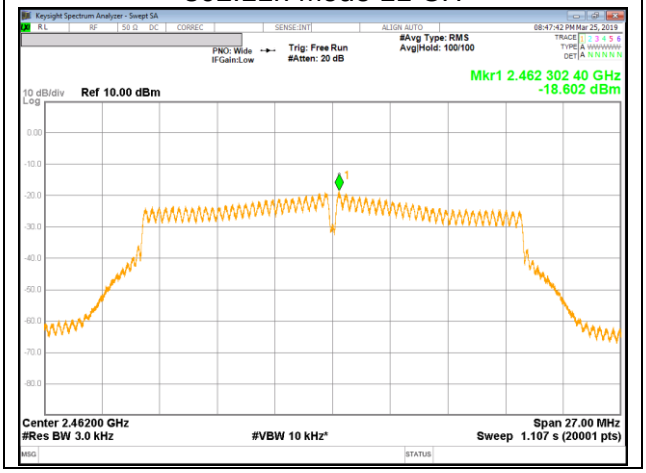
802.11n Mode 9 CH



802.11n Mode 10 CH



802.11n Mode 11 CH



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10.4. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer with RBW = 100 kHz, VBW = 300 kHz, peak detector, and max hold. Measurements utilizing these settings are made of the in-band reference level, bandedge, out-of-band emissions (where measurements to the general radiated limits will not be made)

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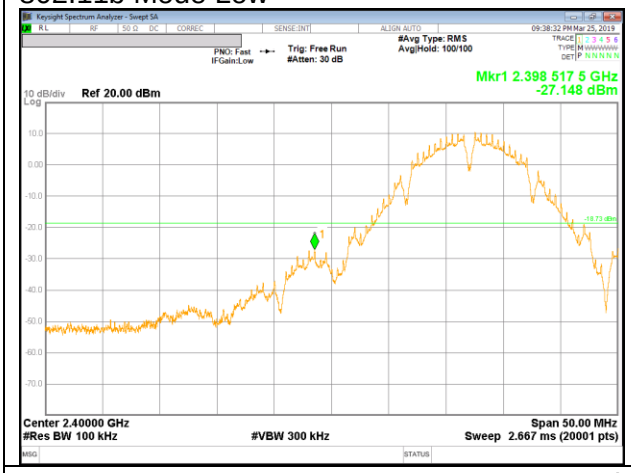
RESULTS

10.4.1. 802.11b MODE IN THE 2.4 GHz BAND

Band Edge

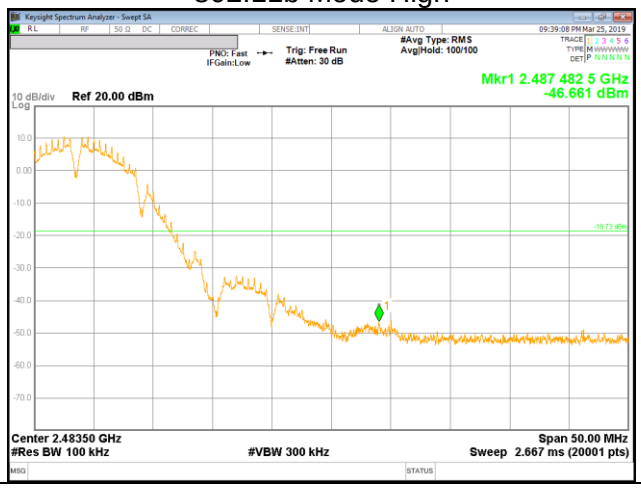
ANTENNA1

802.11b Mode Low



802.11b Mode Mid

802.11b Mode High



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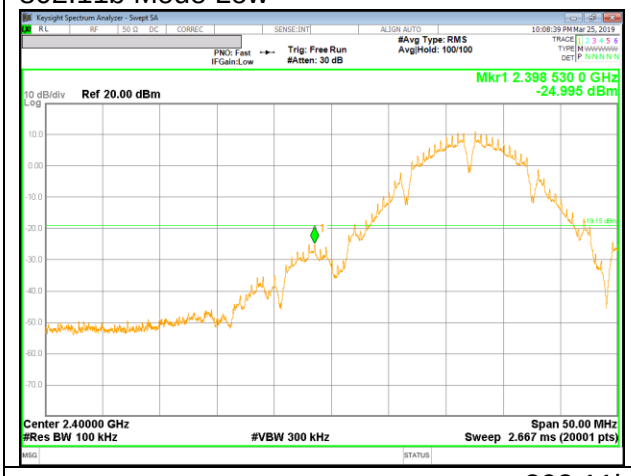
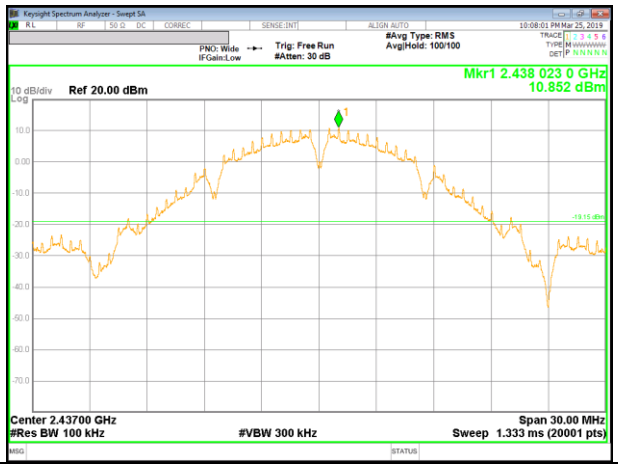
ANTENNA 2

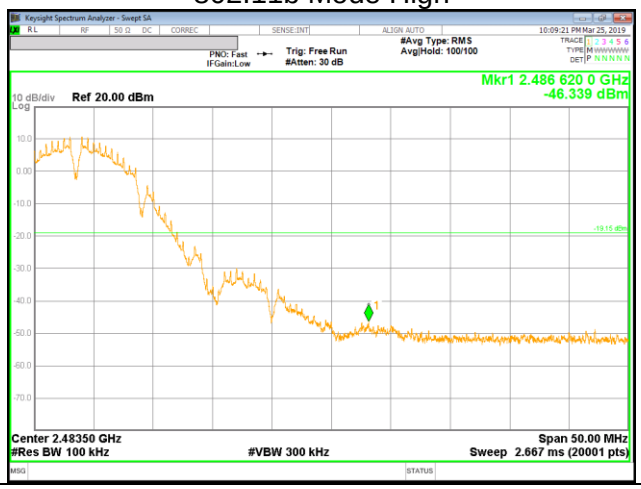
802.11b Mode Low



802.11b Mode Mid



802.11b Mode High



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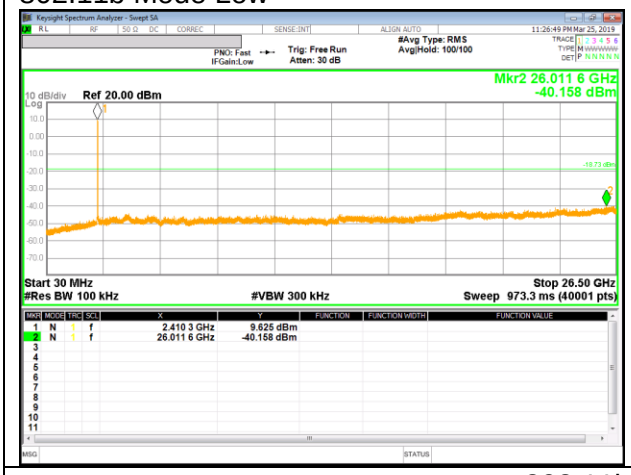
Conducted Spurious Emission

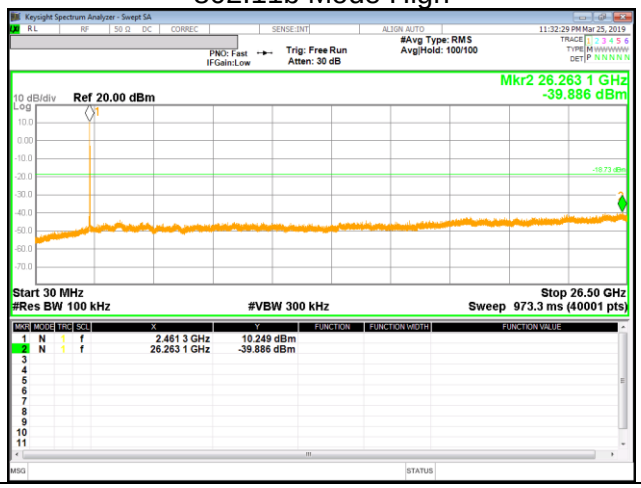
ANTENNA1

802.11b Mode Low



802.11b Mode Mid

802.11b Mode High



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