

CERTIFICATION TEST REPORT

Report Number. : 11760905-E4V2

- Applicant : SONY MOBILE COMMUNICATIONS, INC. 4-12-3 HIGASHI-SHINAGAWA, SHINAGAWA -KU,TOKYO, 140-0002, JAPAN
 - FCC ID : PY7-32042D
- **EUT Description :** GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS & NFC
- Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue: August 23, 2017

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	07/26/17	Initial Issue	D. Coronia
V2	08/23/17	Updated Section 6 & 9.2.3	D. Coronia

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SONY MOBILE COMMUNICATIONS, INC. 4-12-3 HIGASHI-SHINAGAWA, SHINAGAWA -KU, TOKYO, 140-0002, JAPAN
EUT DESCRIPTION:	GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac, GPS & NFC
SERIAL NUMBER:	RADIATED: BH9000HG8, BH90009E85 CONDUCTED: BH9000U97W, BH9000TU7W
DATE TESTED:	JULY 08 - 21, 2017

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

UL Verification Services Inc. 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 Verification Services Inc. 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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB 558074 D01 v04, KDB 662911 D01 Multiple Transmitter Output v02r01 and ANSI C63.10-2013,

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. Line conducted emissions are measured only at the 47173 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.

47173 Benicia Street	47266 Benicia Street		
Chamber A(IC: 2324B-1)	Chamber D(IC: 22541-1)		
Chamber B(IC: 2324B-2)	Chamber E(IC: 22541-2)		
Chamber C(IC: 2324B-3)	Chamber F(IC: 22541-3)		
	Chamber G(IC: 22541-4)		
	Chamber H(IC: 22541-5)		

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. Chambers A through C are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered

site numbers 2324B -1 through 2324B-3, respectively. Chambers D through H are covered under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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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

4.3. MEASUREMENT UNCERTAINTY

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

Parameter	Uncertainty
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 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 with BT, DTS/UNII a/b/g/n/ac, GPS & NFC.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2472	802.11b 2TX	16.33	42.95
2412 - 2472	802.11g 2TX	16.52	44.87
2412 - 2472	802.11n HT20 2TX CDD	16.35	43.15

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band	Antenna Gain (dBi)		
(GHz)	Chain 0	Chain 1	
2.4	-3.70	-5.50	

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was SONY, s_atp_1_00139_B_10_5. The test utility software used during testing was Tera Term Ver 4.79.

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5.5. WORST-CASE CONFIGURATION AND MODE

Radiated bandedge, harmonics, and spurious emissions from 1 GHz to 18GHz were performed. The EUT was set to transmit at the Low/Middle/High channels.

Radiated emission below 1GHz, above 18GHz, and power line conducted emission were performed with the EUT was set to transmit at the channel with highest output power as worst-case scenario.

The fundamental of the EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Z orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Z orientation.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps 802.11g mode: 6 Mbps 802.11n HT20mode: MCS0

The simultaneous mode (SISO 2.4GHz Chain 0 and 5GHz chain 1) was checked and standalone (MIMO) 2.4 GHz / 5GHz remain worst case.

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List							
Description Manufacturer Model Serial Number FCC ID							
Laptop	Lenovo	20B7S0A200	PC015REW	NA			
AC Adapter	SONY	UCH 20	3416W45305756	NA			
Headphones	SONY	N/A	N/A	N/A			

I/O CABLES (CONDUCTED TEST)

	I/O Cable List								
Cable	Cable Port # of identical Connector Cable Type Cable				Remarks				
No		ports	Туре		Length (m)				
1	Antenna	1	RF	Shielded	0.2	To Spectrum Analyzer			
2	USB	1	USB	Shielded	1	N/A			
3	DC	1	DC	Shielded	0.3	N/A			

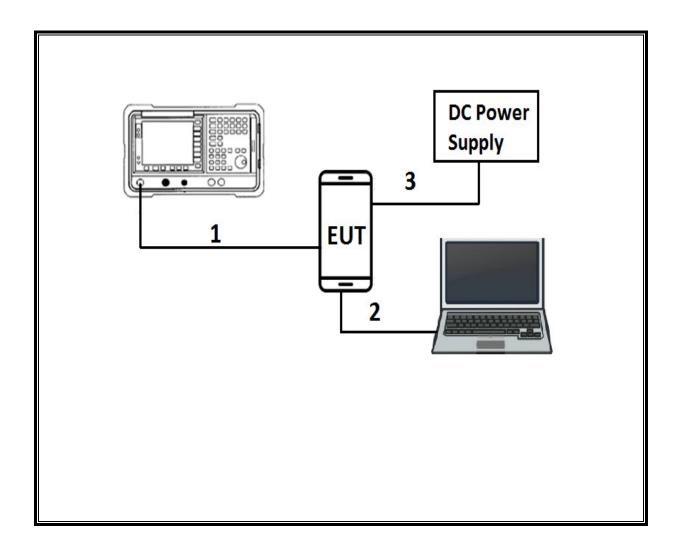
I/O CABLES (RADIATED AND CONDUCTED EMISSIONS)

	I/O Cable List							
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks		
1	USB	1	USB	Shielded	3	N/A		
2	Audio	1	3.5mm	Shielded	1	N/A		

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TEST SETUP

CONDUCTED TEST SETUP DIAGRAM

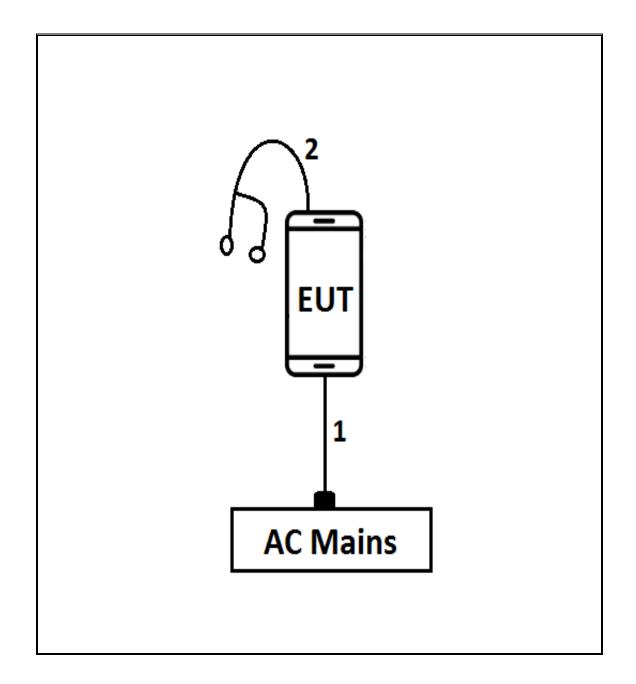


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TEST SETUP

RADIATED AND AC LINE CONDUCTED EMISSIONS SETUP DIAGRAM



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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	Asset	Cal Due					
Antenna, Broadband Hybrid, 30MHz to 2000MHz w/4dB Pad	Sunol Sciences Corp.	JB3	T477	06/22/2018					
Antenna, Active Loop 9kHz-30MHz	ETS-Lindgren	6502	T1683	02/17/2018					
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T712	01/30/2018					
Antenna, Horn 18-26.5GHz	ARA	MWH-1826/B	T449	06/12/2018					
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1264	07/08/2018					
Power Sensor, P – series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T413	06/20/2018					
Amplifier, 1-26.5GHz	MITEQ	AFS42-00101800-25- S-42	T1165	08/01/2017					
Amplifier, 1-26.5GHz	Agilent (Keysight) Technologies	8449B	T404	07/05/2018					
Amplifier, 10kHz-1GHz	Agilent (Keysight) Technologies	8447D	T15	08/26/2017					
Amplifier, 1-8 GHz	MITEQ	AMF-4D-01000800- 30-29P	T1170	04/28/2018					
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent (Keysight) Technologies	E4440A	T199	07/22/2018					
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent (Keysight) Technologies	E4440A	T908	04/13/2018					
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T907	01/23/2018					
Spectrum Analyzer, PSA, 3Hz to 26.5GHz	Agilent (Keysight) Technologies	E9030A	T905	01/11/2018					
LISN	FISCHER	FCC-LISN-50/250- 25-2-01	T1310	06/08/2018					

Test Software List								
Description	Manufacturer	Model	Version					
Radiated Software	UL	UL EMC	Ver 9.5, Apr 26, 2016					
Antenna Port Software	UL	UL RF	Ver 5.1.1, July 15, 2016					
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2016					

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

NOTE: *testing is completed before equipment calibration expiration date.

7. MEASUREMENT METHODS

On Time and Duty Cycle: KDB 558074 D01 v04, Section 6.

<u>6 dB BW</u>: KDB 558074 D01 v04, Section 8.1.

<u>99% BW</u>: ANSI C63.10-2013, Section 6.9.3.

Output Power: KDB 558074 D01 v04, Section 9.2.3.2.

Power Spectral Density: KDB 558074 D01 v04, Section 10.3.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v04, Section 11.1 (b).

Out-of-band emissions in restricted bands: KDB 558074 D01 v04, Section 12.1.

Band-edge: KDB 558074 D01 v04, Section 12.1.

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

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8. SUMMARY TABLE

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

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9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

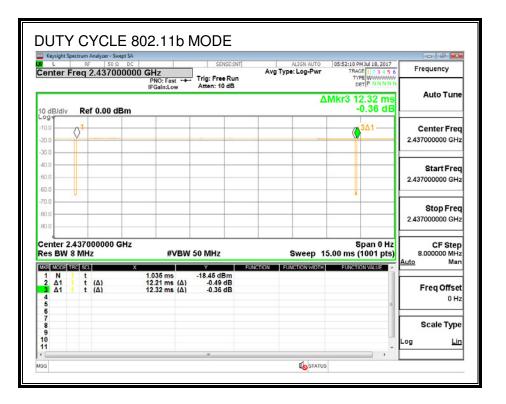
ON TIME AND DUTY CYCLE RESULTS

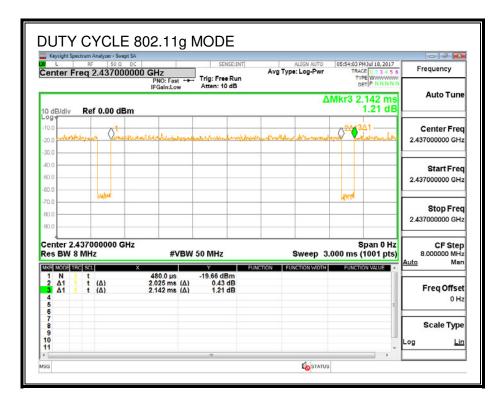
Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/T
			x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
802.11b	12.21	12.32	0.99	99.11%	0.00	0.01
802.11g	2.03	2.14	0.95	94.54%	0.24	0.49
802.11n HT20 CDD	2.51	2.63	0.96	95.58%	0.20	0.40

Note: Chain 1 was tested to represent the worst chain.

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DUTY CYCLE PLOTS





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Frequency	11:14:08 PM Jul 18, 2017 TRACE 1 2 3 4 5 6 TYPE DET P P P P P P	ALIGN AUTO	#A	SENSE:I		PNO: Fast	DC 0000	50 Ω			L	
Auto Tune	Mkr3 2.628 ms -0.90 dB	Δ		Atten: 10 dB	v	IFGain:Low	dBµV	6.99	ef 10	R	B/div	D d
Center Fred 2.437000000 GH:	4-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	day diament for	d alfaine a de	statijangi kante	hterpe		1		ende			og 97.0
Start Free 2.437000000 GH												7.0 7.0 7.0
Stop Fred 2.437000000 GH;								hm			_	7.0
CF Step 8.000000 MH Auto Mar	Span 0 Hz 600 ms (1001 pts) FUNCTION VALUE	Sweep 3.	FUNCTION	50 MHz	вw	#V			0000 3B) 1		s Bl	Re
Freq Offse	Ē			87.91 dBµV -4.71 dB -0.90 dB		712.8 µs 2.509 ms 2.628 ms	1		(Δ) (Δ)	1	Ν Δ1 Δ1	1 2 3 4 5
Scale Type												6 7 8 9
Log <u>Lir</u>	-											0

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9.2. 11b 2TX MIMO MODE IN THE 2.4GHz BAND

9.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

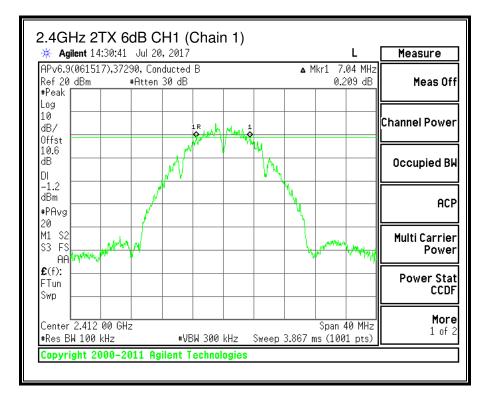
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

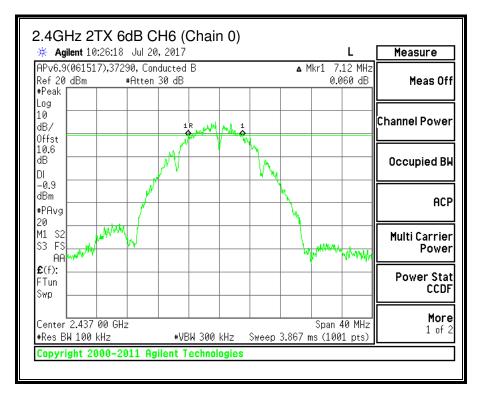
Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	7.16	7.04	0.5
CH6	2437	7.12	7.12	0.5
CH11	2462	7.04	7.08	0.5
CH12	2467	7.56	7.56	0.5
CH13	2472	7.08	8.04	0.5

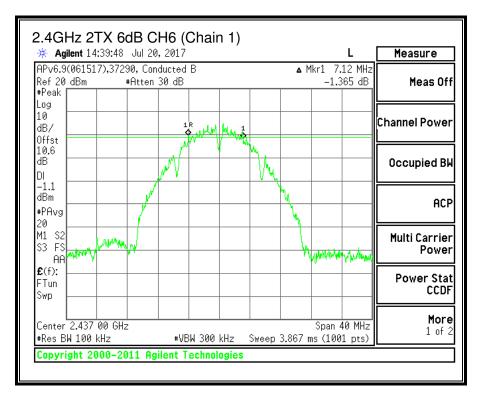
Page 19 of 180

2.4GHz 2TX 6dB CH1 (C	Chain 0)		Measure
APv6.9(061517),37290, Conducted E Ref 20 dBm #Atten 30 dB #Peak	B	▲ Mkr1 7.16 MH 1.203 dE	z
Log 10 dB/ 0ffst	Sum Munt		Channel Power
10.6 dB dB dB data			Occupied BW
-0.8 dBm #PAvg 20		N .	ACP
M1 S2 S3 FS AAW		A CANANA CANANA	Multi Carrier Power
£(f):			Power Stat CCDF
Center 2.412 00 GHz #Res BW 100 kHz #VBk	W 300 kHz Sweep 3	Span 40 MHz 3.867 ms (1001 pts)	
Copyright 2000-2011 Agilent Te	echnologies		



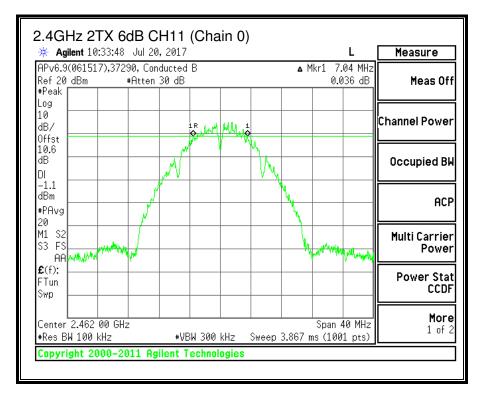
Page 20 of 180

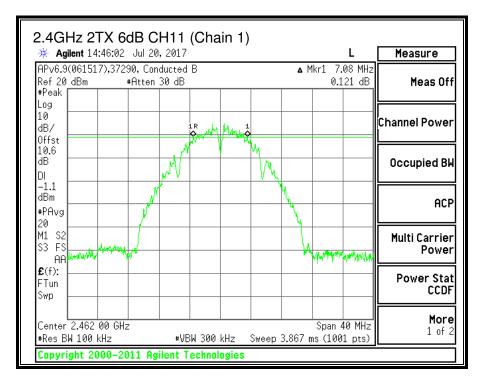




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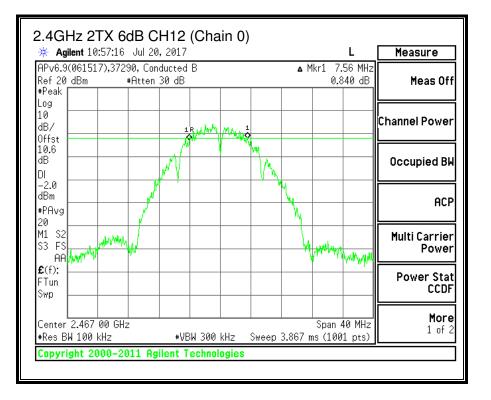
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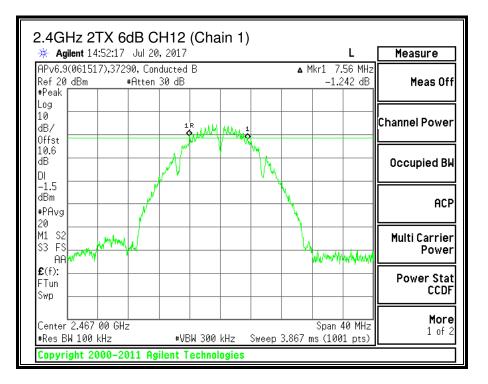




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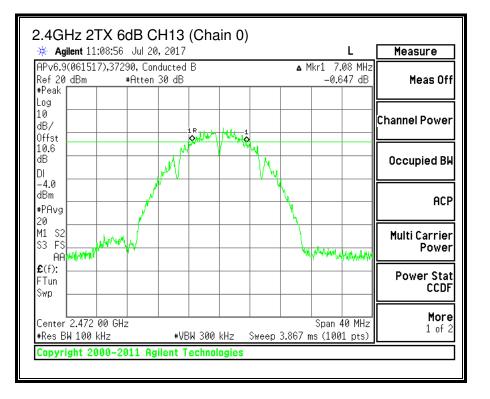
Page 22 of 180

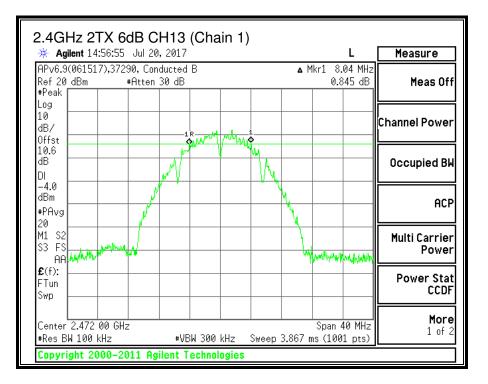




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9.2.2. 99% BANDWIDTH

LIMITS

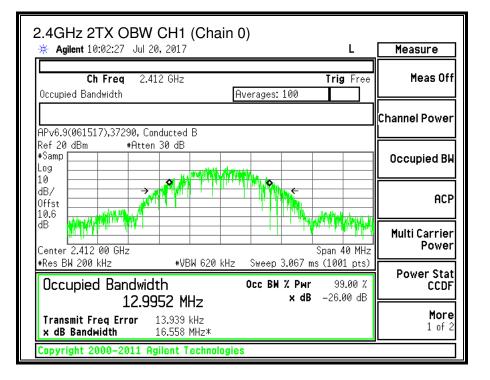
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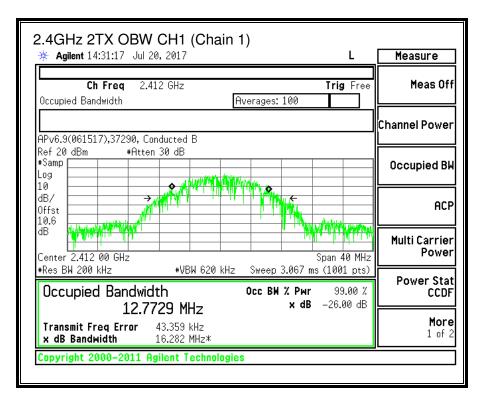
RESULTS

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	12.995	12.773
CH6	2437	12.817	12.707
CH11	2462	12.266	12.388
CH12	2467	12.621	12.666
CH13	2472	13.166	12.838

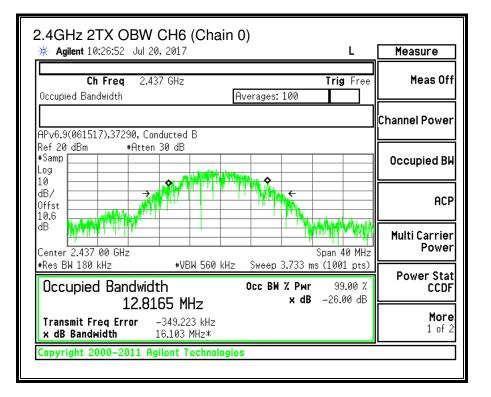
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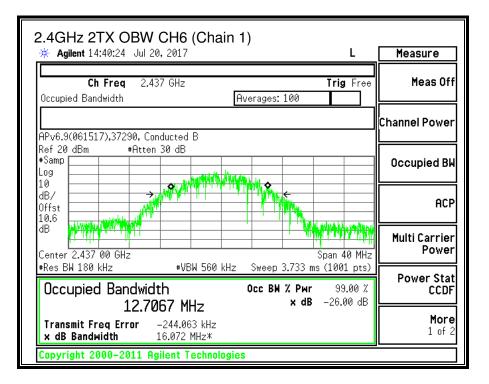
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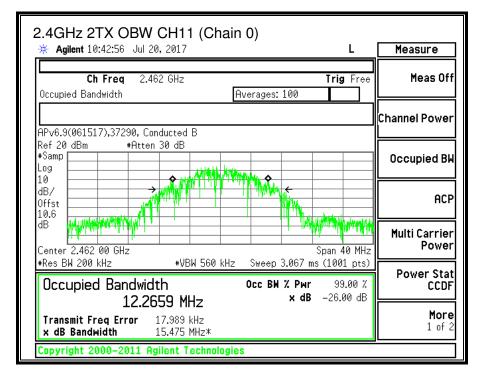


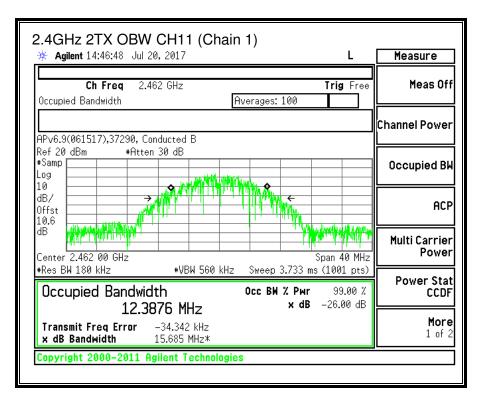
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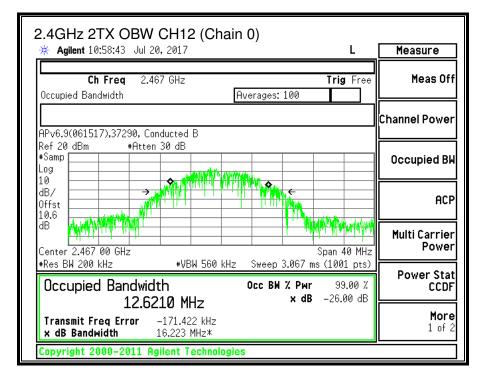


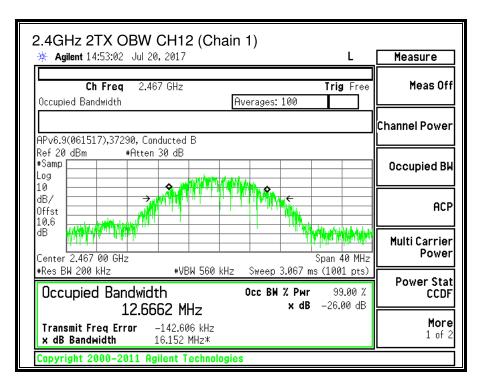
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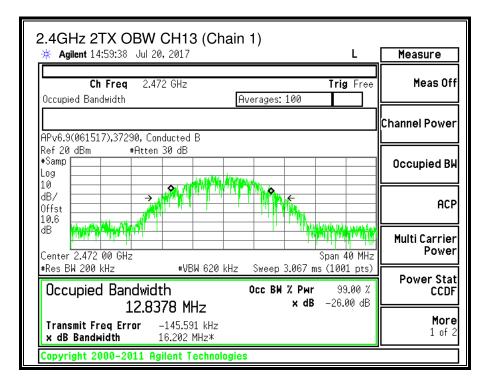
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2.4GHz 2TX OBW	•	in 0)	L	Measure
Ch Freq 2.4 Occupied Bandwidth	72 GHz	Averages: 100	Trig Free	Meas Off
	nducted B			Channel Power
#Samp	30 dB	ulainite		Occupied BW
10 dB/ → 0ffst ///////////////////////////////////				ACF
dB Center 2.472 00 GHz			Span 40 MHz	Multi Carrier Power
*Res BW 200 kHz Occupied Bandwid 1316	*VBW 560 kH; th 558 MHz	Occ BW % Pwr		Power Stat CCDF
Transmit Freq Error				More 1 of 2
Copyright 2000–2011 A	gilent Technologi	es		-



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9.2.3. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b) (3)

For systems using digital modulation in the 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

KDB 58074 D01 v04 Section 9.2.3.2

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains	
Antenna	Antenna	Directional	
Gain	Gain	Gain	
(dBi)	(dBi)	(dBi)	
-3.70	-5.50	-4.51	

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RESULTS

ID: 39317 **Date:** 07/21/17

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.51	30.00	30	36	30.00
CH6	2437	-4.51	30.00	30	36	30.00
CH11	2462	-4.51	30.00	30	36	30.00
CH12	2467	-4.51	30.00	30	36	30.00
CH13	2472	-4.51	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margin
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
CH1	2412	13.42	13.08	16.26	30.00	-13.74
CH6	2437	13.23	13.23	16.24	30.00	-13.76
CH11	2462	13.36	13.27	16.33	30.00	-13.67
CH12	2467	13.12	12.87	16.01	30.00	-13.99
CH13	2472	10.96	11.12	14.05	30.00	-15.95

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

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9.2.4. POWER SPECTRAL DENSITY

LIMITS

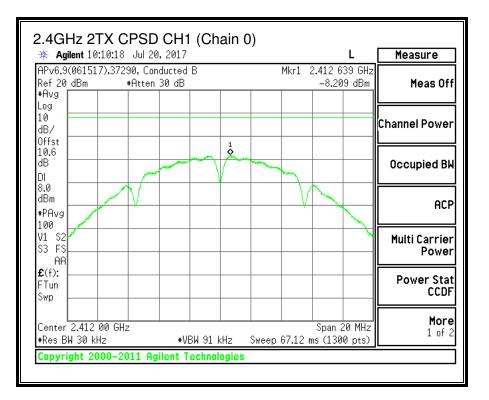
FCC §15.247 (e)

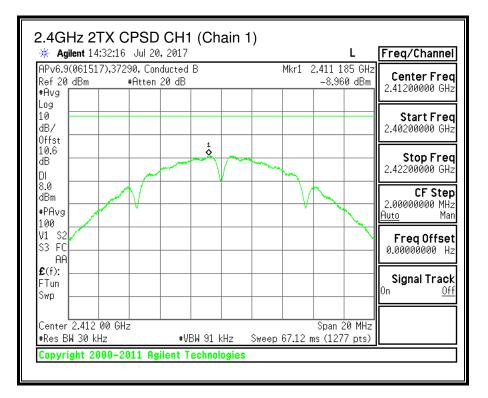
For digitally modulated systems, the power spectral density conducted form the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmissions.

RESULTS

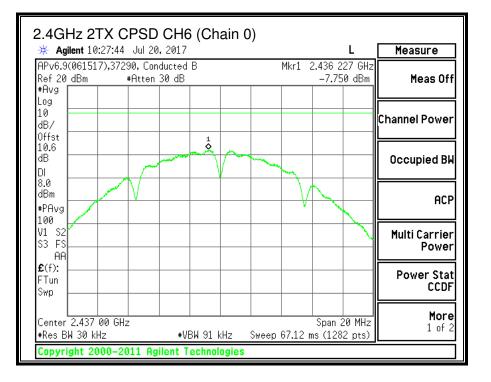
Duty Cycle CF (dB)		0.00	Included in Calculations of Corr'd PSD			
PSD Results						
Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin
		Meas	Meas	Corr'd		Margin
	(MHz)	(dBm)	(dBm)	PSD		
				(dBm)	(dBm)	(dB)
CH1	2412	-8.209	-8.960	-5.56	8.0	-13.6
CH6	2437	-7.750	-8.621	-5.15	8.0	-13.2
CH11	2462	-7.985	-8.184	-5.07	8.0	-13.1
CH12	2467	-8.028	-8.439	-5.22	8.0	-13.2
CH13	2472	-10.870	-10.889	-7.87	8.0	-15.9

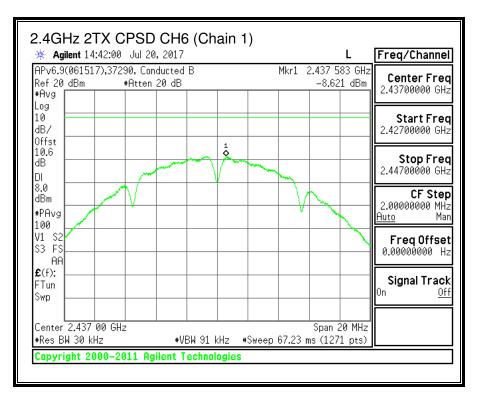
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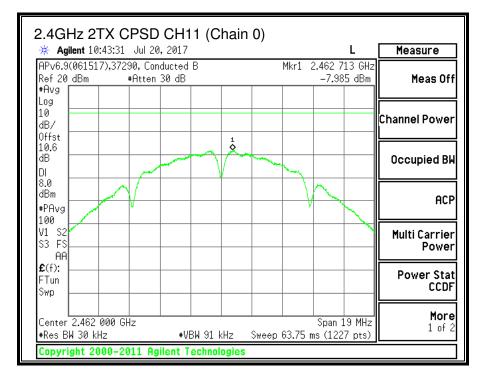
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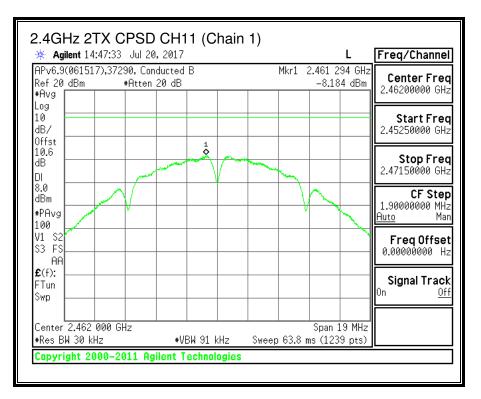




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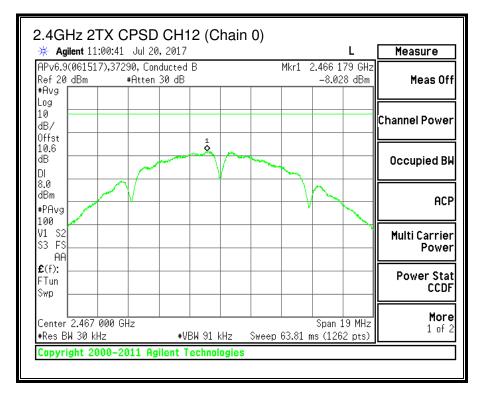
Page 35 of 180

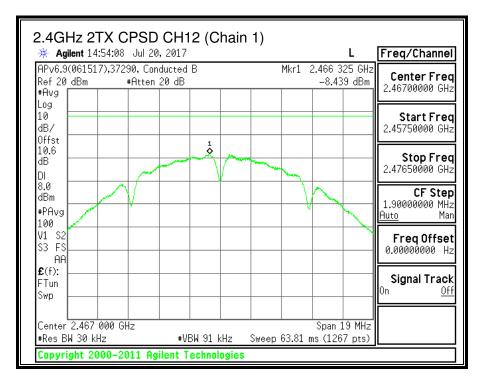




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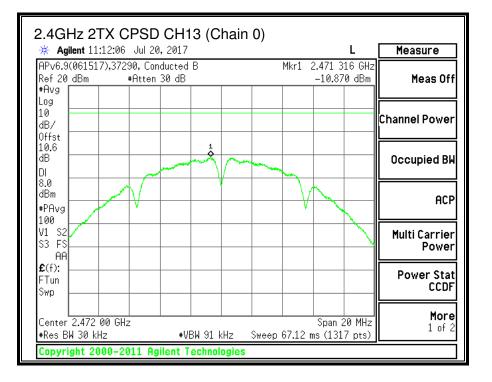
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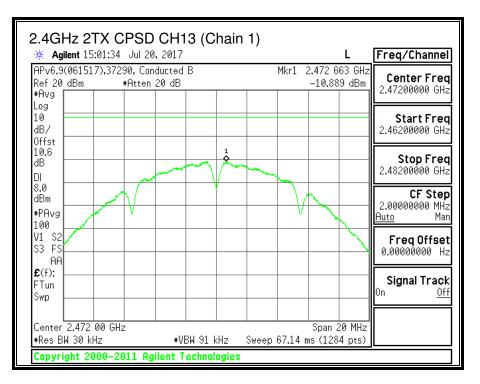




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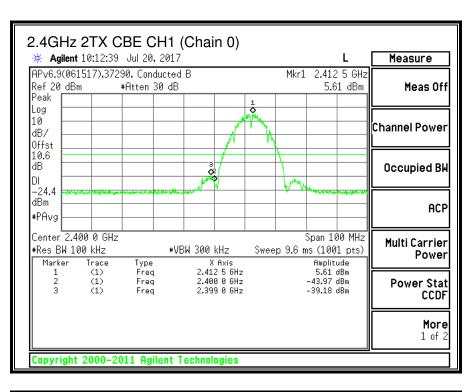
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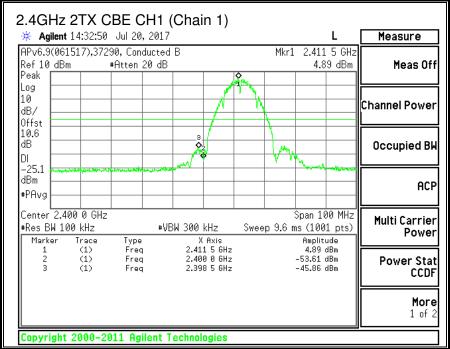


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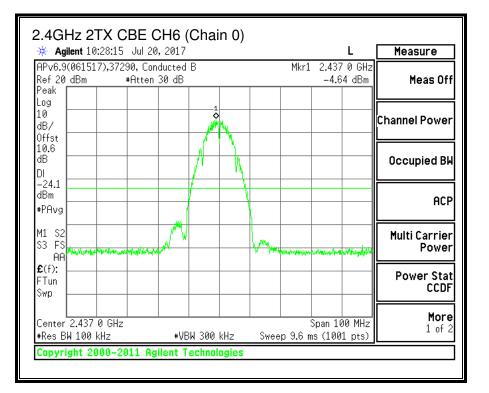
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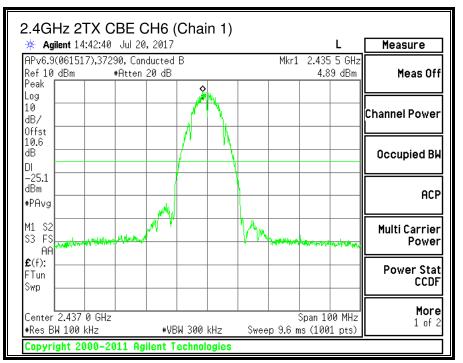


9.2.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

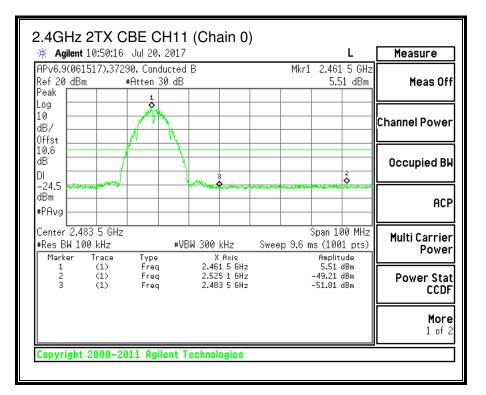


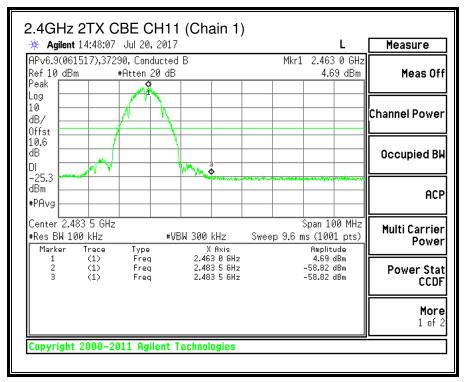
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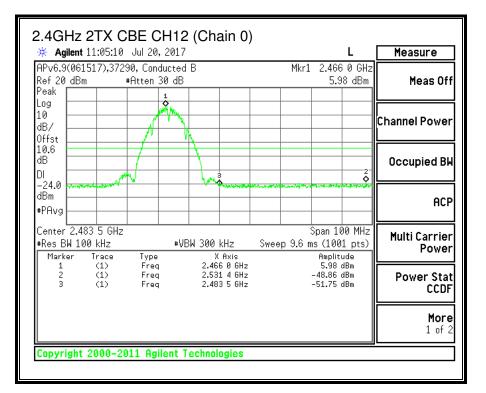
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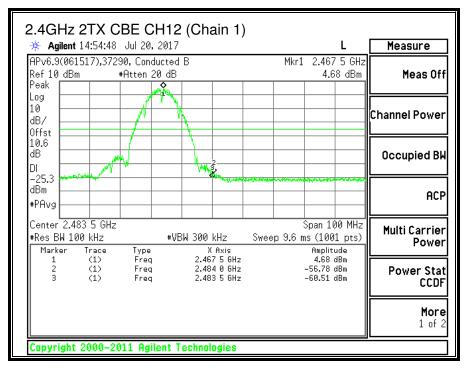




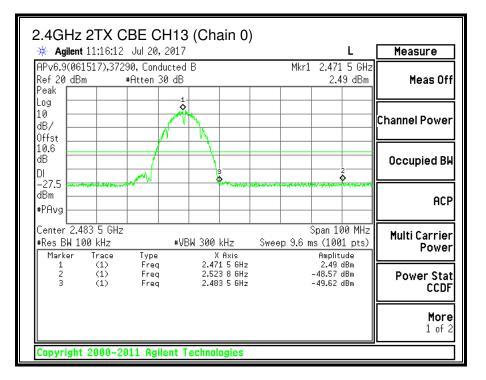
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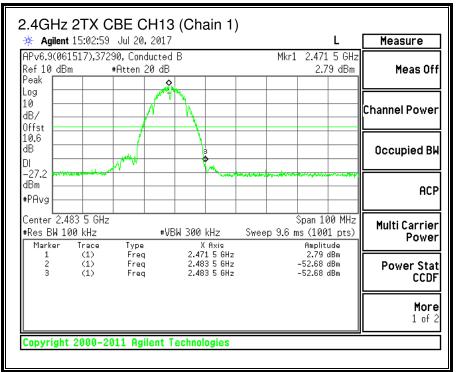
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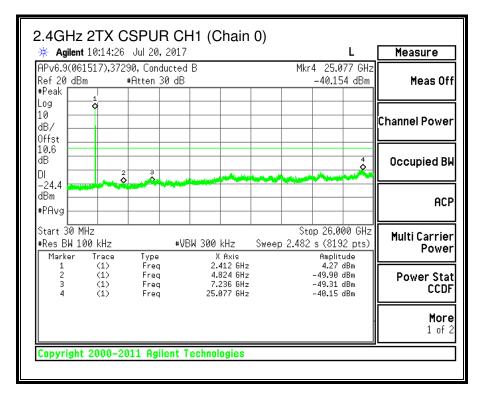


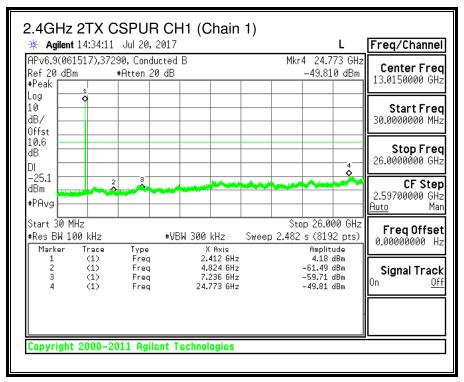
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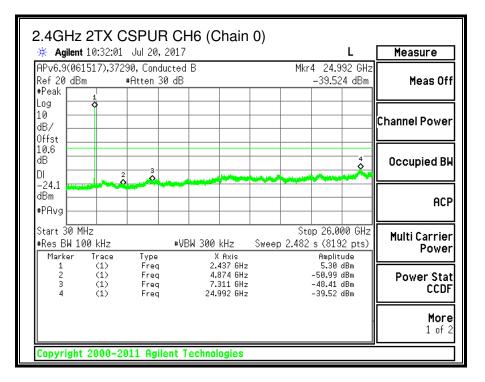


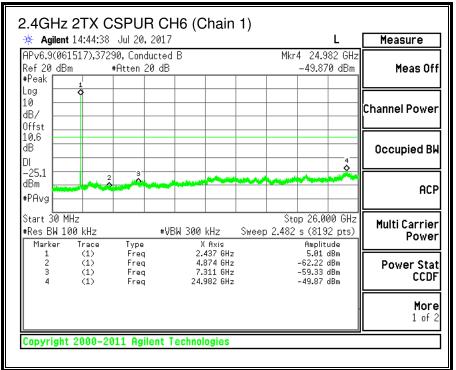
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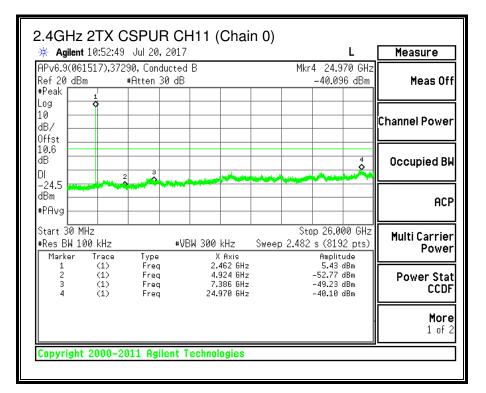


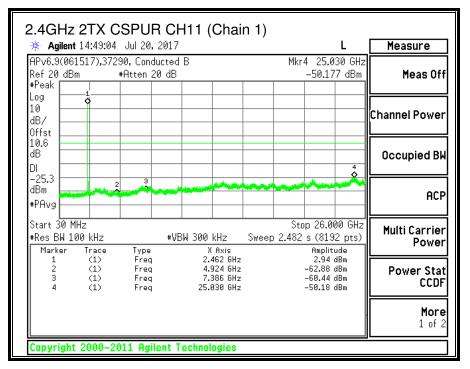
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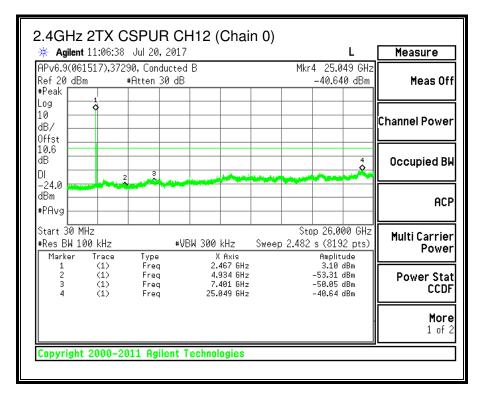


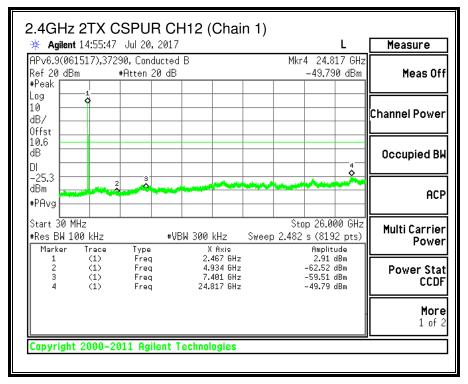
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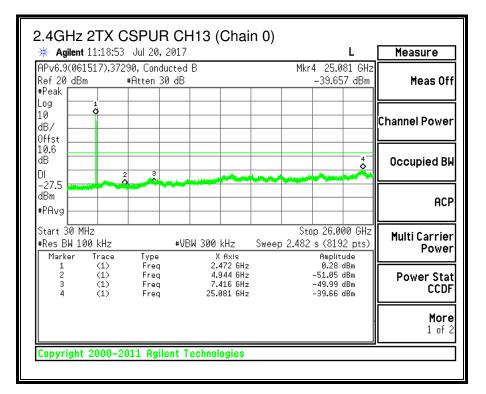
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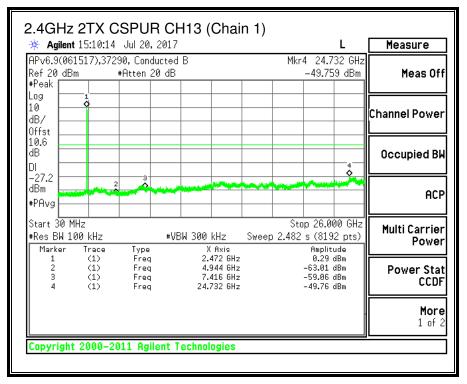




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9.3. 11g 2TX CDD MIMO MODE IN THE 2.4GHz BAND

9.3.1. 6 dB BANDWIDTH

LIMITS

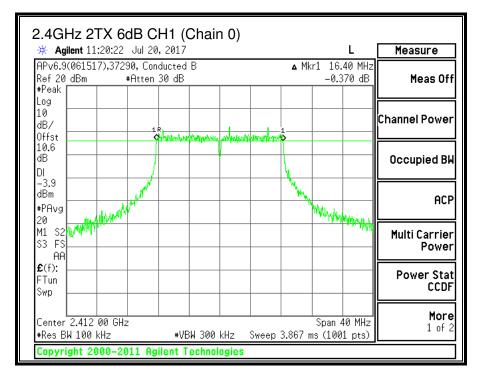
FCC §15.247 (a) (2)

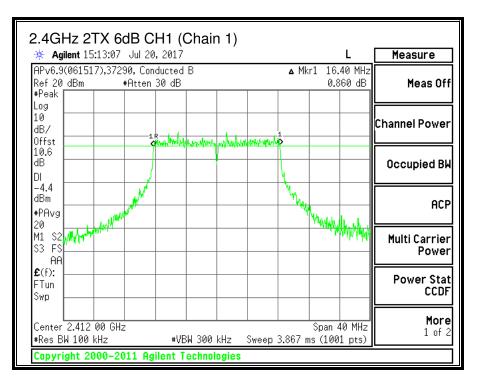
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	16.40	16.40	0.5
CH2	2417	16.40	16.36	0.5
CH6	2437	15.72	16.40	0.5
CH11	2462	16.32	16.36	0.5
CH12	2467	15.48	16.44	0.5
CH13	2472	16.40	16.32	0.5

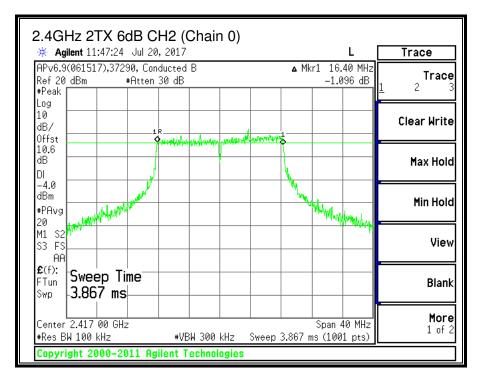
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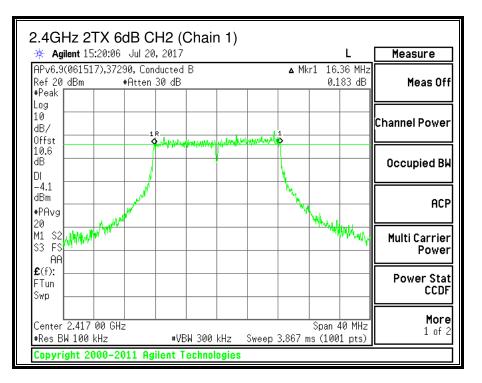




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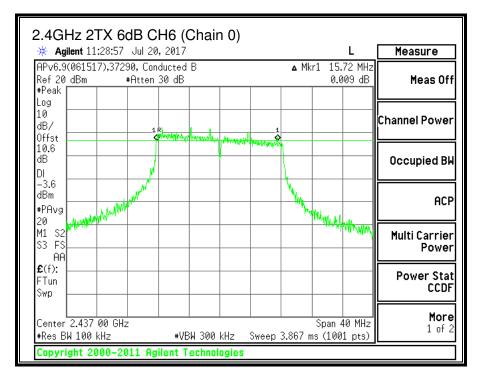
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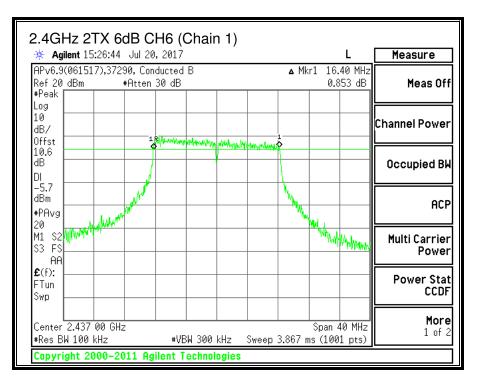




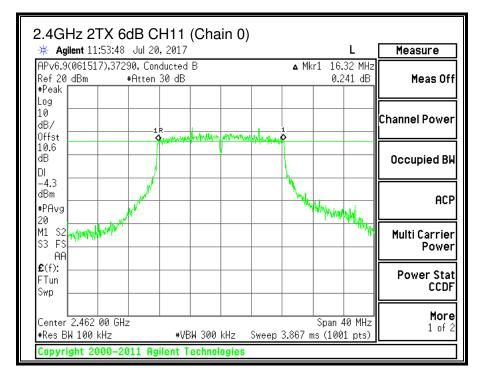
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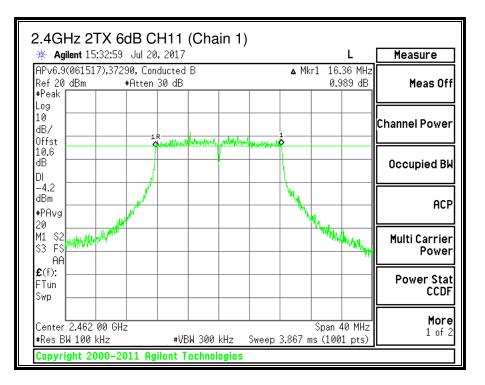
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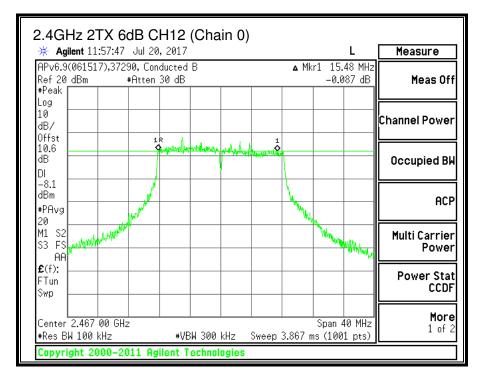
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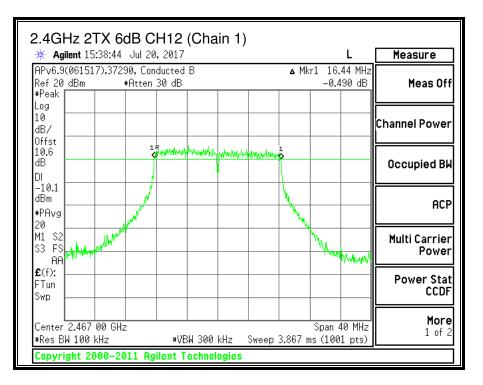




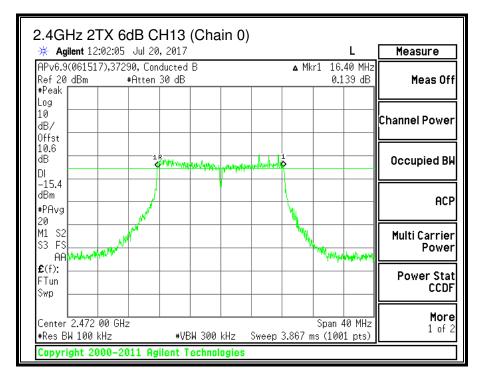
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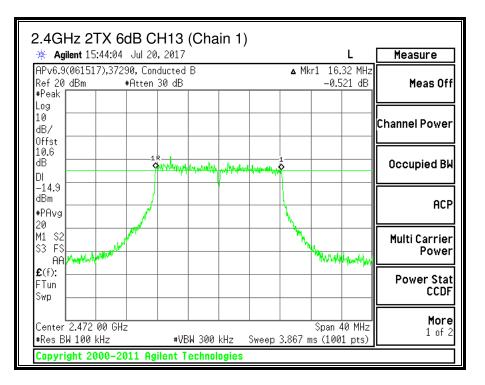
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9.3.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

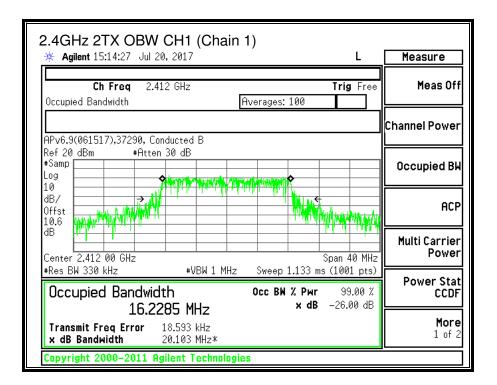
RESULTS

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	16.375	16.229
CH2	2417	16.353	16.278
CH6	2437	16.326	16.282
CH11	2462	16.186	16.189
CH12	2467	16.048	16.240
CH13	2472	16.310	16.520

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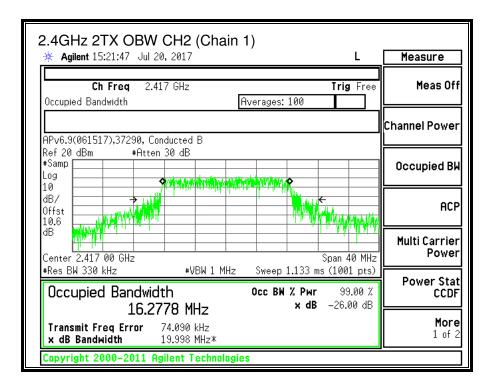
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2.4GHz 2TX OBW CH1 (Chain 0) * Agilent 11:21:43 Jul 20, 2017 L	Measure
Ch Freq 2.412 GHz Trig Fre	e Meas Off
Occupied Bandwidth Averages: 100	Channel Power
APv6.9(061517),37290, Conducted B Ref 20 dBm #Atten 30 dB #Samp Log	Occupied BW
dB/ Offst 10.6	ACP
dB www.minitian	
Image: Solid Kn2 Image: Solid Kn2	Power Stat
Transmit Freq Error 18.682 kHz x dB Bandwidth 20.648 MHz*	More 1 of 2
Copyright 2000–2011 Agilent Technologies	



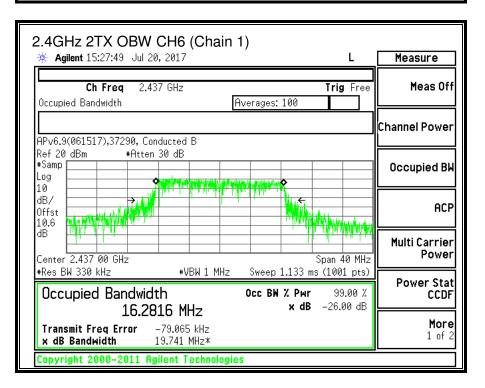
Page 57 of 180

2.4GHz 2TX OBW CH2 (Chain 0)	L	Measure
Ch Freq 2.417 GHz Tr Occupied Bandwidth Averages: 100	ig Free	Meas Off
APv6.9(061517).37290, Conducted B		Channel Power
Ref 20 dBm #Atten 30 dB #Samp		Occupied BW
10 dB/ Offst 10.6 ANAMANANANANANANANANANANANANANANANANANA		ACP
	40 MHz	Multi Carrier Power
#Res BW 330 kHz #VBW 1 MHz Sweep 1.133 ms (10 Occupied Bandwidth Осс ВМ % Рыг 3 16.3532 MHz × dB -20	99.00 %	Power Stat CCDF
Transmit Freq Error -4.829 kHz x dB Bandwidth 20.656 MHz*		More 1 of 2
Copyright 2000–2011 Agilent Technologies		-



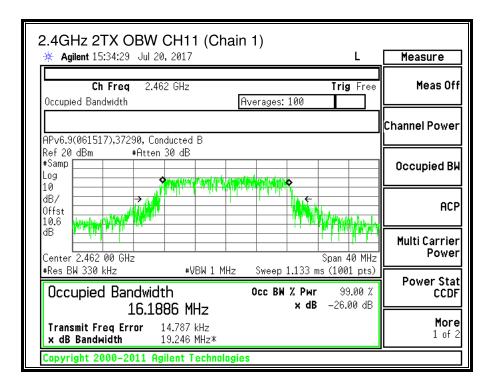
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2.4GHz 2TX OBW CH6 (Chain 0)	L	Measure
Ch Freq 2.437 GHz Occupied Bandwidth Averages: 100	Trig Free	Meas Off
APv6.9(061517),37290, Conducted B		Channel Power
Ref 20 dBm #Atten 30 dB #Samp Log		Occupied BW
	And the second second	ACP
dB Center 2.437 00 GHz	Span 40 MHz	Multi Carrier Power
#Res BW 330 kHz #VBW 1 MHz Sweep 1.133 m Occupied Bandwidth 0cc BW % Рыг 16.3256 MHz × dB		Power Stat CCDF
Transmit Freq Error -39.463 kHz x dB Bandwidth 19.859 MHz*		More 1 of 2
Copyright 2000–2011 Agilent Technologies		-



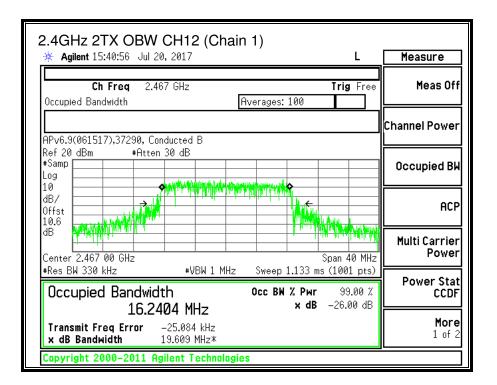
Page 59 of 180

2.4GHz 2TX OBW CH11 (Chain 0)	L	Measure
Ch Freq 2.462 GHz Occupied Bandwidth Averages: 100	Trig Free	Meas Off
		Channel Power
APv6.9(061517),37290, Conducted B Ref 20 dBm #Atten 30 dB #Samp Log		Occupied BW
dB/ Offst 10.6 ₩MMMMMM		ACP
dB	pan 40 MHz	Multi Carrier Power
Occupied Bandwidth Occ BW % Pwr		Power Stat CCDF
Transmit Freq Error34.206 kHzx dB Bandwidth19.350 MHz*		More 1 of 2
Copyright 2000–2011 Agilent Technologies		

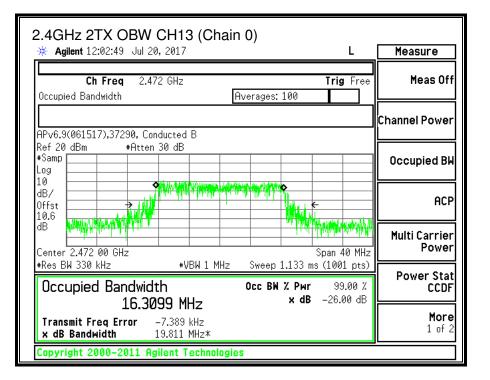


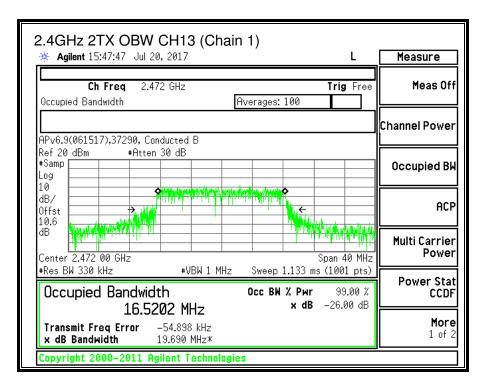
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2.4GHz 2TX OBW CH12 (Chain 0)	Masaura
☆ Agilent 11:58:43 Jul 20, 2017 L	Measure
Ch Freq 2.467 GHz Trig Free	Meas Off
Occupied Bandwidth Averages: 100	
APv6.9(061517),37290, Conducted B	Channel Power
Ref 20 dBm #Atten 30 dB	
#Samp	Occupied BW
Offst	ACP
	Multi Carrier Power
Center 2.467 00 GHz Span 40 MHz #Res BW 330 kHz #VBW 1 MHz Sweep 1.133 ms (1001 pts)	
Occupied Bandwidth Occ BW % Pwr 99.00 %	Power Stat CCDF
16.0475 MHz × dB -26.00 dB	CCDF
Transmit Freg Error 138.764 kHz	More
x dB Bandwidth 19.778 MHz*	1 of 2
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9.3.3. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b) (3)

For systems using digital modulation in the 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

KDB 58074 D01 v04 Section 9.2.3.2

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
-3.70	-5.50	-4.51

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RESULTS

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.51	30.00	30	36	30.00
CH2	2417	-4.51	30.00	30	36	30.00
CH6	2437	-4.51	30.00	30	36	30.00
CH11	2462	-4.51	30.00	30	36	30.00
CH12	2467	-4.51	30.00	30	36	30.00
CH13	2472	-4.51	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margin
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
CH1	2412	13.18	12.88	16.04	30.00	-13.96
CH2	2417	13.65	13.36	16.52	30.00	-13.48
CH6	2437	12.96	13.37	16.18	30.00	-13.82
CH11	2462	13.24	13.11	16.19	30.00	-13.81
CH12	2467	8.57	8.67	11.63	30.00	-18.37
CH13	2472	2.07	2.32	5.21	30.00	-24.79

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

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9.3.4. POWER SPECTRAL DENSITY

LIMITS

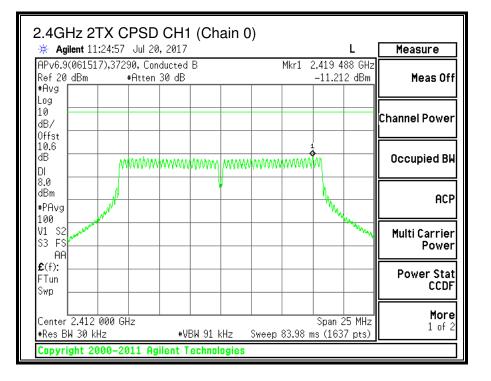
FCC §15.247 (e)

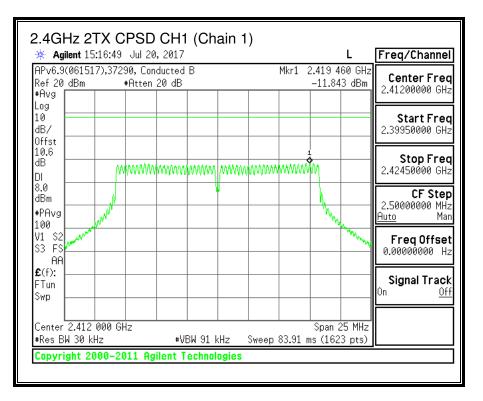
For digitally modulated systems, the power spectral density conducted form the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmissions.

RESULTS

Duty Cycle CF (dB)		0.24	Included	ncluded in Calculations of Corr'd PSD				
PSD Resu	ults							
Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin		
		Meas	Meas	Corr'd				
	(MHz)	(dBm)	(dBm)	PSD				
				(dBm)	(dBm)	(dB)		
CH1	2412	-11.212	-11.843	-8.27	8.0	-16.3		
CH2	2412	-10.574	-11.919	-7.94	8.0	-15.9		
CH6	2437	-10.825	-11.222	-7.77	8.0	-15.8		
CH11	2462	-11.019	-11.898	-8.19	8.0	-16.2		
CH12	2467	-16.623	-16.130	-13.12	8.0	-21.1		
CH13	2472	-22.152	-22.714	-19.17	8.0	-27.2		

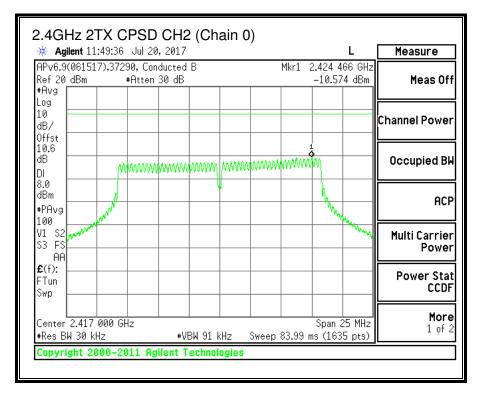
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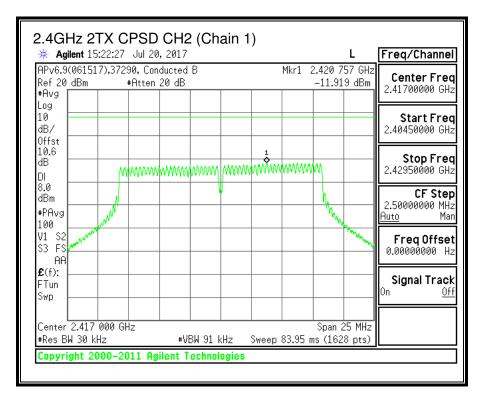




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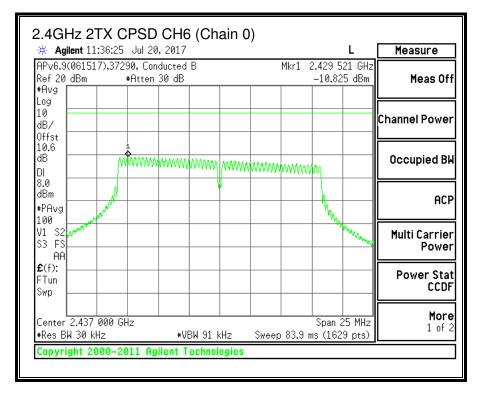
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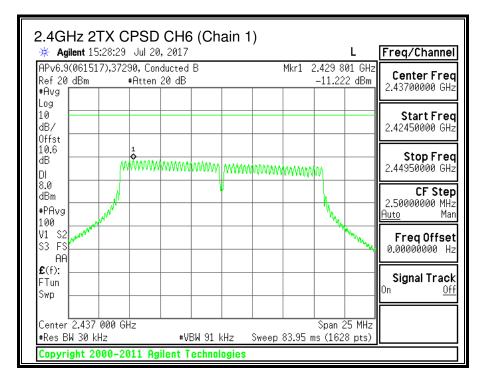




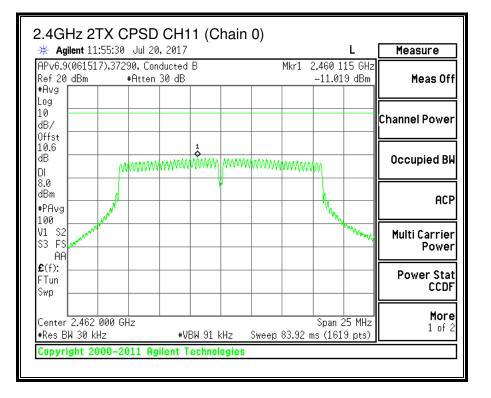
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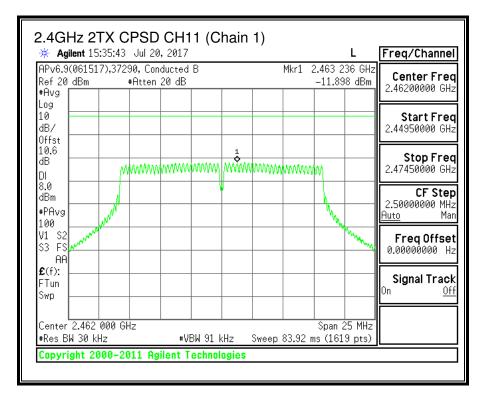
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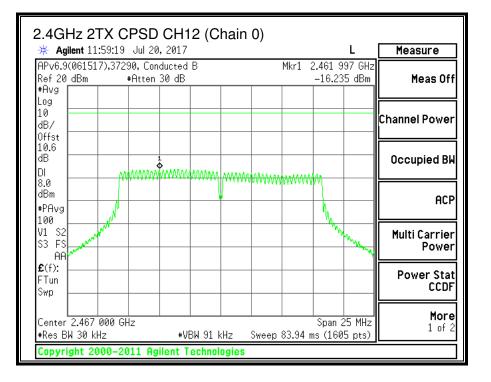
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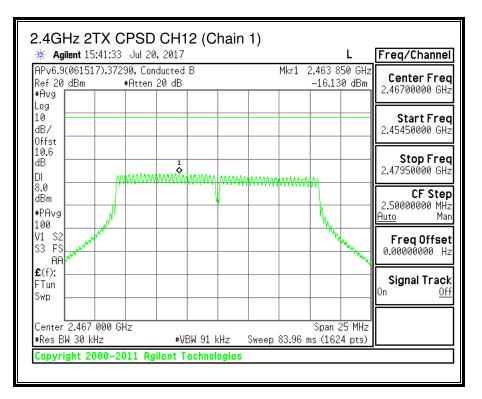




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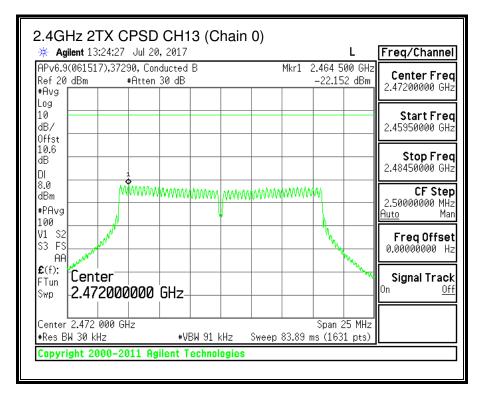
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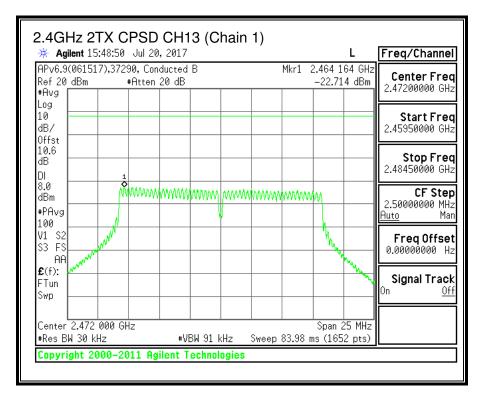




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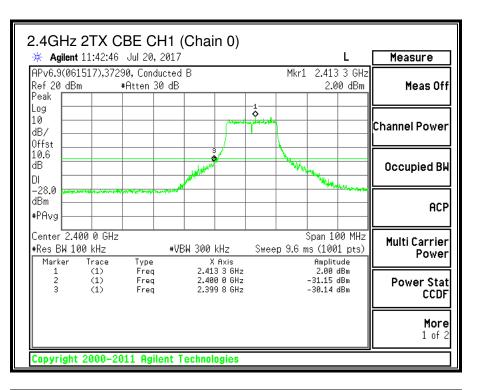
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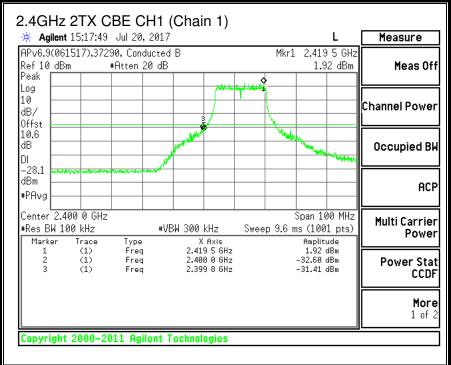


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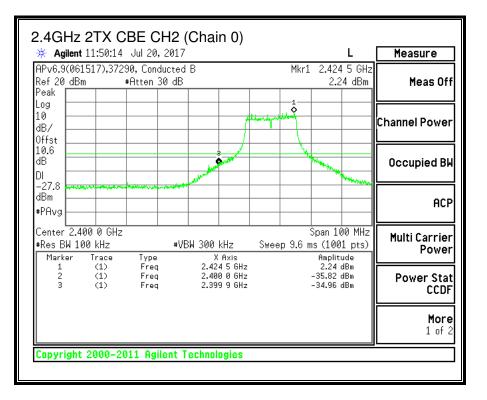


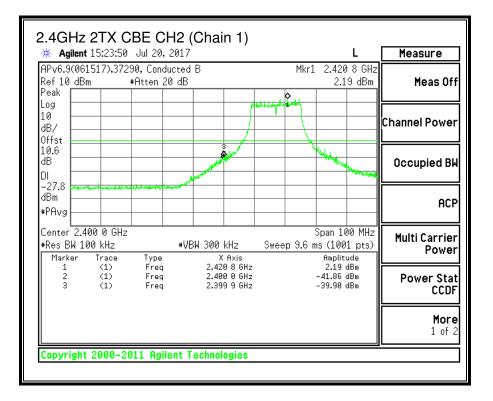
9.3.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS



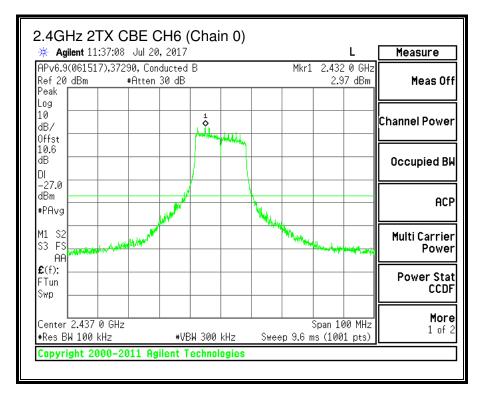
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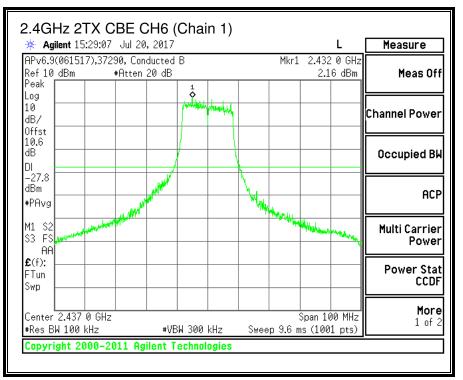
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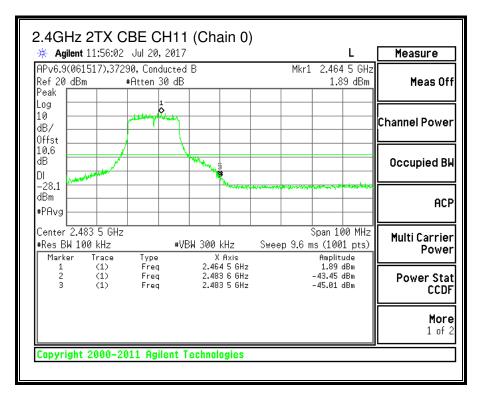
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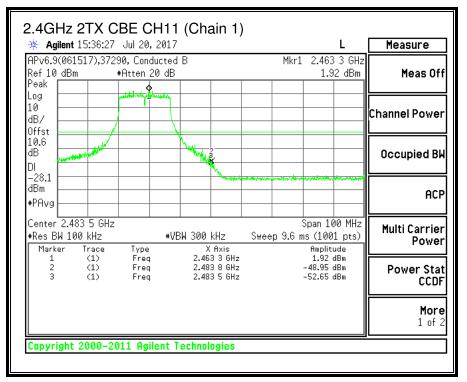




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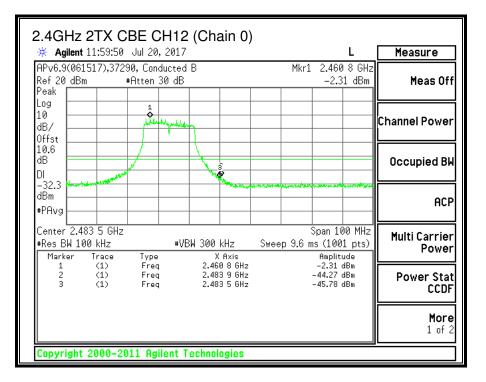
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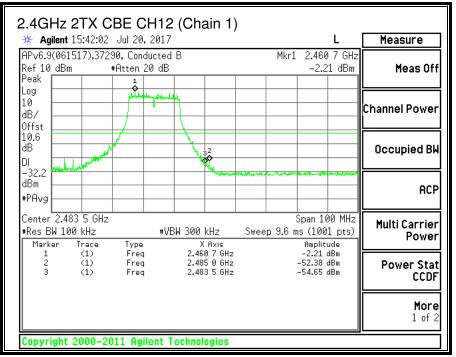


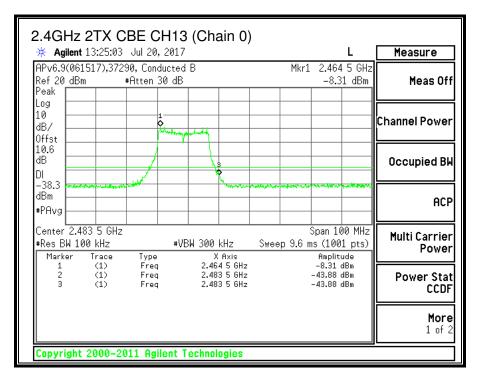


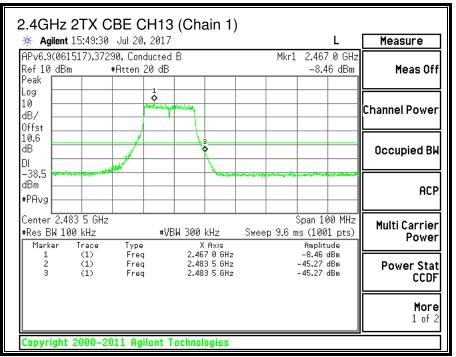
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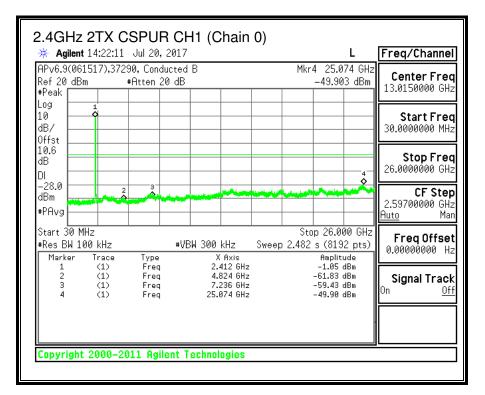
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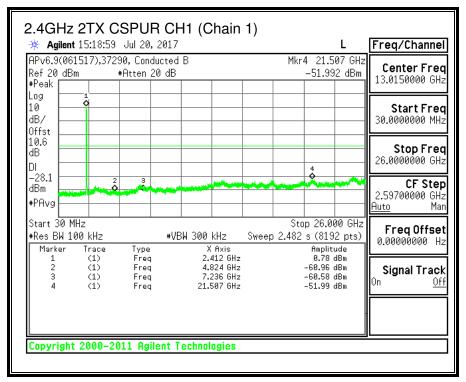




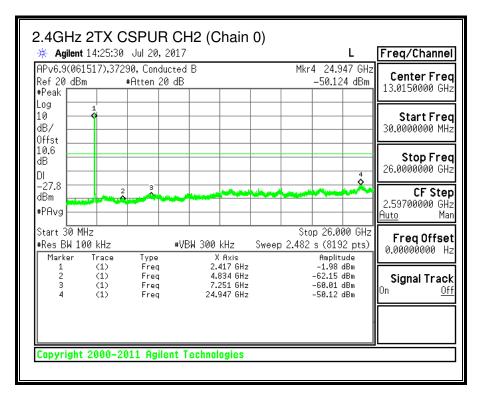


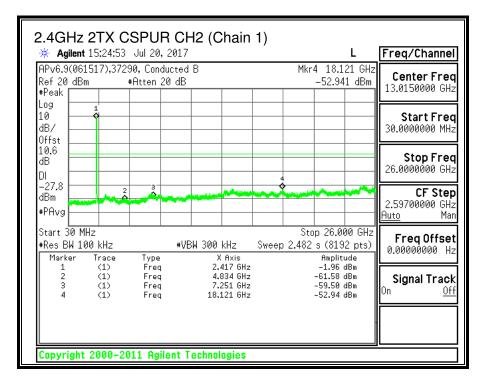




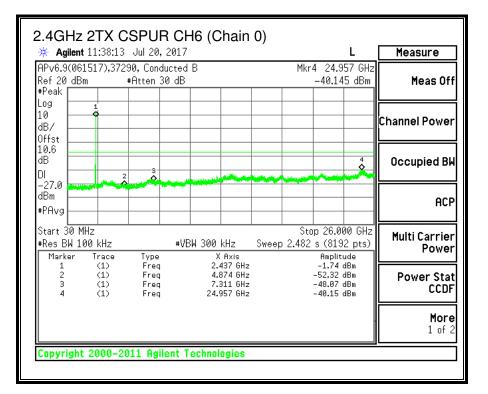


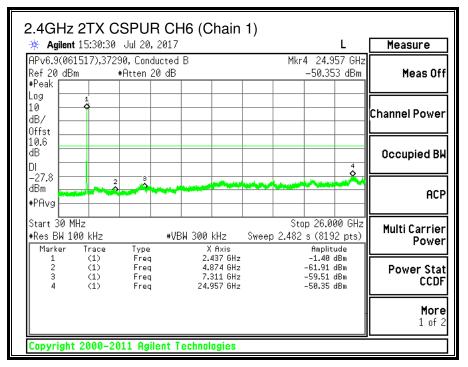
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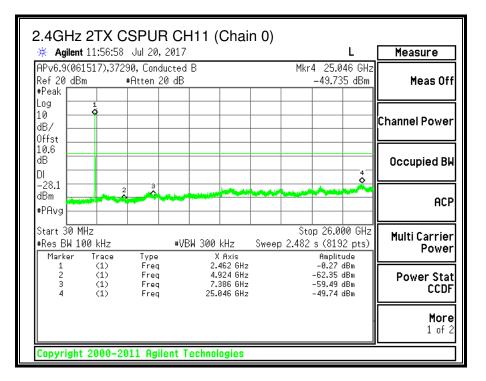


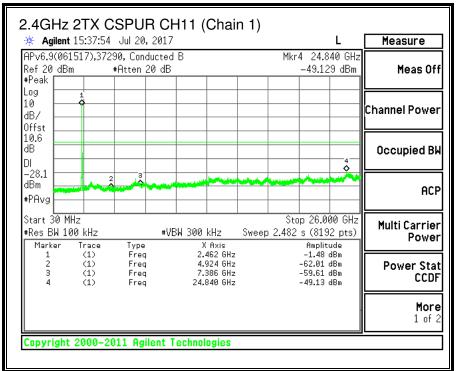
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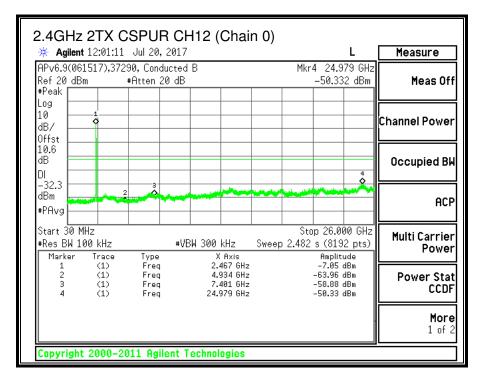
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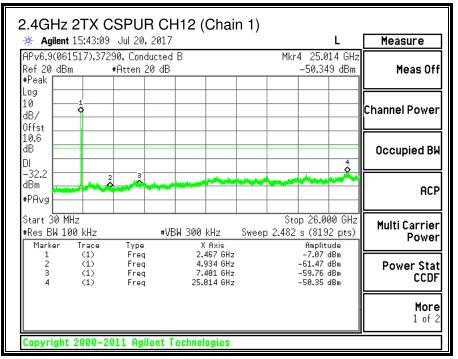


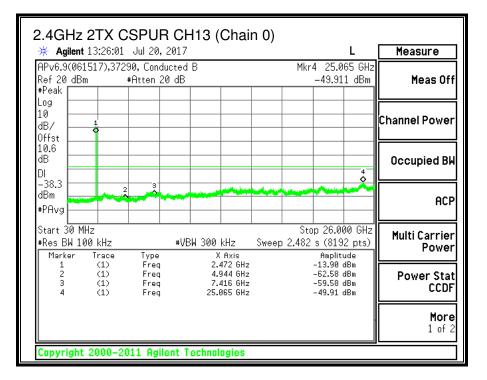


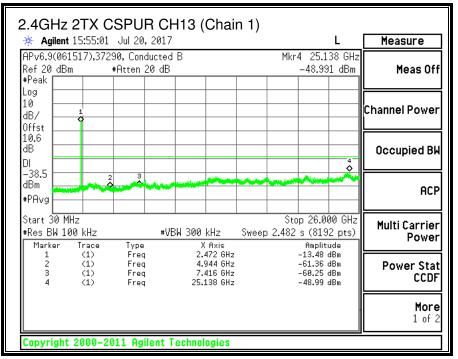
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9.4. 11n HT20 2TX CDD MIMO MODE IN THE 2.4GHz BAND

9.4.1. 6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

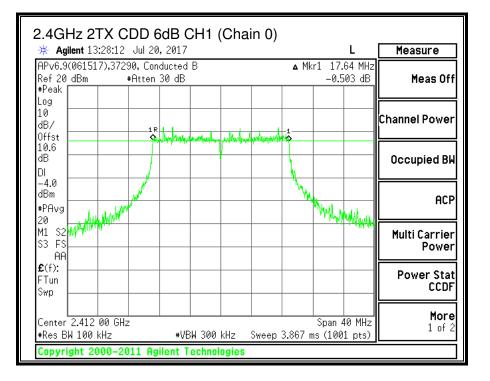
The minimum 6 dB bandwidth shall be at least 500 kHz.

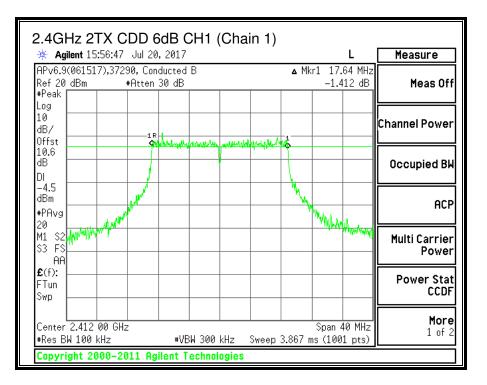
RESULTS

Channel	Frequency	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	17.64	17.64	0.5
CH2	2417	17.64	17.60	0.5
CH6	2437	16.28	17.68	0.5
CH11	2462	17.68	17.68	0.5
CH12	2467	17.76	17.64	0.5
CH13	2472	17.76	17.68	0.5

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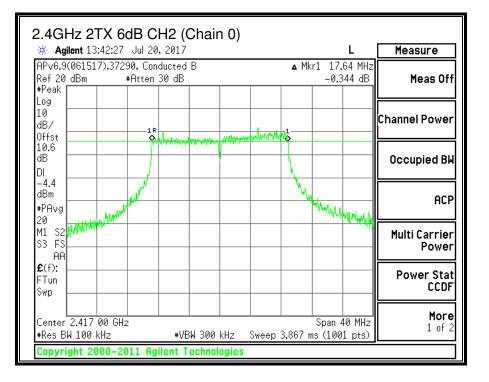
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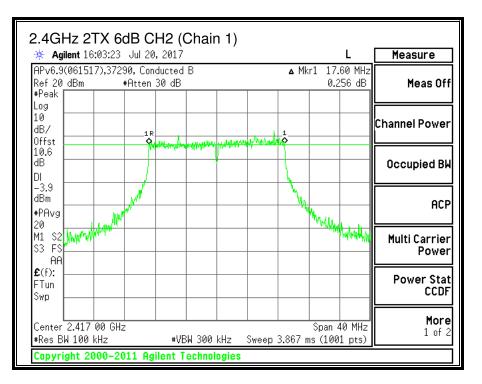




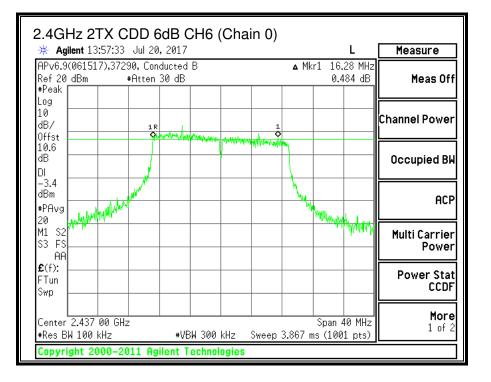
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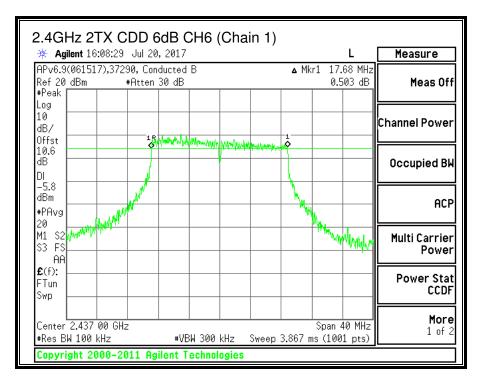
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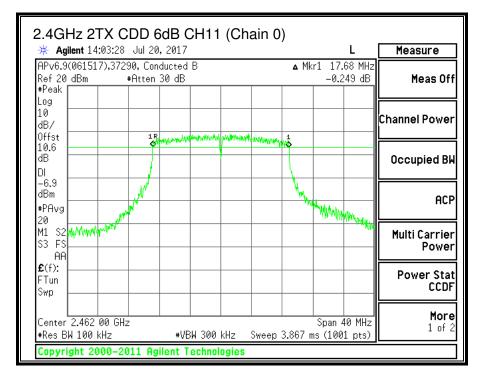
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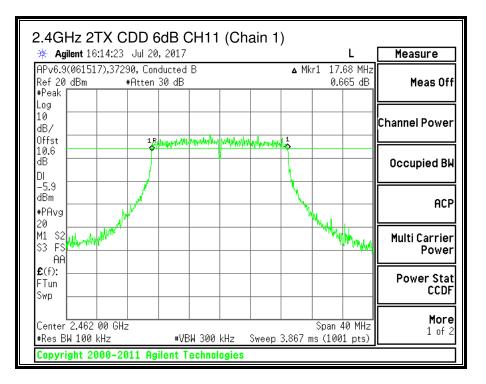




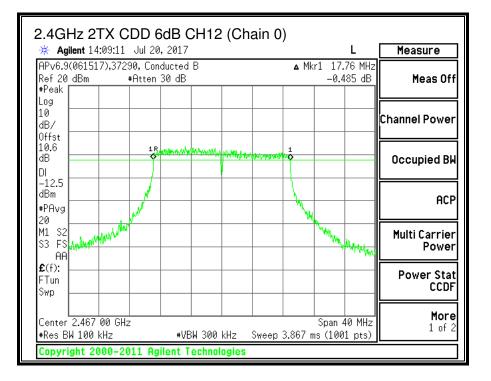
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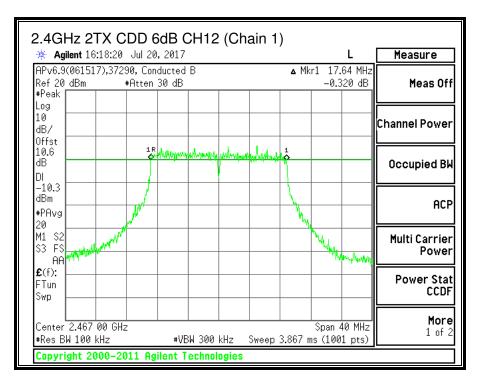
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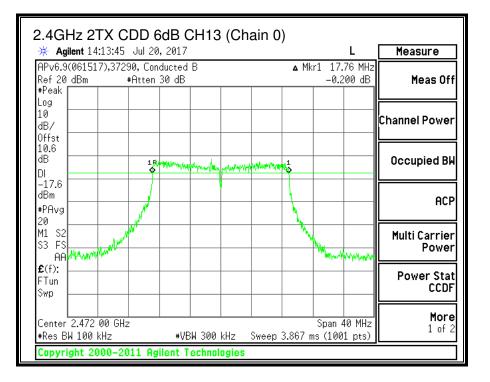


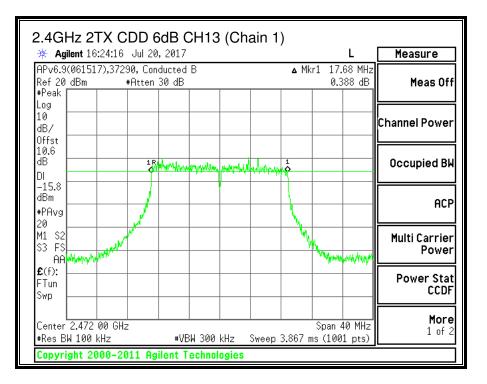
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9.4.2. 99% BANDWIDTH

LIMITS

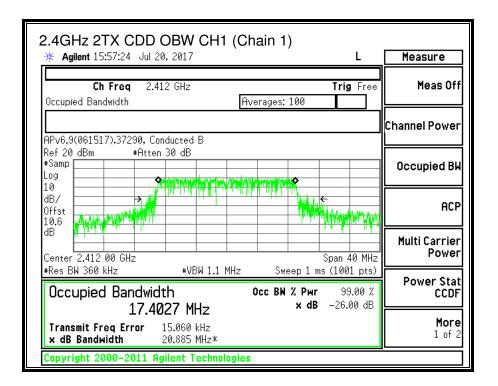
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	17.615	17.403
CH2	2417	17.559	17.574
CH6	2437	17.483	17.384
CH11	2462	17.384	17.408
CH12	2467	17.427	17.485
CH13	2472	17.531	17.502

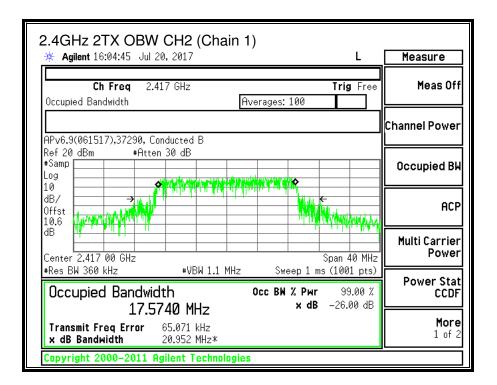
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2.4GHz 2TX CDD OBW CH1 (Chain 0)	L Me	asure
	I Free	Meas Off
APv6.9(061517),37290, Conducted B	Chanr	iel Power
Ref 20 dBm #Atten 30 dB #Samp	000	upied BW
10 dB/ Offst 10.6		ACP
	40 MHz	ti Carrier Power
#Res BW 360 kHz #VBW 1.1 MHz Sweep 1 ms (100 Occupied Bandwidth Осс ВW % Рыг 95 17.6152 MHz × dB -26.	9.00 % PC	ower Stat CCDF
Transmit Freq Error -63.318 kHz x dB Bandwidth 21.714 MHz*		More 1 of 2
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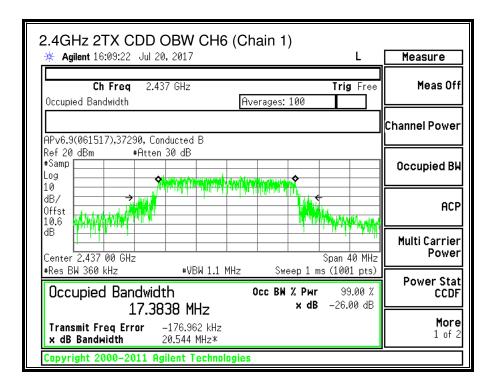
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2.4GHz 2TX OBW CH2 (Chain * Agilent 13:43:40 Jul 20, 2017	0)	L	Measure
Ch Freq 2.417 GHz		Free	Meas Off
	Averages: 100		Channel Power
APv6.9(061517),37290, Conducted B Ref 20 dBm #Atten 30 dB #Samp			Occupied BW
dB/		M#7/4	ACP
dB	Span 4 Sweep 1 ms (100)		Multi Carrier Power
Occupied Bandwidth 17.5591 MHz	Occ BW % Pwr 99 × dB -26.0	.00 %	Power Stat CCDF
Transmit Freq Error 10.950 kHz x dB Bandwidth 21.510 MHz*			More 1 of 2
Copyright 2000–2011 Agilent Technologie	S		



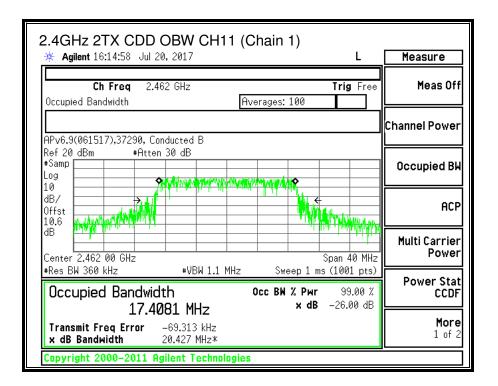
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2.4GHz 2TX CDD OBW CH6 (Chain 0) * Agilent 13:58:38 Jul 20, 2017	L	Measure
Ch Freq 2.437 GHz	Trig Free	Meas Off
Occupied Bandwidth Averages: 100		Channel Power
APv6.9(061517),37290, Conducted B Ref 20 dBm #Atten 30 dB #Samp Log		Occupied BW
dB/ Offst 10.6		ACP
dB	Span 40 MHz	Multi Carrier Power
Occupied Bandwidth Occ BW % P	1 ms(1001 pts) Mar 99.00 % dB -26.00 dB	Power Stat CCDF
Transmit Freq Error –73.062 kHz x dB Bandwidth 20.943 MHz*		More 1 of 2
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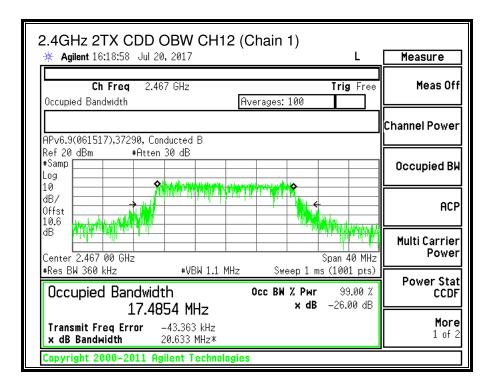
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2.4GHz 2TX CDD OBW CH11 (Chain 0)	
✤ Agilent 14:04:11 Jul 20, 2017	Measure
Ch Freq 2.462 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
APv6.9(061517),37290, Conducted B	Channel Power
Ref 20 dBm #Atten 30 dB #Samp Log	Occupied BW
dB/ Offst 10.6 APACAL AND	ACP
dB Image: Center 2.462 00 GHz Span 40 MHz #Res BW 360 kHz #VBW 1.1 MHz Sweep 1 ms (1001 pts)	Multi Carrier Power
Occupied Bandwidth осс вм % Рыг 99.00 % 17.3836 MHz × dB -26.00 dB	Power Stat CCDF
Transmit Freq Error -39.282 kHz x dB Bandwidth 20.807 MHz*	More 1 of 2
Copyright 2000–2011 Agilent Technologies	

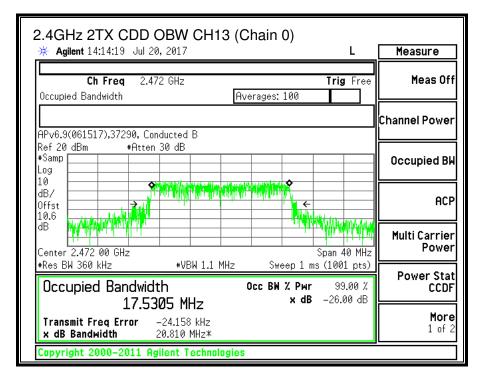


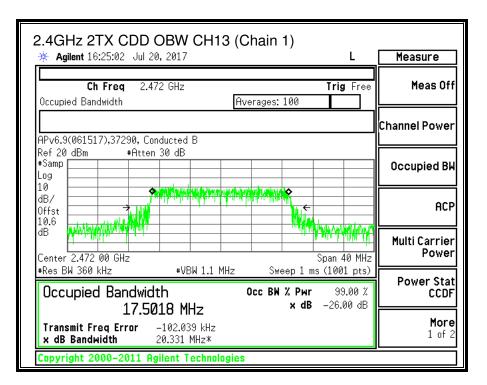
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2.4GHz 2TX CDD OBW CH12 (Chain 0)	
★ Agilent 14:09:51 Jul 20, 2017	Measure
Ch Freq 2.467 GHz Trig Free Occupied Bandwidth Averages: 100	Meas Off
APv6.9(061517),37290, Conducted B	Channel Power
Ref 20 dBm #Atten 30 dB	
#Samp	Occupied BW
10 dB/ Offst 10.6 Http://data.off.com/	ACP
dB Center 2.467 00 GHz Span 40 MHz	Multi Carrier Power
#Res BW 360 kHz	Power Stat
Occupied Bandwidth Occ BW % Pwr 99.00 %	CCDF
17.4267 MHz × dB -26.00 dB	
Transmit Freq Error -115.158 kHz x dB Bandwidth 20.958 MHz*	More 1 of 2
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9.4.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

For systems using digital modulation in the 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

KDB 58074 D01 v04 Section 9.2.3.2

DIRECTIONAL ANTENNA GAIN

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

Chain 0	Chain 1	Uncorrelated Chains
Antenna	Antenna	Directional
Gain	Gain	Gain
(dBi)	(dBi)	(dBi)
-3.70	-5.50	-4.51

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RESULTS

ID: 39317 **Date:** 07/21/17

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.51	30.00	30	36	30.00
CH2	2417	-4.51	30.00	30	36	30.00
CH6	2437	-4.51	30.00	30	36	30.00
CH11	2462	-4.51	30.00	30	36	30.00
CH12	2467	-4.51	30.00	30	36	30.00
CH13	2472	-4.51	30.00	30	36	30.00

Results

Channel	Frequency	Chain 0	Chain 1	Total	Power	Margin
		Meas	Meas	Corr'd	Limit	
		Power	Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dBm)	(dB)
CH1	2412	13.44	13.23	16.35	30.00	-13.65
CH2	2417	13.26	13.02	16.15	30.00	-13.85
CH6	2437	13.37	13.04	16.22	30.00	-13.78
CH11	2462	13.22	13.32	16.28	30.00	-13.72
CH12	2467	7.63	7.95	10.80	30.00	-19.20
CH13	2472	2.14	2.39	5.28	30.00	-24.72

Note: the power readings above were measured with gated method, and the measurement was taken only during the ON time. No duty cycle correction was necessary.

9.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

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

RESULTS

Duty Cycle CF (dB) 0.20 Included in Calculations of Corr'c						d PSD	
PSD Results							
Channel	Frequency	Chain 0	Chain 1	Total	Limit	Margin	
		Meas	Meas	Corr'd			
	(MHz)	(dBm)	(dBm)	PSD			
				(dBm)	(dBm)	(dB)	
CH1	2412	-11.776	-12.445	-8.89	8.0	-16.9	
CH2	2417	-11.074	-11.876	-8.25	8.0	-16.2	
CH6	2437	-11.175	-11.514	-8.13	8.0	-16.1	
CH11	2462	-11.510	-12.001	-8.54	8.0	-16.5	
CH12	2467	-17.401	-17.415	-14.20	8.0	-22.2	
CH13	2472	-22.391	-22.941	-19.45	8.0	-27.4	

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