

CERTIFICATION TEST REPORT

Report Number. : 12097277-E4V1

- Applicant : SONY MOBILE COMMUNICATIONS, INC. 4-12-3 HIGASHI-SHINAGAWA, SHINAGAWA -KU,TOKYO, 140-0002, JAPAN
 - FCC ID : PY7-72474U
- EUT Description : GSM/WCDMA/LTE PHONE with BT, DTS/UNII a/b/g/n/ac & NFC
- Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:

January 24, 2018

Prepared by:

UL Verification Services Inc. 47173 Benicia Street Fremont, CA 94538, U.S.A. TEL: (510) 771-1000 FAX: (510) 661-0888



		Revision History	
Rev.	lssue Date	Revisions	Revised By
V1	01/24/18	Initial Issue	Dan 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 & NFC
SERIAL NUMBER:	RADIATED: BH90006RAY & BH900083AY CONDUCTED: BH90005MAY & BH9000ALAY
DATE TESTED:	December 26, 2017 – January 19, 2018

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

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.

Approved & Released For UL Verification Services Inc. By:

DAN CORONIA OPERATIONS LEADER UL VERIFICATION SERVICES INC.

Prepared By:

KIYA KEDIDA PROJECT ENGINEER UL VERIFICATION SERVICES INC.

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 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 under Industry Canada company address code 22541 with site numbers 22541 -1 through 22541-5, respectively.

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
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 & NFC.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows:

Frequency Range	Mode	Output Power	Output Power
(MHz)		(dBm)	(mW)
2412 - 2472	802.11b 2TX	15.73	37.41
2412 - 2472	802.11g 2TX	15.35	34.28
2412 - 2472	802.11n HT20 2TX CDD	15.55	35.89

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a loop antenna for chain 0 and a monopole antenna for chain 1, with the maximum gains:

Frequency Band	Antenna	Gain (dBi)
(GHz)	Chain 0	Chain 1
2.4	-1.90	-8.80

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, using the following two configurations, AC/DC Adapter and headphone. It was determined that X-Axis with only AC/DC Adapter was worst-case orientation; therefore, all final radiated testing was performed with the EUT in X-Axis with AC/DC Adapter 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.

NOTE: SISO mode is covered by MIMO mode due to same maximum tune-up limit (power).

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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	1309-8864.1	VB17W46601037	NA			
DC Power Supply	Ametek	XT 15-4	T463	NA			

I/O CABLES (CONDUCTED TEST)

	I/O Cable List							
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)

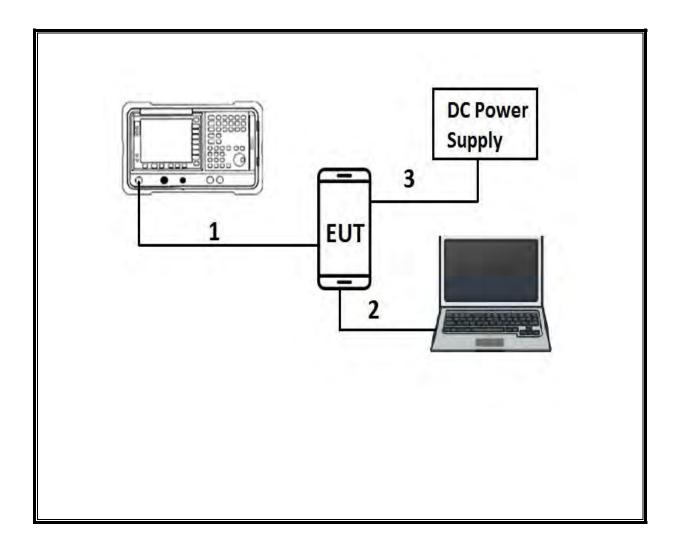
	I/O Cable List						
Cable	Port	# of identical	Connector	Cable Type	Cable	Remarks	
No		ports	Туре		Length (m)		
1	USB	1	USB	Shielded	3	N/A	

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TEST SETUP

CONDUCTED TEST SETUP DIAGRAM

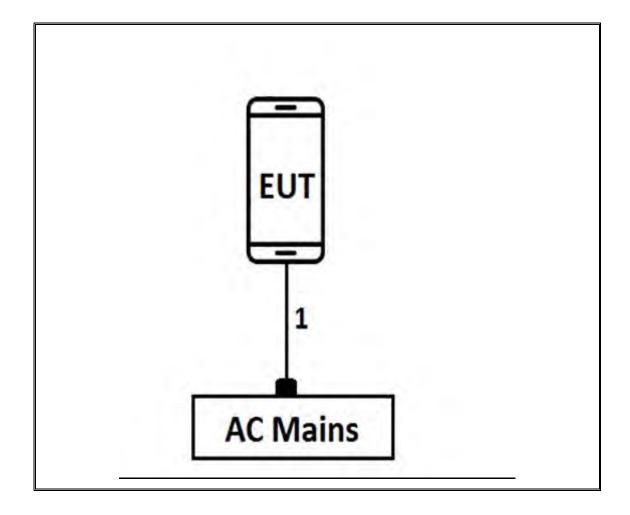


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TEST SETUP

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	Т899	06/15/2018			
Antenna, Active Loop 9kHz-30MHz	Com-Power Corp.	AL-130R	T1866	10/10/2018			
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T863	06/09/2018			
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T711	01/30/2018			
Antenna, Horn 18-26.5GHz	ARA	MWH-1826	T449	06/12/2018			
Power Meter, P-series single channel	Agilent (Keysight) Technologies	N1911A	T1268	06/15/2018			
Power Sensor, P – series, 50MHz to 18GHz, Wideband	Agilent (Keysight) Technologies	N1921A	T1223	03/29/2018			
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25- S-42	T742	11/29/2018			
Amplifier, 1 - 18GHz	MITEQ	AFS42-00101800-25- S-42	T1131	06/29/2018			
Pre Amplifier, 1-26.5GHz	Agilent	8449B	T404	7/23/2018			
Amplifier, 10kHz-1GHz	Agilent (Keysight) Technologies	8447D	T10	02/15/2018			
Amplifier, 1-8GHz	MITEQ	AMF-4D-01000800- 30-29P	T1169	06/29/2018			
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T428	11/29/2018			
Filter, HPF 3.0GHz	MICRO-TRONICS	HPM17543	T426	06/29/2018			
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1210	07/17/2018			
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T341	11/12/2018			
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T1113	12/21/2018			
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent (Keysight) Technologies	N9030A	T907	01/23/2018			
Test Receiver, EMI, 10Hz-7GHz	Rhode&Schwarz	ESR	T1436	01/06/2018			
LISN	FISCHER	FCC-LISN-50/250-25- 2-01	T1310	01/17/2018			

Test Software List						
Description	Manufacturer	Model	Version			
Radiated Software	UL	UL EMC	Ver 9.5, Dec 01, 2016			
Conducted Software	UL	UL EMC	Ver 9.5, May 26, 2015			
Antenna Port Software	UL	UL RF	Ver 7.7, Dec 14, 2017			

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

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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	on < 54dBuV/m		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.

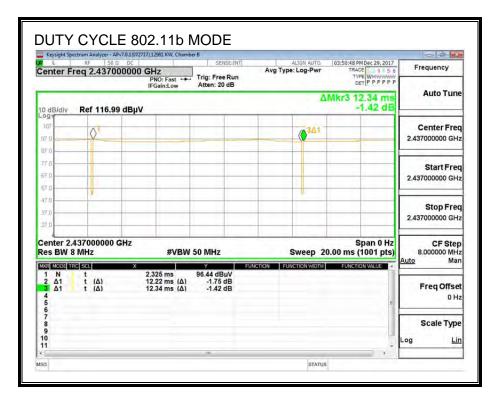
ON TIME AND DUTY CYCLE RESULTS

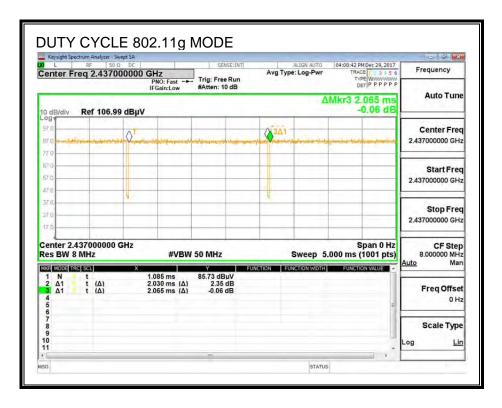
Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/T
			x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
802.11b	12.220	12.340	0.99	99.03%	0.00	0.01
802.11g	2.030	2.065	0.98	98.31%	0.00	0.01
802.11n HT20 CDD	2.510	2.585	0.97	97.10%	0.13	0.40

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

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DUTY CYCLE PLOTS





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L RF S0.0 DC SERSEINT ALIGN AUTO Det 29, 2017 enter Freq 2.437000000 GHz Trig: Free Run #Atten: 10 dB Augr Type: Log-Pwr Trace: S3.3 5 o Trace S3.4 5 o Trace Trig: Free Run #Atten: 10 dB Augr Type: Log-Pwr Trace: S3.3 5 o Trace S3.4 5 o Trace Trace S3.4 5 o Trace S3.4 5 o Trace Trace S3.4 5 o Trace Trace S3.4 5 o Trace S3.4 5 o Trace S3.4 5 o Trace S3.4 1 o	
PNCF hast Ingr. 10 dB Derli ^p PP PP P dB/div Ref 106.99 dBµV 0.24 dB 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Auto Tur Center Fre 2.437000000 GH
dB/div Ref 106.99 dBµV 0.24 dB	Center Fre 2.437000000 GH
	2.437000000 GH
	2.437000000 GH
	Start Fre
	Start Fre
	2.437000000 GH
	Stop Fre
	2.437000000 GH
enter 2.437000000 GHz Span 0 Hz es BW 8 MHz #VBW 50 MHz Sweep 5.000 ms (1001 pts)	CF Ste 8.000000 MH
	Auto Ma
1 N t 1,450 ms 83.89 dBuV	-
2 Δ1 t (Δ) 2.510 ms (Δ) 2.77 dB 3 Δ1 t (Δ) 2.586 ms (Δ) 0.24 dB	Freq Offs
5 E	01
	Coole Tre
	Scale Typ

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

9.2.1. 6 dB BANDWIDTH

LIMITS

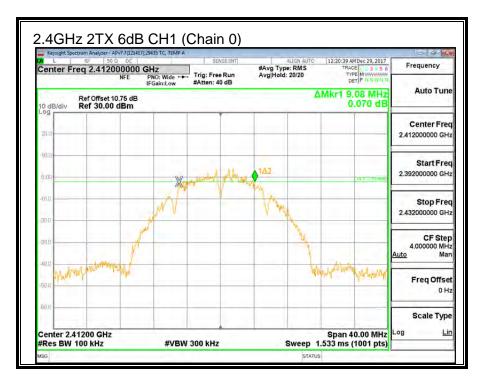
FCC §15.247 (a) (2)

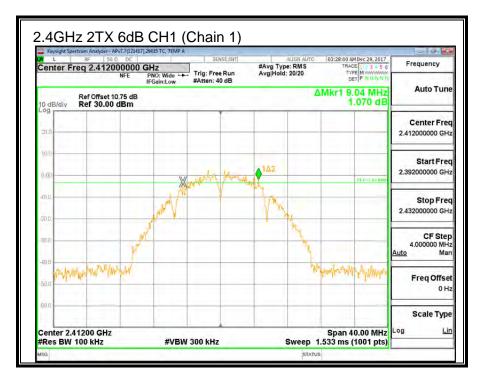
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency (MHz)	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	9.08	9.04	0.5
CH6	2437	8.28	8.68	0.5
CH11	2462	9.08	9.08	0.5
CH12	2467	8.08	8.56	0.5
CH13	2472	8.12	9.08	0.5

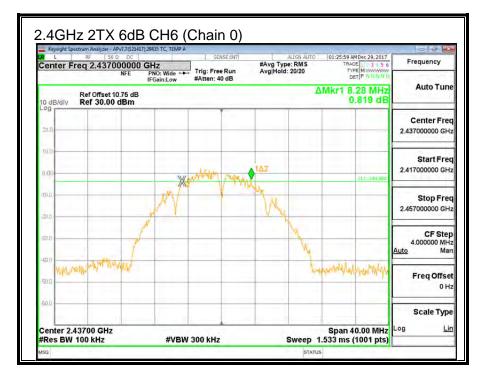
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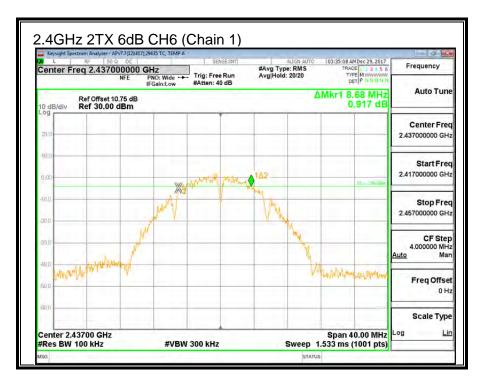




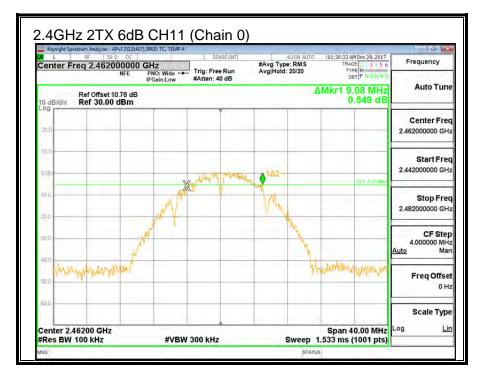
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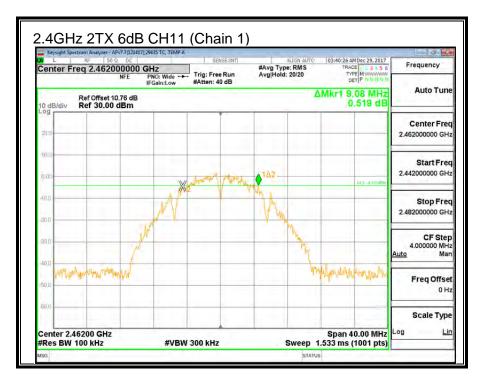
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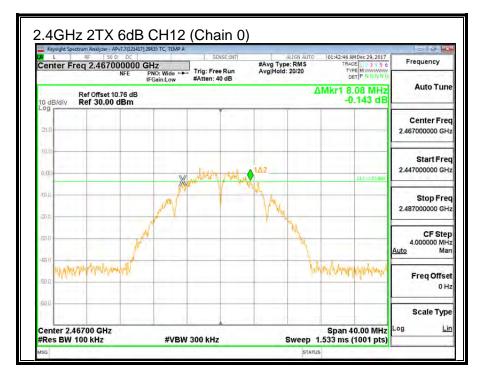


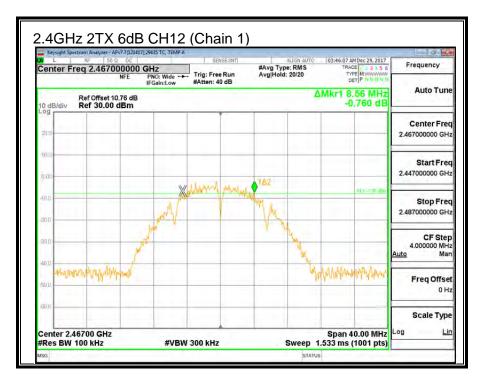
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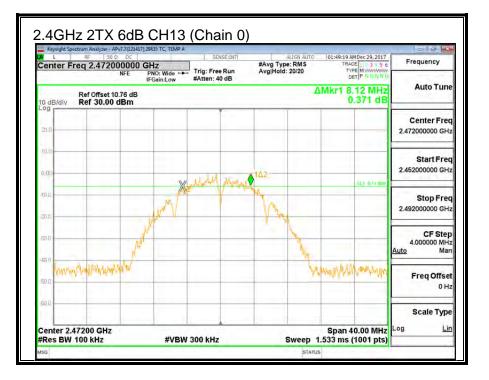


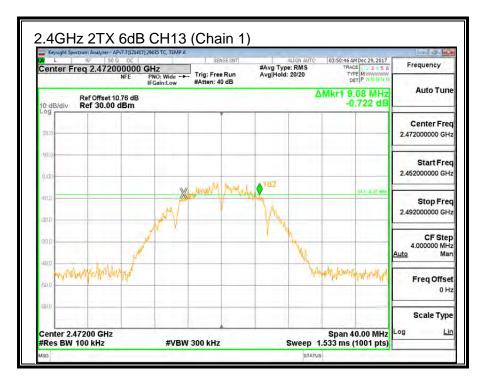
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9.2.2. 99% BANDWIDTH

LIMITS

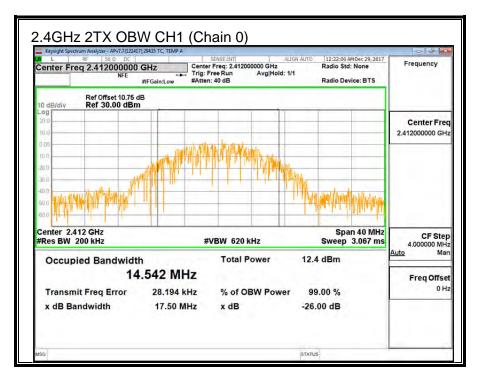
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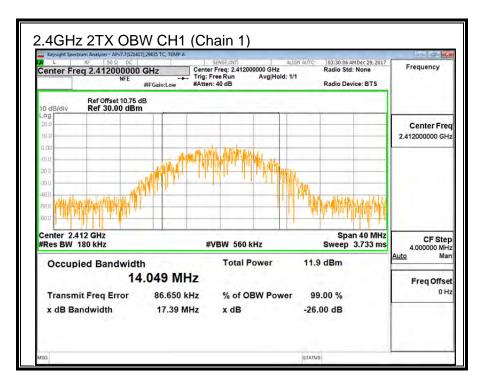
RESULTS

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	14.542	14.049
CH6	2437	13.983	14.349
CH11	2462	13.547	13.958
CH12	2467	13.681	14.188
CH13	2472	14.091	13.999

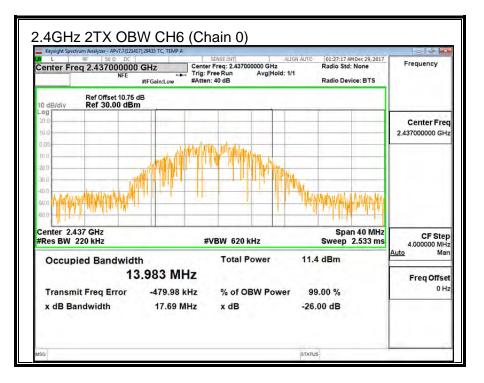
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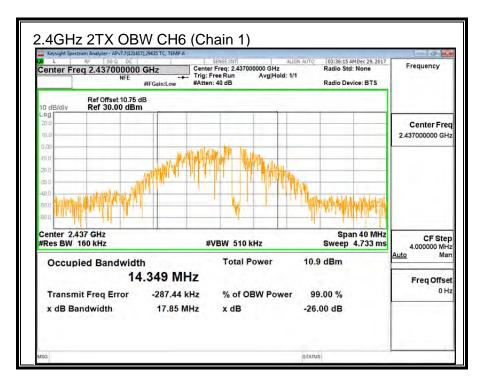
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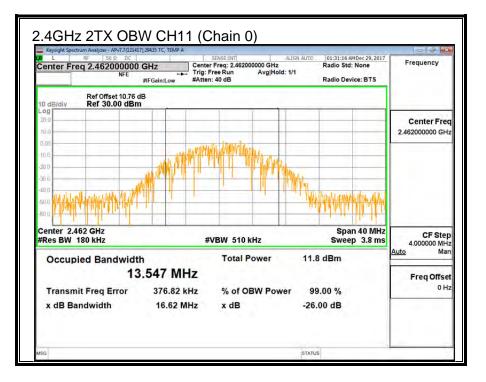


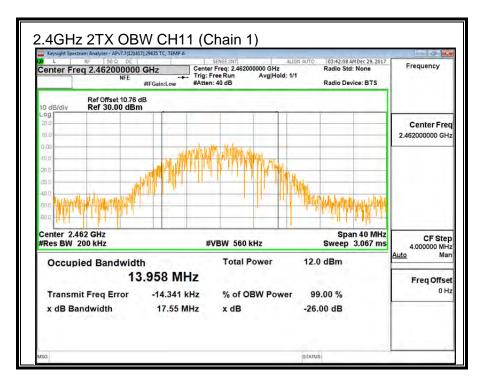
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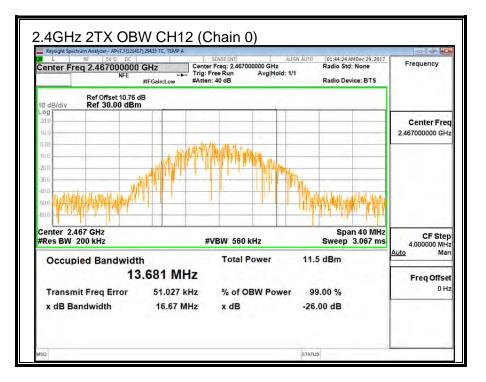


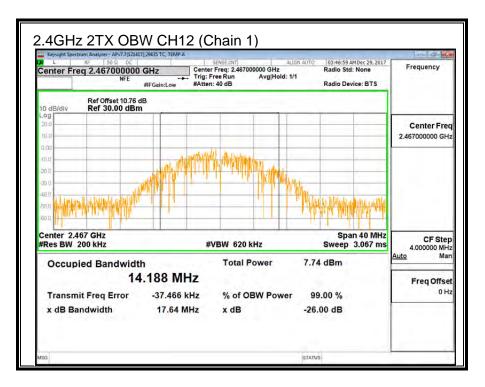
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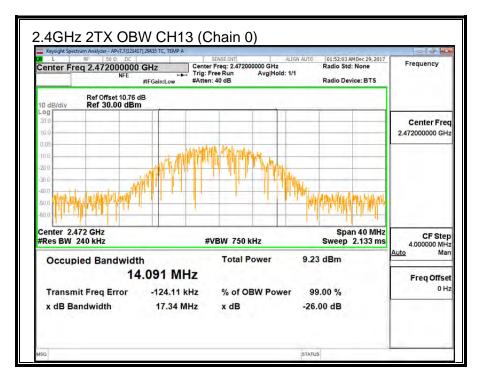
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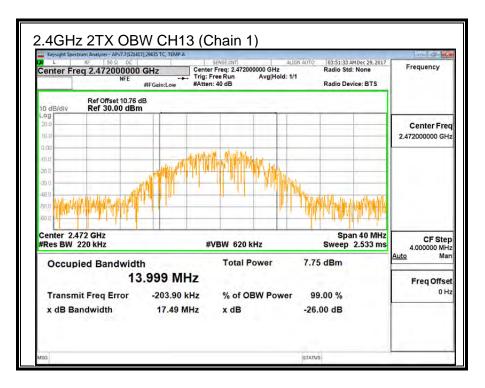




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9.2.3. OUTPUT POWER

<u>LIMITS</u>

FCC §15.247 (b) (3) IC RSS-247 (5.4) (4)

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)
-1.90	-8.80	-4.10

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RESULTS

ID: GE43578	Date:	1/7/17
-------------	-------	--------

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.10	30.00	30	36	30.00
CH6	2437	-4.10	30.00	30	36	30.00
CH11	2462	-4.10	30.00	30	36	30.00
CH12	2467	-4.10	30.00	30	36	30.00
CH13	2472	-4.10	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	12.47	12.71	15.60	30.00	-14.40
CH6	2437	12.53	12.90	15.73	30.00	-14.27
CH11	2462	12.10	12.84	15.50	30.00	-14.50
CH12	2467	12.15	12.81	15.50	30.00	-14.50
CH13	2472	9.88	12.88	14.64	30.00	-15.36

<u>Note:</u> 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

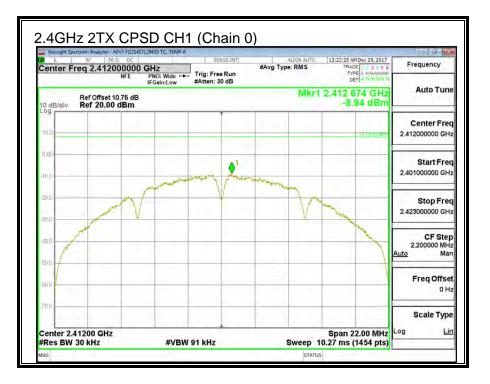
FCC §15.247 (e)

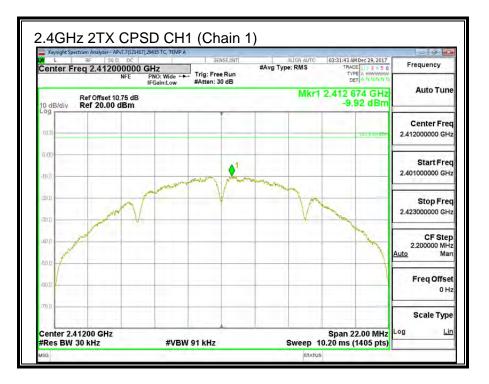
For digitally modulated systems, the power spectral density conducted form the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmissions.

RESULTS

Duty C	ycle CF (dB)	0.00	0.00 Included in Calculations of Corr'd PS					
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	-8.94	-9.92	-6.39	8.0	-14.4		
CH6	2437	-10.67	-9.85	-7.23	8.0	-15.2		
CH11	2462	-10.03	-9.61	-6.80	8.0	-14.8		
CH12	2467	-10.06	-9.24	-6.62	8.0	-14.6		
CH13	2472	-12.96	-9.55	-7.92	8.0	-15.9		

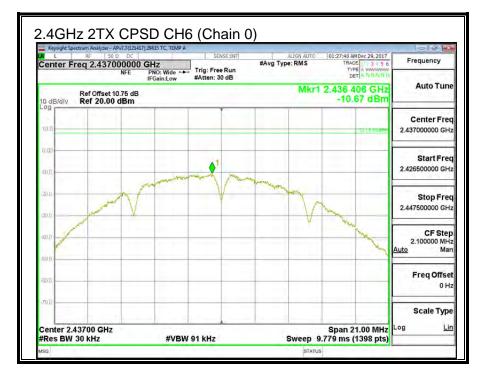
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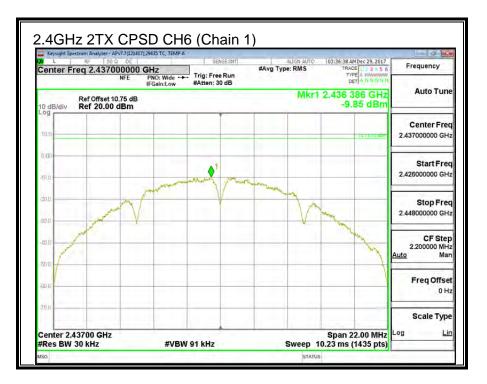




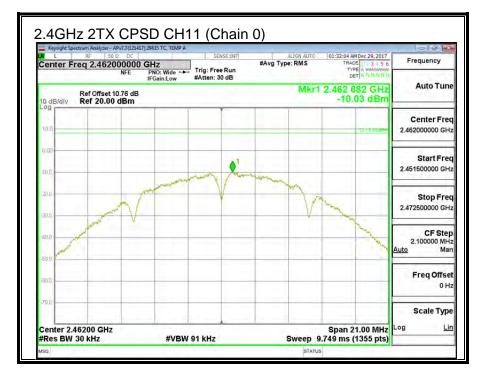
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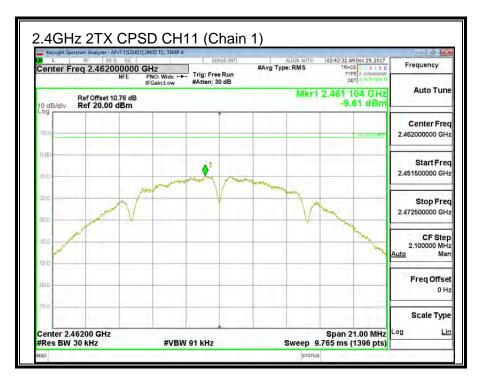
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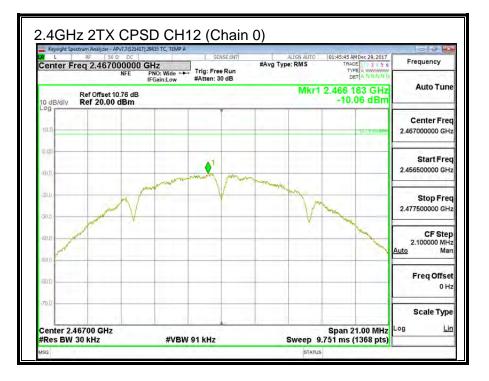


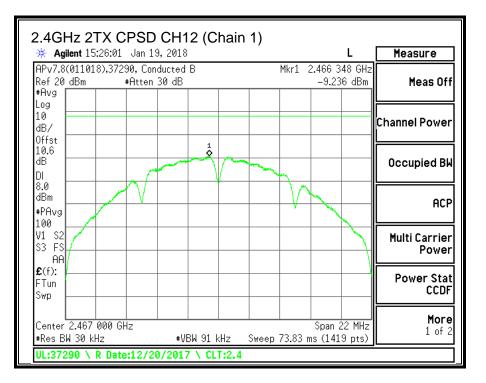
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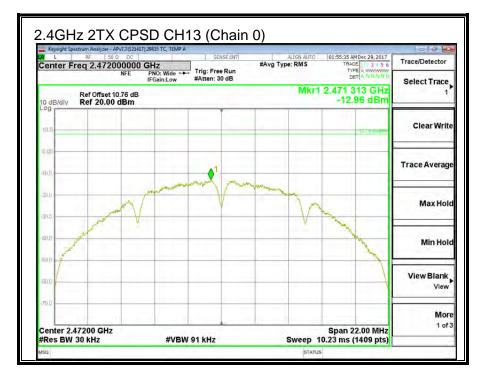
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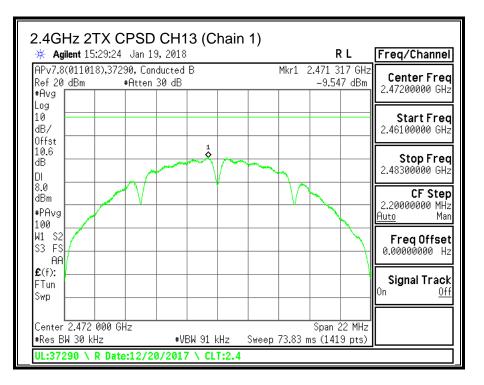




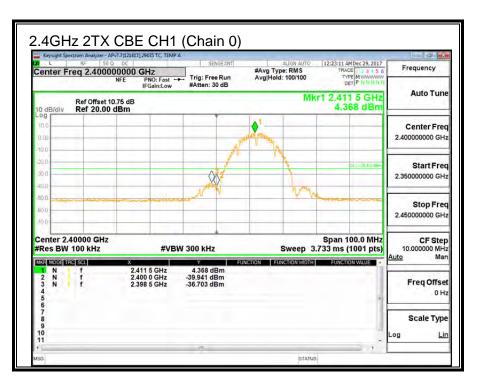
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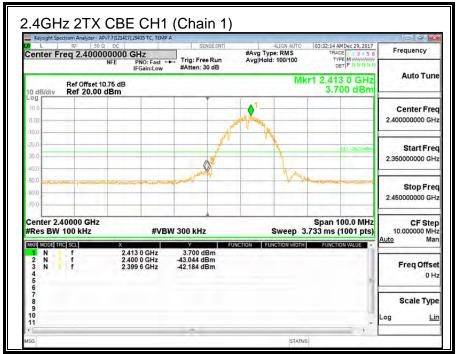




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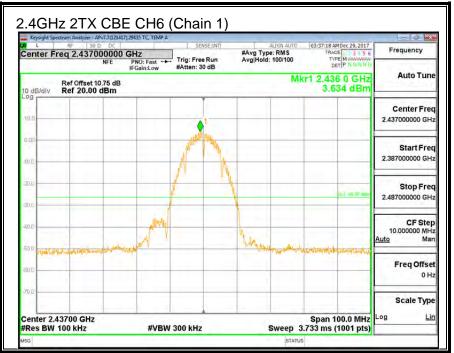


9.2.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

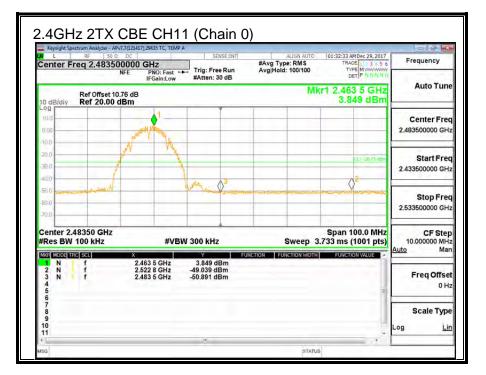


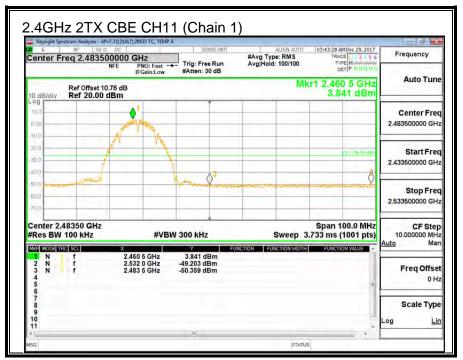
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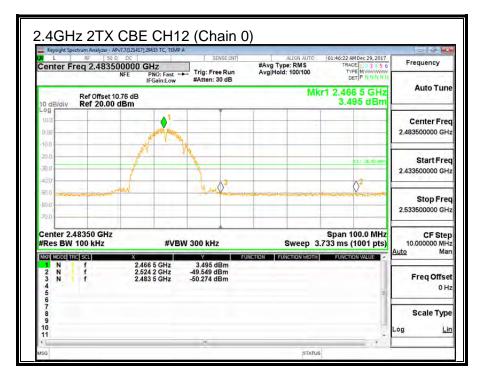


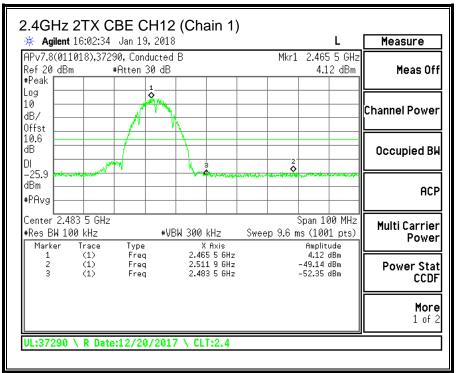
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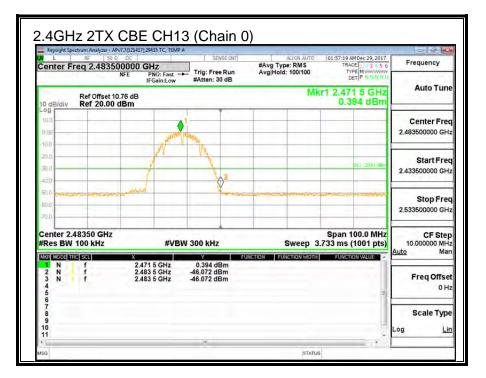
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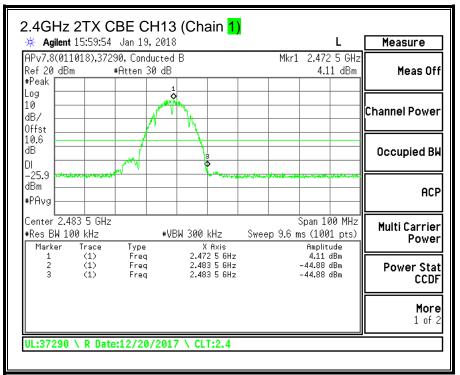




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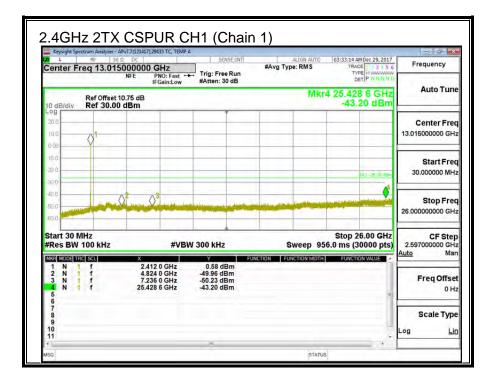




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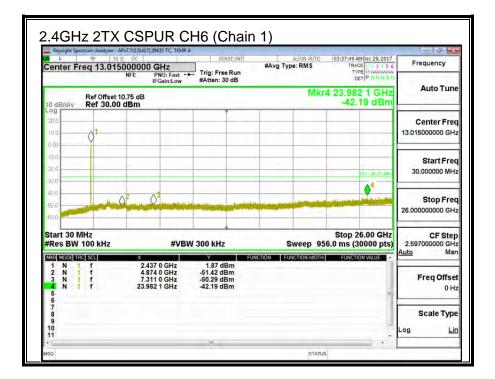
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	12:23:54 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT	v7.3 (121417), 29435 TC, TEMP 4		ht Spectr	Key
Frequency	TRACE 1 2 3 4 5 6	#Avg Type: RMS		000000 GHz	q 13.0150	r Fre	ent
1 1 2 3 2	DET PNNNN		#Atten: 30 dB	NFE PNO: Fast -			
Auto Tur	(r4 2.398 5 GHz -39.80 dBm	M			Ref Offset 10 Ref 30.00 c		0 dE
Center Fre			1				200
13.015000000 GH							10.0 0.00
Start Fre						_	6.0
30.000000 MH	DL1-25.03 dBm						20.0
-					4		90.0 40.5
Stop Fre 26.00000000 GH	toria desta de calendaria e 191	A CONTRACTOR OF	in the second second	$f = 0^3$	0	ALCONTACT.	50.0
20.000000000							60.0
CF Ste 2.597000000 GH	Stop 26.00 GHz 6.0 ms (30000 pts)	Sweep 95	V 300 kHz	#VBV	z 00 kHz	30 MH BW 1	
Auto Ma	FUNCTION VALUE	NCTION FUNCTION WIDTH		X		DE TRC	
Freq Offse	E		1.31 dBm -52.00 dBm -52.15 dBm -39.80 dBm	2.412 0 GHz 4.824 0 GHz 7.236 0 GHz 2.398 5 GHz	f	1	23
Scale Typ							789
Log L							10



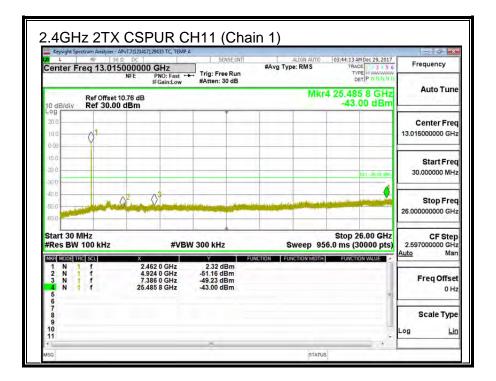
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Frequency	01:28:47 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT		Pv7.7(121417),2943 Ω DC	F 50	R	L
(requerie)	TYPE M WWWWW DET P N N N N	#Avg Type: RMS	ig: Free Run	HZ O: Fast		13.015	Freq	ente
Auto Tun	4 25.874 5 GHz -42.91 dBm	Mkr		unicon	0.75 dB	f Offset 1 ef 30.00		dB/d
Center Free			1					.0
13.015000000 GH						1	0	1.0 00
Start Free				_			_	1.0
30.000000 MH	CL1-2713 dBm							0
Stop Free	4		100		32 A3		_	.6
26.00000000 GH					V V		Lowest Street	10 10
CF Ste	Stop 26.00 GHz 6.0 ms (30000 pts)	Sweep 95	0 kHz	#VBW		kH7	0 MHz W 100	
<u>Auto</u> Ma	· · ·	CTION FUNCTION WIDTH			x		TRC SC	
Freq Offse 0 H	E		0.41 dBm 9.44 dBm 0.52 dBm 2.91 dBm	GHz	2.437 (4.874 (7.311 (25.874)			
Scale Typ								5
Log <u>Li</u>								



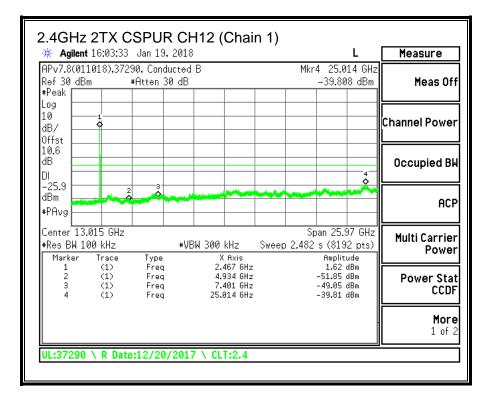
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	01:33:47 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT	Pv7.7(121417),29435 TC, TEMP -		it Spectrum	Keysig
Frequency	TRACE 123456	#Avg Type: RMS	Trig: Free Run	000000 GHz		Freq	ente
1.	DET P NANN (#Atten: 30 dB	NFE PNO: Fast H IFGain:Low			
Auto Tur	4 24.725 7 GHz -42.50 dBm	Mkr			of Offset 10 of 30.00		0 dB/
Center Fre							20.0
13.015000000 GH					1		10.0
						4	0.00-
Start Fre						-	6.0
30.000000 MH	DL1-26.15 (Bm						10.02
	A4						0.0
Stop Fre	In the Local Division of Street, Stree			2^2 β^3			10.0 50.0
26.00000000 GH					-		0.0
CF Ste	Stop 26.00 GHz					0 MHz	
2.597000000 GH Auto Ma	6.0 ms (30000 pts)		V 300 kHz			SW 100	
	FUNCTION VALUE	TION FUNCTION WIDTH	0.38 dBm	2.462 0 GHz		E TRC SC	1 N
Freq Offs 0 H	E		-50.27 dBm -51.75 dBm -42.50 dBm	4.924 0 GHz 7.386 0 GHz 24.725 7 GHz		11	2 N N N
Scale Typ							56789
Log L							10



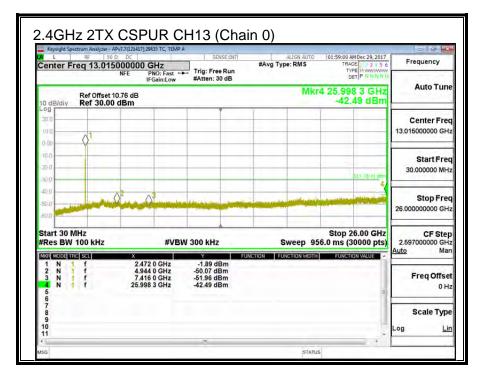
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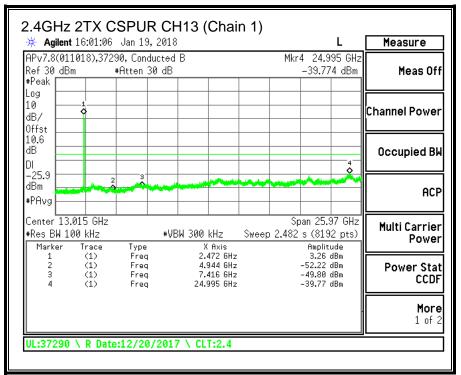
	- APv7.7(121417),29435 TC, TEMP -	SENSE:INT	ALIGN AUTO	01:47:17 AM Dec 29, 2017	- 6 -
Center Freq 13.0	15000000 GHz	Trig: Free Run	#Avg Type: RMS	TRACE	Frequency
	IFGain:Low	#Atten: 30 dB		DET P NNNN ()	Auto Tun
Ref Offse Ref 30.0	t 10.76 dB 00 dBm		Mkr	4 24.335 3 GHz -42.73 dBm	Auto full
.20.0					Center Fre
10.0					13.015000000 GH
10.0					Start Fre
20.0				DL1 -26.50.48m	30.000000 MH
-30.0 40.5				4	
50.0	Of Of	in the second second	der son ander der ander	and another the stand of the	Stop Fre
60.0					26.00000000 GH
Start 30 MHz #Res BW 100 kHz	#VB1	W 300 kHz	Sweep 95	Stop 26.00 GHz 6.0 ms (30000 pts)	CF Ste 2.597000000 GH
MKR MODE TRC SCL	2.467 0 GHz	2.79 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	Auto Ma
1 N 1 f 2 N 1 f 3 N 1 f 4 N 1 f 5 6 7	2.467 0 GHz 4.934 0 GHz 7.401 0 GHz 24.335 3 GHz	-50.72 dBm -50.72 dBm -50.72 dBm -42.73 dBm		E	Freq Offse 0 H
5 7 8 9					Scale Typ
10					Log Li



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

9.3.1. 6 dB BANDWIDTH

LIMITS

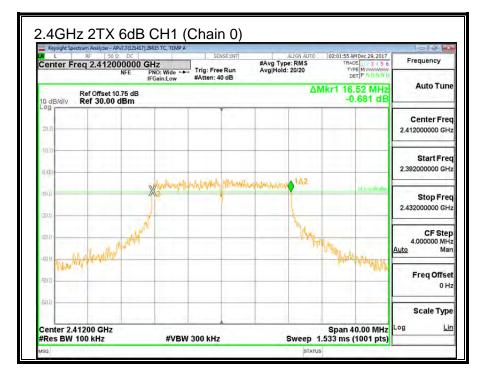
FCC §15.247 (a) (2)

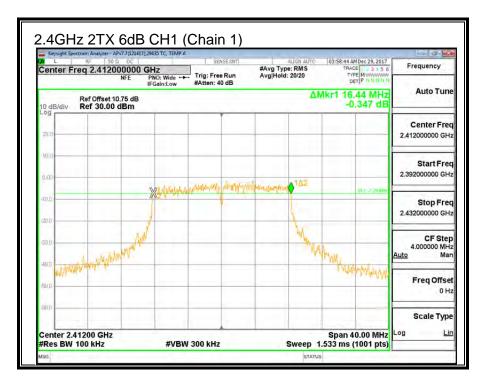
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	16.52	16.44	0.5
CH6	2437	16.46	16.40	0.5
CH11	2462	16.36	16.36	0.5
CH12	2467	16.36	16.40	0.5
CH13	2472	16.52	16.40	0.5

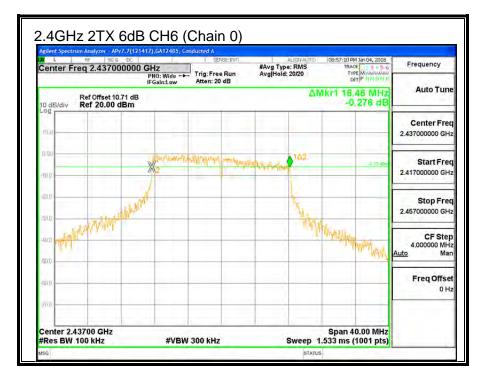
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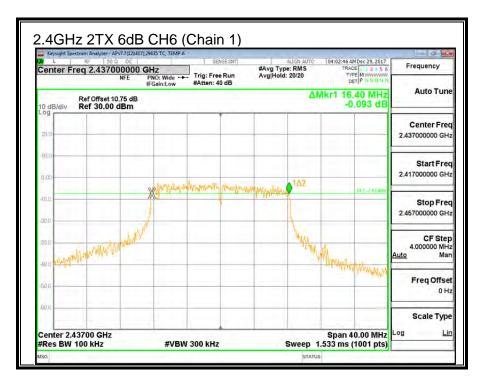




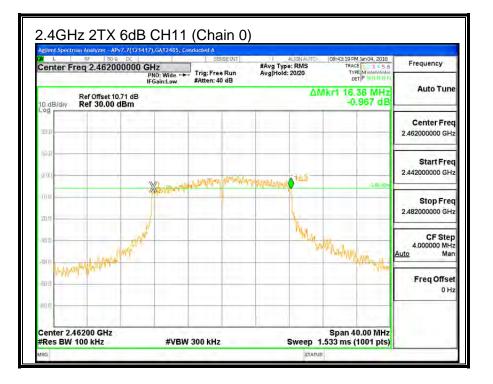
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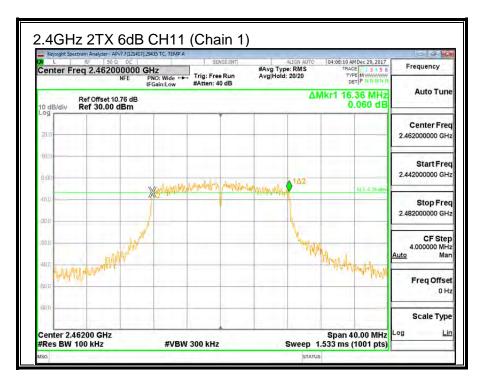
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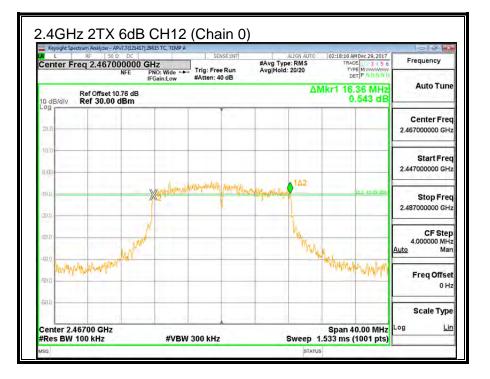


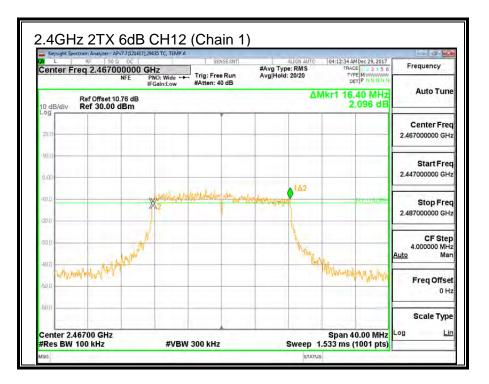
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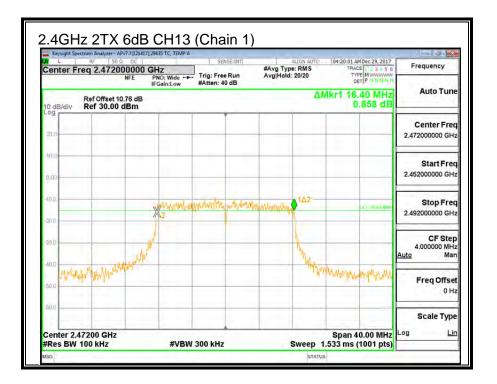
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		SENSE;INT	ALIGN AUTO #Avg Type: RMS Avg Hold: 20/20	02:23:12 AM Dec 29, 2017 TRACE 1 3 5 6	Frequency
Pef Offer	NFE PNO: Wide IFGain:Low	#Atten: 40 dB	a loss and the second	kr1 16.52 MHz	Auto Tune
	00 dBm		-	-0.527 dB	
20.0					Center Free 2.472000000 GH:
10.0 ······					Start Free 2.452000000 GH:
10,0 	A MANAN AND A MANAN	and the second second	manage 122	71.5 =19.75 mm	Stop Free 2.492000000 GH:
40.0	and a				CF Step 4.000000 MH Auto Mar
50.0 W. M.M. M.M.	ul-durper.		<u>~~~</u>	nersonal and a second second	Freq Offse 0 H:
60.0 Center 2.47200 GH				Span 40.00 MHz	Scale Type



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9.3.2. 99% BANDWIDTH

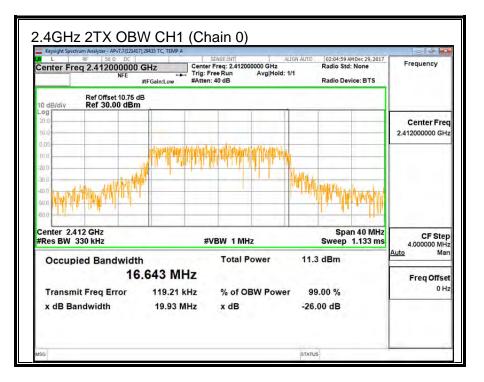
LIMITS

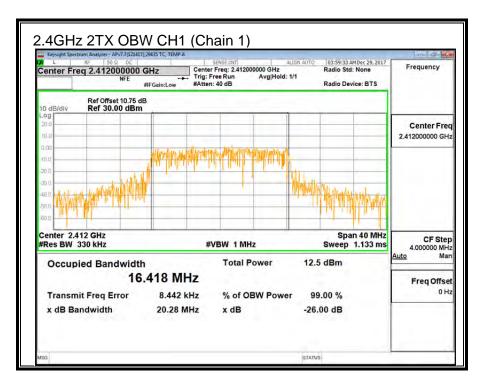
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	16.643	16.418
CH6	2437	16.497	16.592
CH11	2462	16.324	16.415
CH12	2467	16.397	16.459
CH13	2472	16.503	16.518

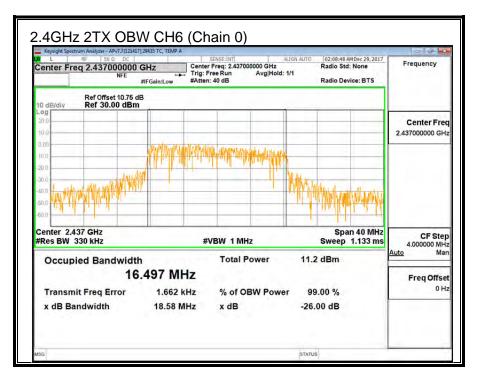
Page 55 of 161

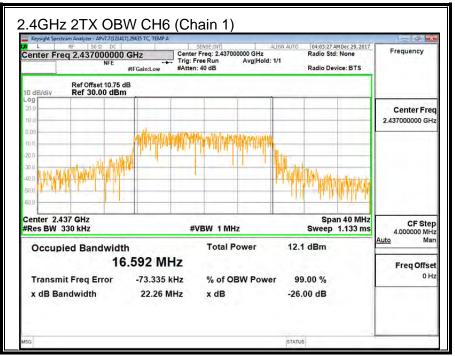




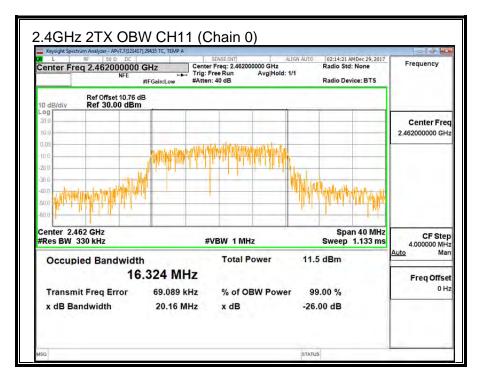
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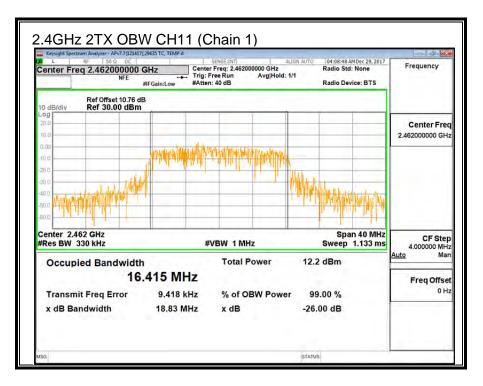
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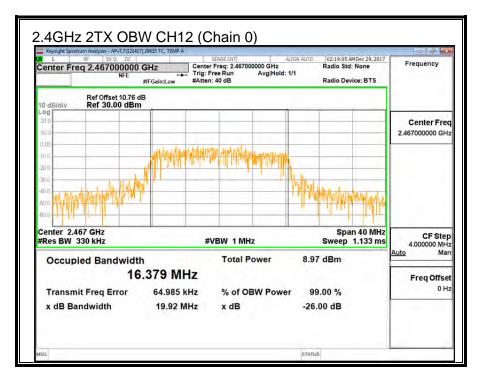
Page 57 of 161

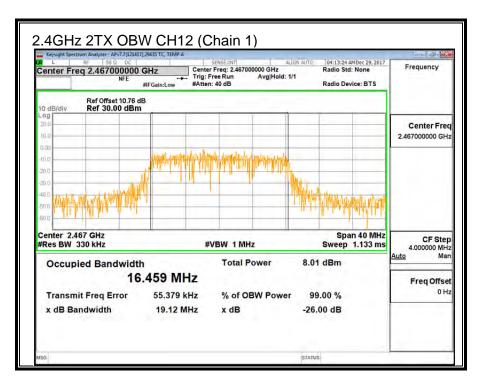




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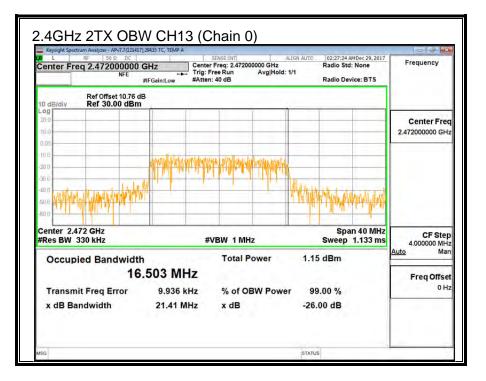
Page 58 of 161

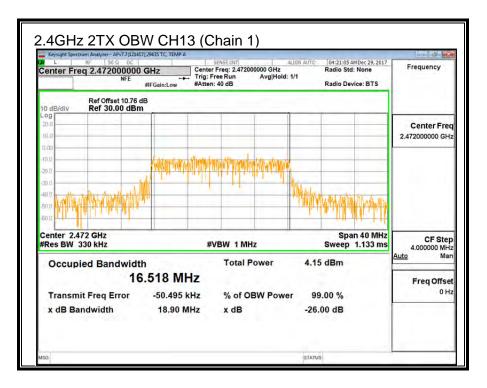




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9.3.3. OUTPUT POWER

<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)
-1.90	-8.80	-4.10

Page 61 of 161

RESULTS

ID:	GE43578	Date:	1/7/17
-----	---------	-------	--------

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.10	30.00	30	36	30.00
CH6	2437	-4.10	30.00	30	36	30.00
CH11	2462	-4.10	30.00	30	36	30.00
CH12	2467	-4.10	30.00	30	36	30.00
CH13	2472	-4.10	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	11.72	12.62	15.20	30.00	-14.80
CH6	2437	11.43	12.99	15.29	30.00	-14.71
CH11	2462	11.62	12.96	15.35	30.00	-14.65
CH12	2467	9.36	8.14	11.80	30.00	-18.20
CH13	2472	1.24	-0.03	3.66	30.00	-26.34

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)

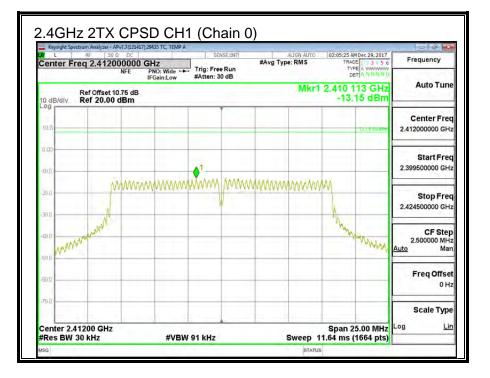
For digitally modulated systems, the power spectral density conducted form the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmissions.

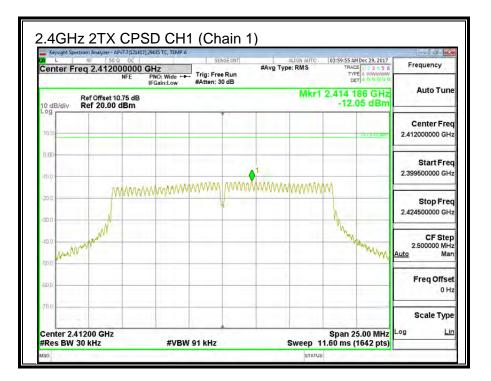
RESULTS

Duty C	ycle CF (dB)	0.00	Included	in Calc	ulations	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	-13.15	-12.05	-9.55	8.0	-17.6	
CH6	2437	-12.48	-12.16	-9.31	8.0	-17.3	
CH11	2462	-12.26	-11.48	-8.84	8.0	-16.8	
CH12	2467	-14.88	-16.27	-12.51	8.0	-20.5	
CH13	2472	-23.67	-20.50	-18.79	8.0	-26.8	

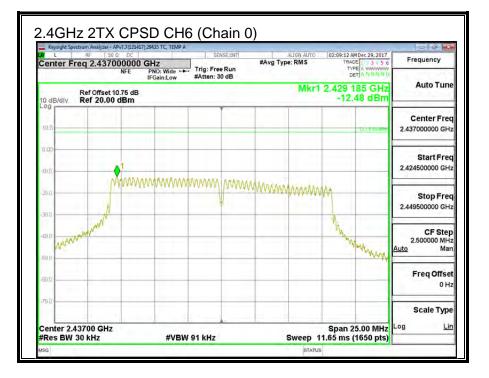
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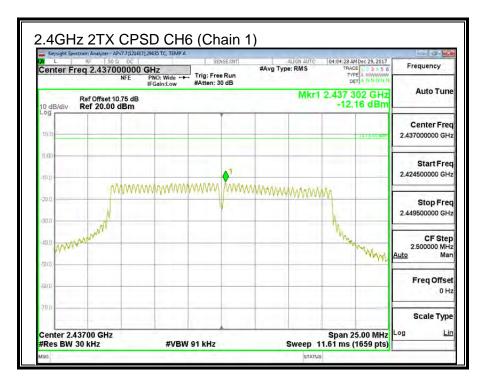
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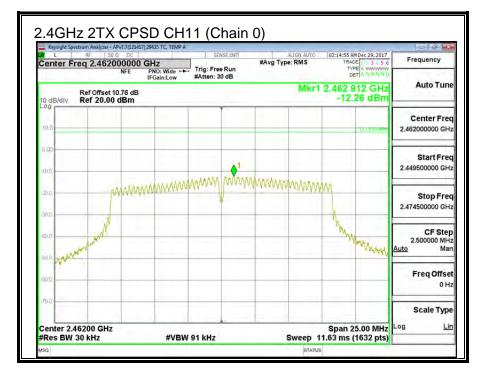
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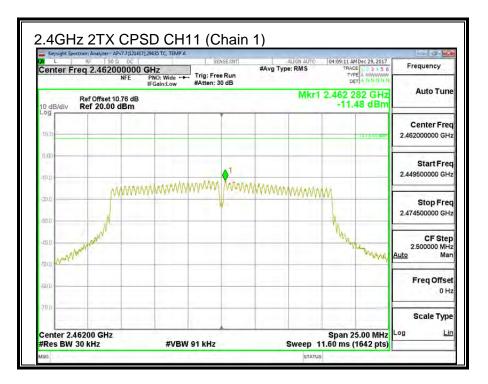




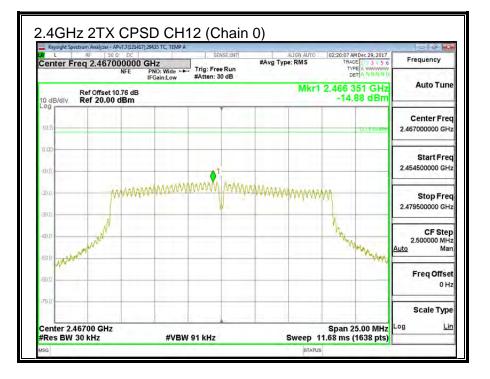
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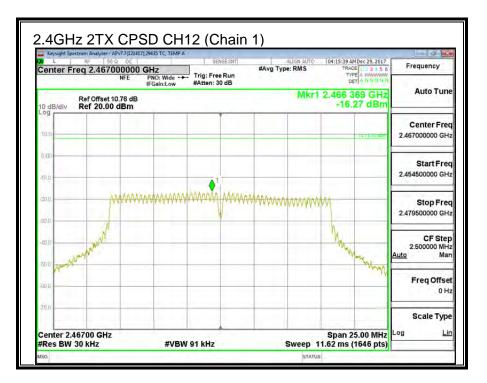
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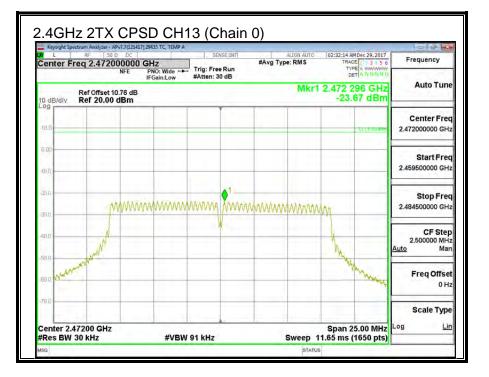
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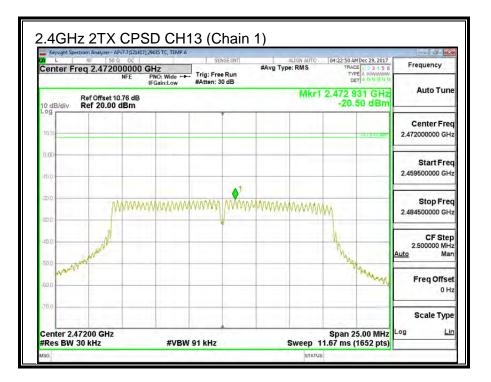




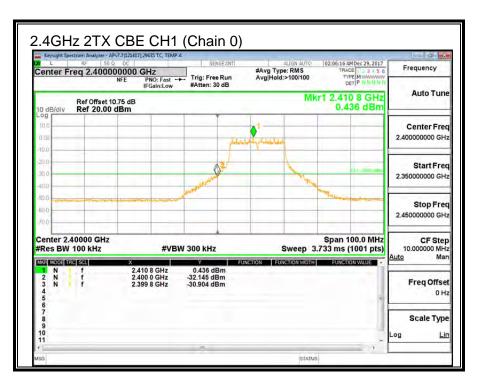
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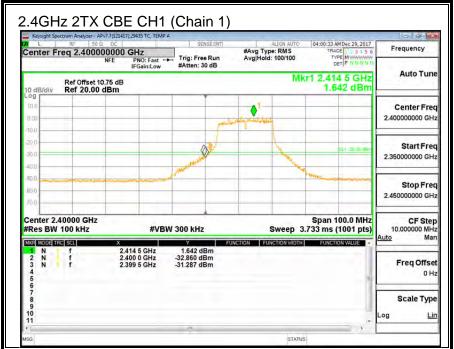




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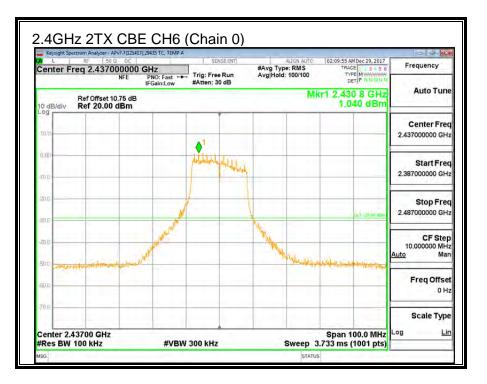


9.3.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS



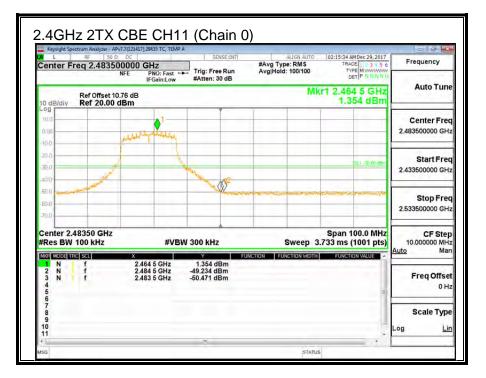
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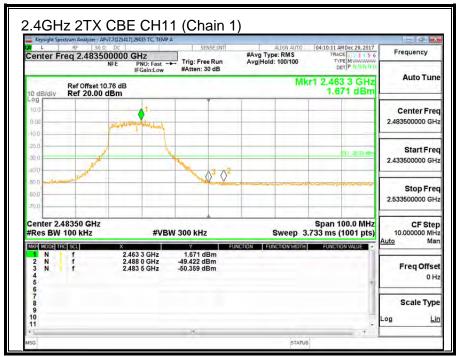
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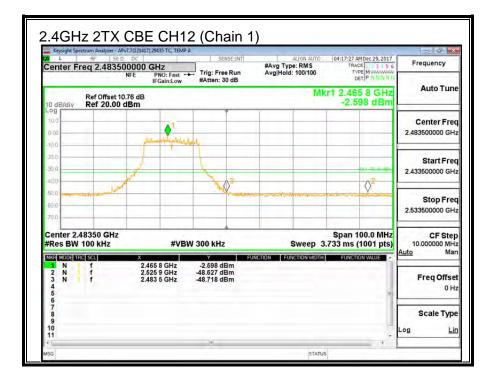
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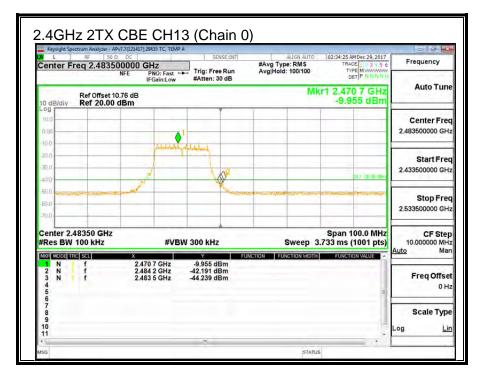


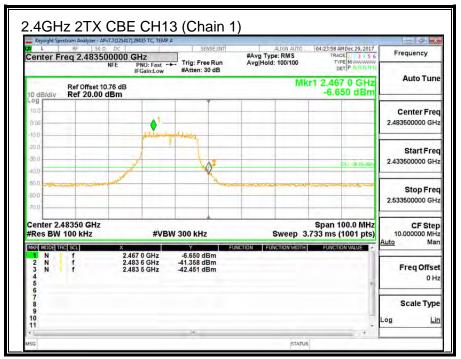
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Frequency	02:20:44 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT		Analyzer - APv7.7(12141 50 Ω DC	T	L		
Frequency	TRACE 1 3 4 5 6 TVPE M	#Avg Type: RMS Avg[Hold: 100/100	Trig: Free Run #Atten: 30 dB	GHz PNO: Fast →	2.483500000 NFE	Fred	ente		
Auto Tur	Mkr1 2 465 9 CUr					Ref Offset 10.76 dB 10 dB/div Ref 20.00 dBm			
Center Fre 2.483500000 GF			L.	un faire			9.0 1.00		
Start Fre 2.433500000 GF	(DL1 - 20 87 dgm)		the BE				0.0 0.0 0.0		
Stop Fre 2.533500000 GH		to a star more manufactured	×				0.0 0.0 0.0		
CF Ste 10.000000 MH Auto Ma	2.48350 GHz Span 100.0 MHz W 100 kHz #VBW 300 kHz Sweep 3.733 ms (1001 pts)						Res		
Freq Offs	FUNCTION VALUE	FUNCTION FUNCTION WIDTH	-0.871 dBm -45.838 dBm -46.010 dBm	465 8 GHz 483 9 GHz 483 5 GHz	2.	ETRCS	1 1 2 1 3 1 4 5 6 7		
Scale Typ							8		
Log <u>L</u>							0		



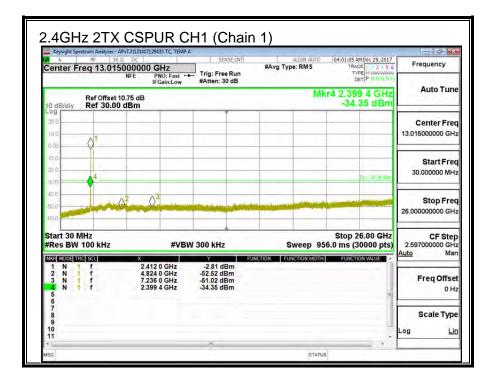
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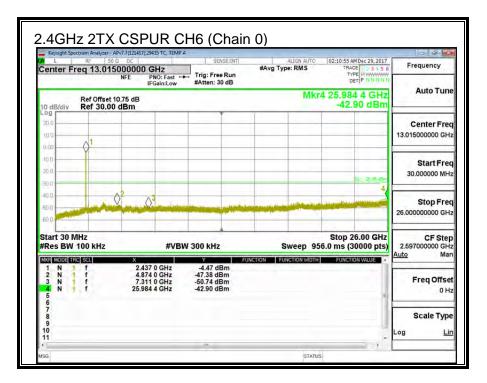


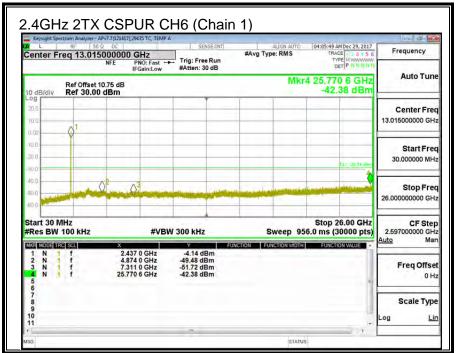


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	02:06:57 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT	Pv7.7(121417),29435 TC, TEMP 4		Keysight Sp
Frequency	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET P NNNN	#Avg Type: RMS		NFE PNO: Fast -		enter F
Auto Tun	r4 2.399 4 GHz -34.49 dBm	M	writen. oo ub	0.75 dB	Ref Offset 1 Ref 30.00	0 dB/div
Center Fre 13.015000000 GH					01	09 20.0 10.0
Start Fre 30.000000 MH	5L1-29 55 dim				4	10.0. 20.0. 30.0
Stop Fre 26.000000000 GH				y ² . Q ³	June	40.6 50.0 50.0
CF Ste 2.597000000 GH	Stop 26.00 GHz 6.0 ms (30000 pts)	Sweep 95	V 300 kHz	#VBV	VIHz 100 kHz	tart 30 I Res BW
Auto Ma Freq Offse	FUNCTION VALUE	ICTION FUNCTION WOTH	-4.62 dBm -51.81 dBm -50.54 dBm	x 2.412 0 GHz 4.824 0 GHz 7.236 0 GHz	RC ISCU f f f	AKR MODE T 1 N 2 N 3 N
0 H Scale Typ			-34.49 dBm	2.399 4 GHz	f.	4 N 5 6 7 8 9
Log <u>Li</u>						9 10 11

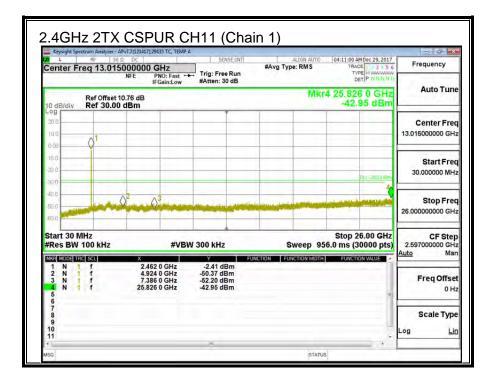






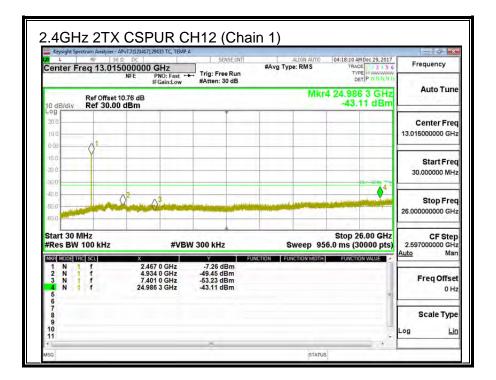
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- 6 K	02:16:52 AM Dec 29, 2017	ALIGN AUTO	SENSE:INT	7.7(121417),29435 TC, TEMP A			Keysig
Frequency	TRACE 1 2 3 4 5 6 TYPE M WWWWW	#Avg Type: RMS		00000 GHz			ente
	DET PNNNN		#Atten: 30 dB	NFE PNO: Fast -			
Auto Tun	4 24.412 3 GHz -42.61 dBm	Mkr			f Offset 10 ef 30.00 (0 dB/
Center Fre							20.0
13.015000000 GH						_	10.0
					1	- 0	0.00-
Start Fre						_	10.0
30.000000 MH							20 07
	DLT-28 65 65H				1		90.0
Stop Fre	Contractor	and the second sec		2 13	. (40.6
26.00000000 GH	and the second s					-	50.0
	Aug. 201 1. 1. 1.						0.06
CF Ste 2.597000000 GH	Stop 26.00 GHz 6.0 ms (30000 pts)	Sweep 95	V 300 kHz	#VBV	kHz	0 MHz W 100	
Auto Ma	FUNCTION VALUE	CTION FUNCTION WIDTH		×	u)	E TRC SC	
Freq Offse 0 F	5		-4.16 dBm -49.82 dBm -51.63 dBm -42.61 dBm	2.462 0 GHz 4.924 0 GHz 7.386 0 GHz 24.412 3 GHz			1 N N N N N N N N N N N N N N N N N N N
Scale Typ							56789
Log Li							10



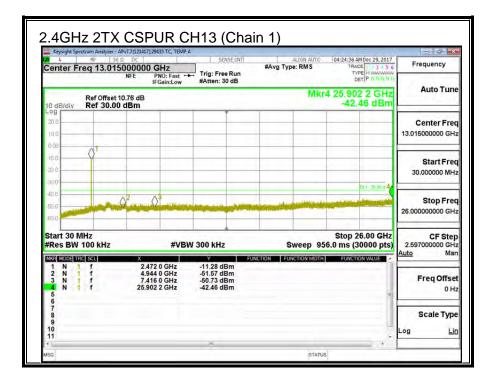
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Keysight Spectru	m Analyzer - APv7.J(1) RF 50 Ω DC	21417),29435 TC, TEMP	A SENSE INT	ALIGN AUTO	02:21:50 AM Dec 29, 2017	
enter Free	q 13.015000	000 GHz		#Avg Type: RMS	TRACE 112 3 4 5 6	Frequency
	NFE	PNO: Fast -	#Atten: 30 dB		DET P NNNN ()	1.2.2.2.1
0 dB/div	Ref Offset 10.76 c Ref 30.00 dBn			Mkr	4 24.903 2 GHz -42.71 dBm	Auto Tun
20.0						Center Fre
10.0 0.00	01					13.015000000 GH
10.0						Start Fre
20 0. 30 0					DLI-3017 dBm	30.000000 MH
40.6	· ^2	A3			4	Stop Fre
50.0 60.0						26.00000000 GH
Start 30 MH		#VBI	N 300 kHz	Sweep 95	Stop 26.00 GHz 6.0 ms (30000 pts)	CF Ste 2.597000000 GH
KR MODE TRC :	scu)	x		INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
1 N 1 2 N 1 3 N 1 5		2.467 0 GHz 4.934 0 GHz 7.401 0 GHz 24.903 2 GHz	-5.45 dBm -51.53 dBm -51.22 dBm -42.71 dBm		H.	Freq Offse 0 H
5 6 7 8 9						Scale Typ
10					14	Log <u>Li</u>



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	02:39:01 AM Dec 29, 2017	ALIGN AUTO	SENSE: INT	N7.7(121417),29435 TC, TEMP /		ight Spect
Frequency	TRACE	#Avg Type: RMS		NFE PNO: Fast		er Fre
Auto Tun	DET P NNNN (#Atten: 30 dB	IFGain:Low		
Autorun	4 25.885 7 GHz -43.28 dBm	Mkr			Ref Offset 10 Ref 30.00	
Center Fre						
13.015000000 GH						
Start Fre					01	-
30.000000 MH						
-	01-39-54					
Stop Fre 26.00000000 GH			have been	λ^{2}	Jacob S	. The shirt
20.00000000 GH						
CF Ste 2.597000000 GH	Stop 26.00 GHz 6.0 ms (30000 pts)	Sweep 95	V 300 kHz	#VBV	lz 00 kHz	30 MI BW 1
Auto Ma	FUNCTION VALUE	CTION FUNCTION WIDTH		×		ODE TRC
Freq Offse 0 H	E		-15.15 dBm -49.23 dBm -52.61 dBm -43.28 dBm	2.472 0 GHz 4.944 0 GHz 7.416 0 GHz 25.885 7 GHz		
Scale Typ						
Log <u>Li</u>						



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

9.4.1. 6 dB BANDWIDTH

LIMITS

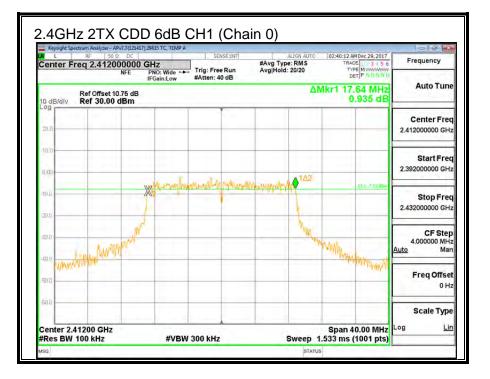
FCC §15.247 (a) (2)

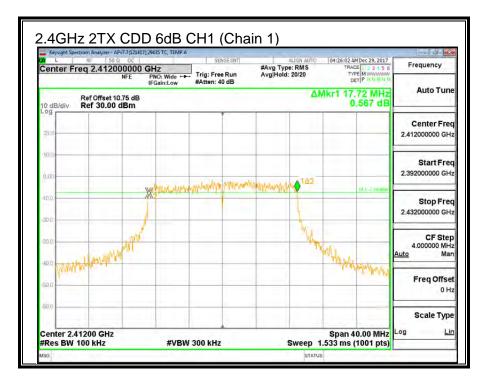
The minimum 6 dB bandwidth shall be at least 500 kHz.

RESULTS

Channel	Frequency	6 dB BW Chain 0 (MHz)	6 dB BW Chain 1 (MHz)	Minimum Limit (MHz)
CH1	2412	17.64	17.72	0.5
CH6	2437	17.72	17.64	0.5
CH11	2462	17.64	17.60	0.5
CH12	2467	17.60	17.60	0.5
CH13	2472	17.64	17.60	0.5

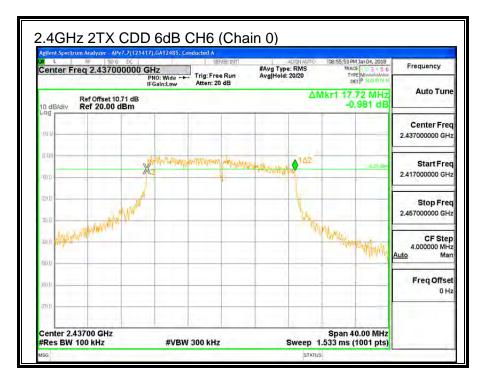
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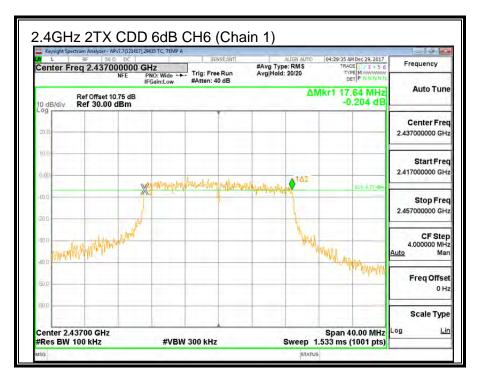




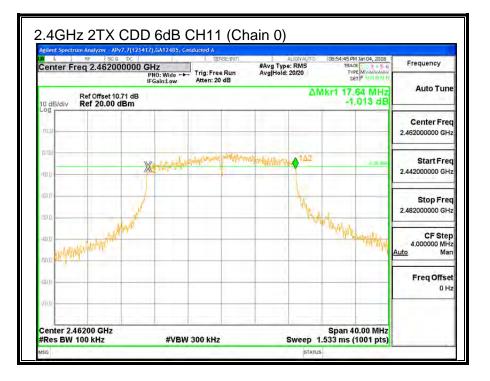
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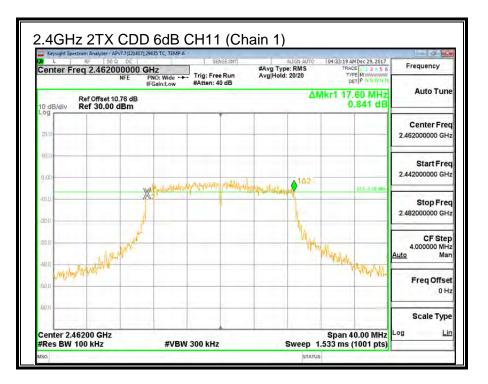
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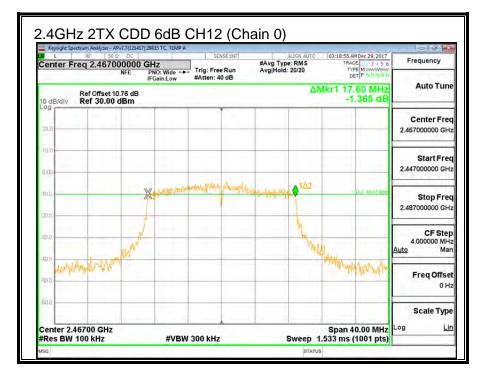
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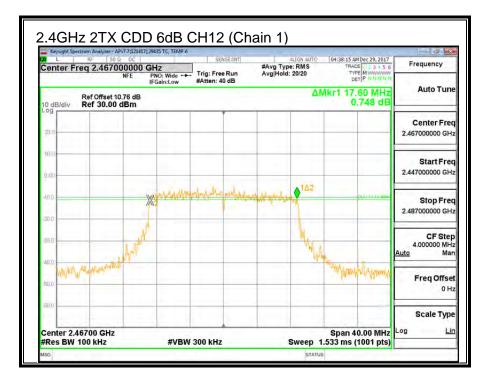




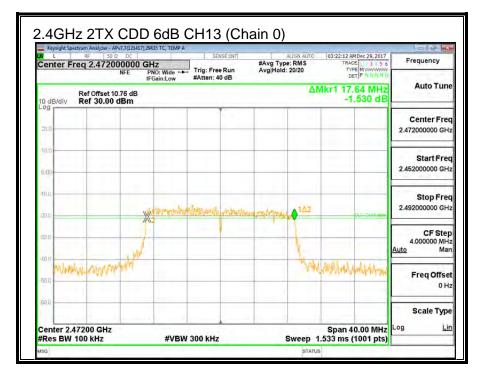
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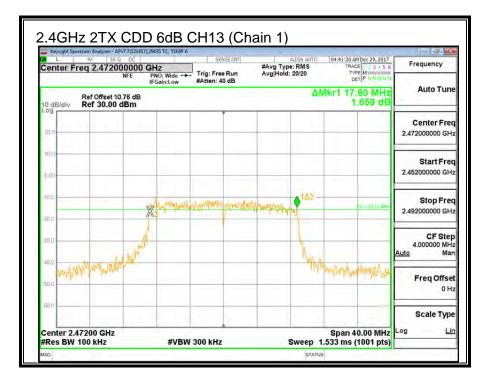
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9.4.2. 99% BANDWIDTH

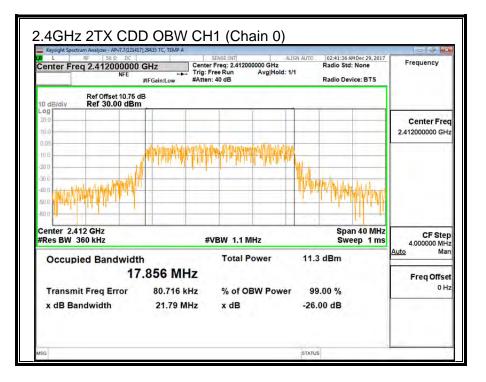
LIMITS

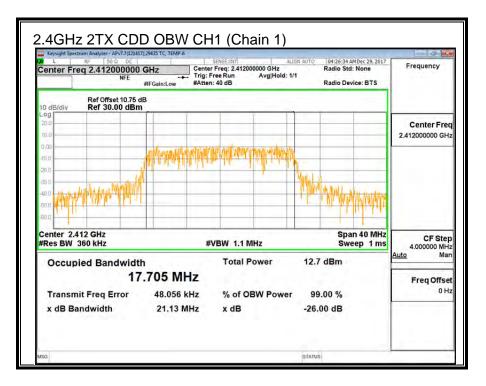
None; for reporting purposes only.

RESULTS

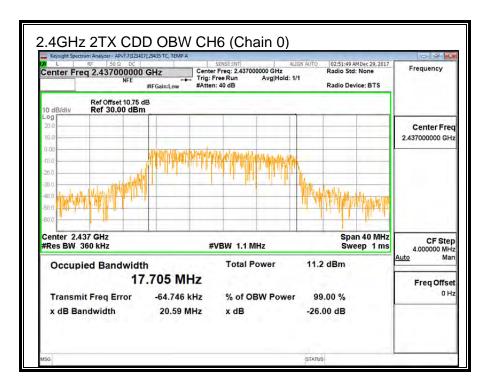
Channel	Frequency (MHz)	99% Bandwidth Chain 0 (MHz)	99% Bandwidth Chain 1 (MHz)
CH1	2412	17.856	17.705
CH6	2437	17.705	17.832
CH11	2462	17.514	17.680
CH12	2467	17.584	17.800
CH13	2472	17.885	17.709

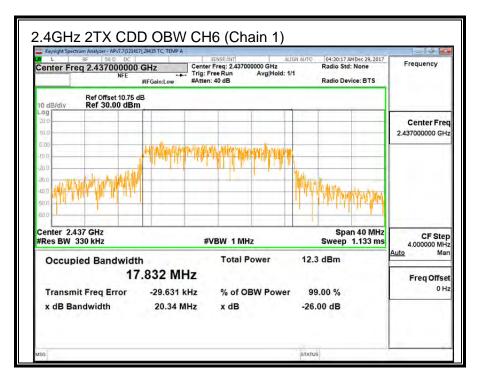
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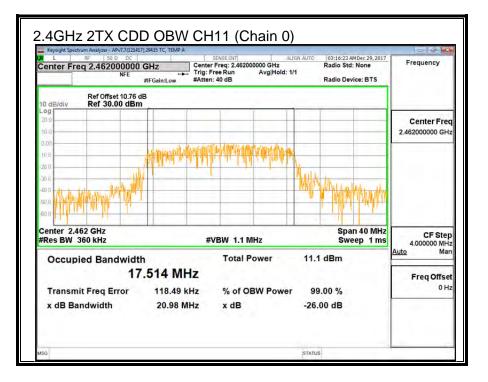


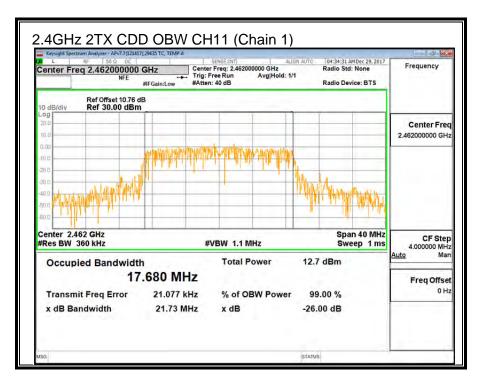
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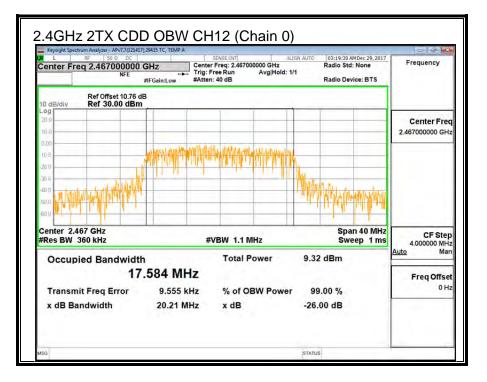


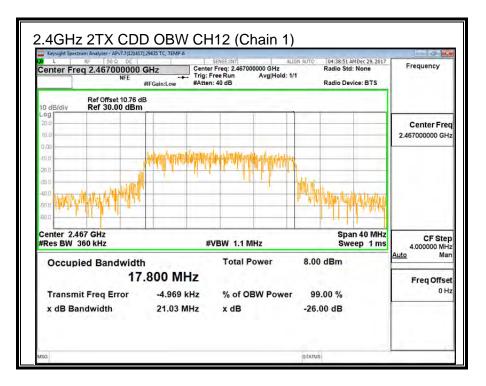
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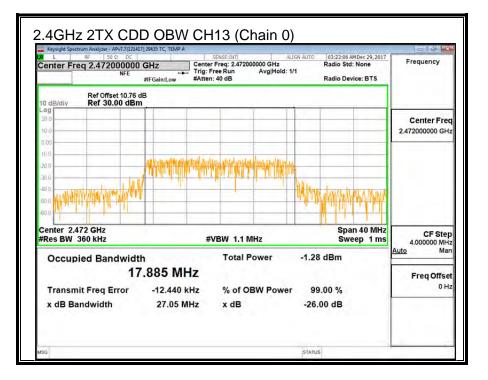


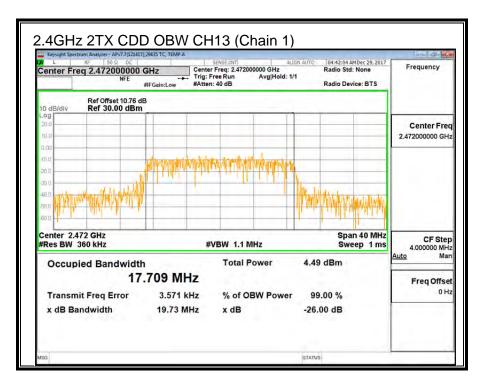
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9.4.3. OUTPUT POWER

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)
-1.90	-8.80	-4.10

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RESULTS

ID: GE43578	Date:	1/7/17
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Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
CH1	2412	-4.10	30.00	30	36	30.00
CH6	2437	-4.10	30.00	30	36	30.00
CH11	2462	-4.10	30.00	30	36	30.00
CH12	2467	-4.10	30.00	30	36	30.00
CH13	2472	-4.10	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	11.96	13.05	15.55	30.00	-14.45
CH6	2437	11.96	12.96	15.50	30.00	-14.50
CH11	2462	11.37	13.23	15.41	30.00	-14.59
CH12	2467	9.26	8.01	11.69	30.00	-18.31
CH13	2472	-0.45	-1.55	2.05	30.00	-27.95

<u>Note:</u> 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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9.4.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

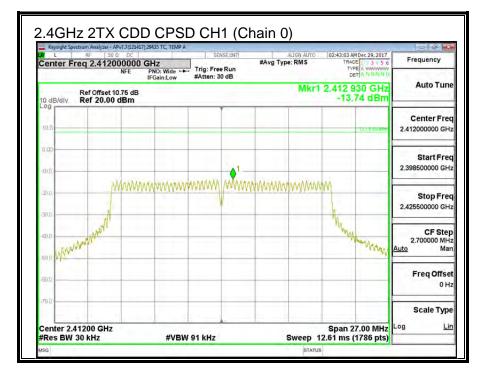
For digitally modulated systems, the power spectral density conducted form the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 KHz band during any time interval of continuous transmissions.

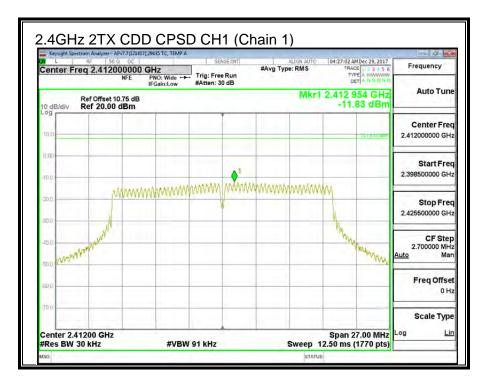
RESULTS

Duty C	ycle CF (dB)	0.13	Included	in Calc	ulations	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	-13.74	-11.83	-9.54	8.0	-17.5	
CH6	2437	-12.59	-12.20	-9.25	8.0	-17.3	
CH11	2462	-12.34	-11.12	-8.55	8.0	-16.5	
CH12	2467	-14.22	-16.50	-12.07	8.0	-20.1	
CH13	2472	-25.90	-20.97	-19.63	8.0	-27.6	

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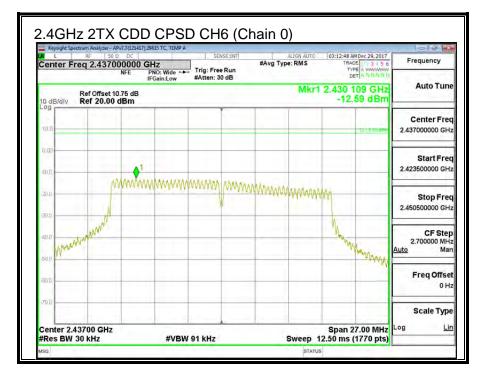
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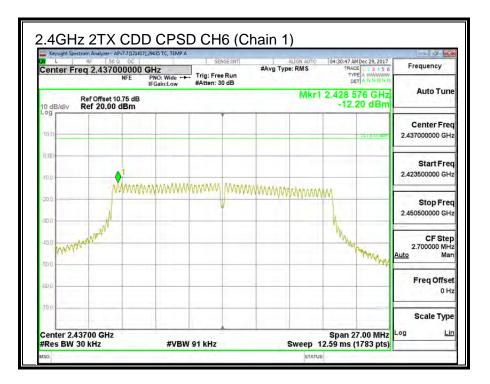




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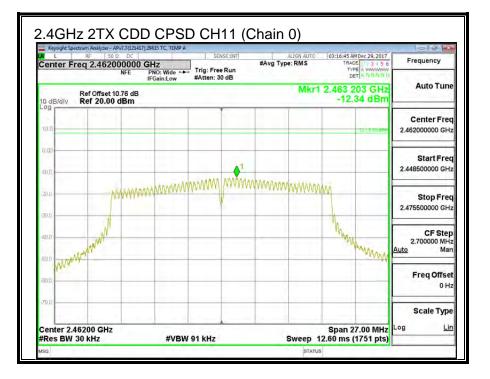
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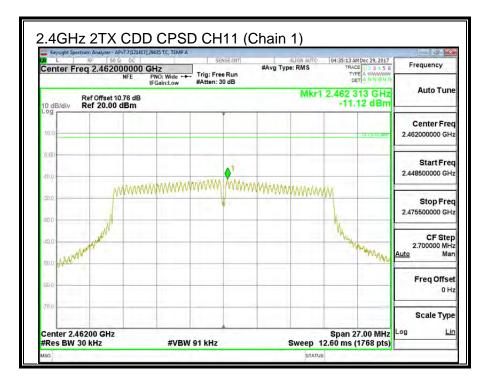




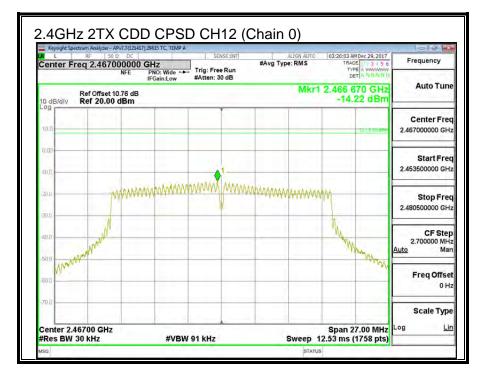
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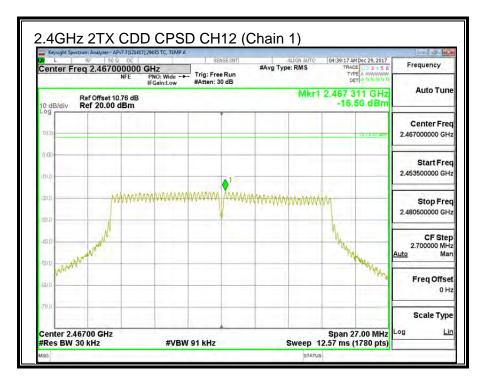
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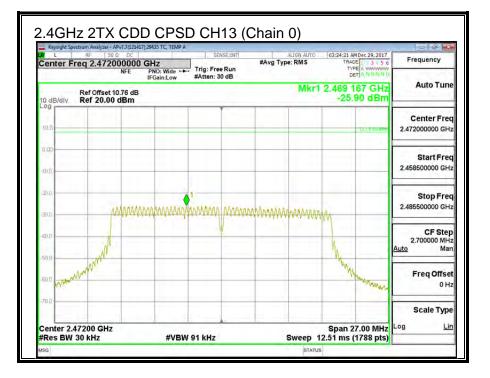


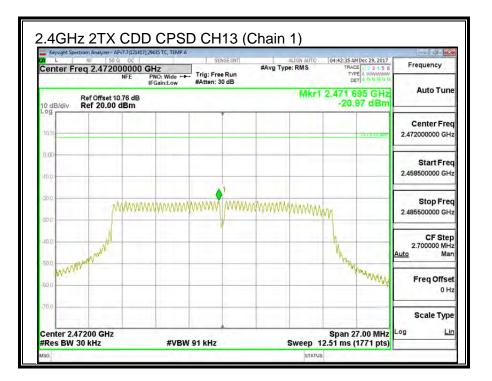
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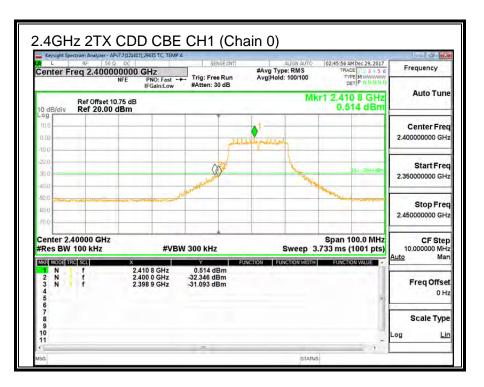


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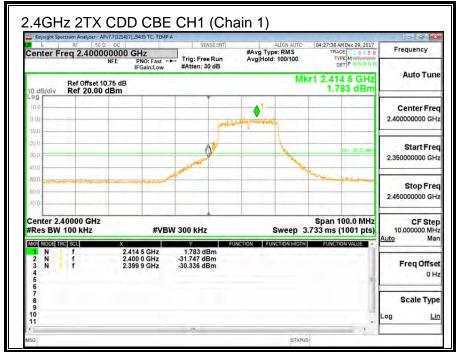




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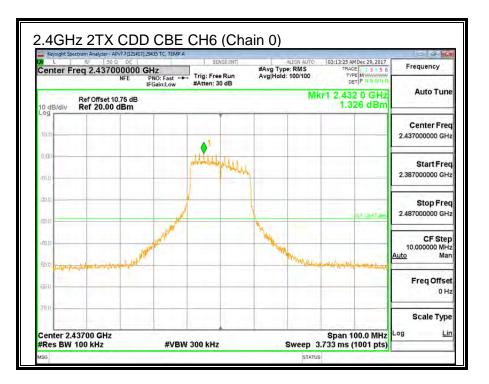


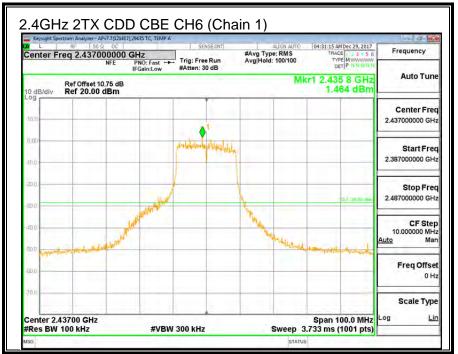
9.4.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS



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