

FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-247 ISSUE 1

CERTIFICATION TEST REPORT

FOR

TABLET DEVICE

MODEL NUMBER: A1584

FCC ID: BCGA1584 IC: 579C-A1584

REPORT NUMBER: 14U19185-E3V3

ISSUE DATE: SEPTEMBER 11, 2015

Prepared for APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.

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NVLAP LAB CODE 200065-0

Revision History

Rev.	lssue Date	Revisions	Revised By
V1	09/03/2015	Initial Issue	M. Mekuria
V2	09/08/2015	Addressed TCB Questions	E. Yu
V3	09/11/2015	Updated antenna gain	C. Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	APPLE, INC. 1 INFINITE LOOP CUPERTINO, CA 95014, U.S.A.		
EUT DESCRIPTION:	TABLET DEVICE		
MODEL:	A1584		
SERIAL NUMBER:	DLXQ1008GPCP (Radiated); DLXQ1005GPCP (Conducted)		
DATE TESTED:	JULY 10, 2015 - AUGUST 07, 2015		
	APPLICABLE STANDARDS		
ST	ANDARD	TEST RESULTS	
CFR 47 F	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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Zeg_

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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, ANSI C63.10-2013, RSS-GEN Issue 4, and RSS-247 Issue 1.

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	🛛 Chamber D		
Chamber B	🖂 Chamber E		
Chamber C	Chamber F		
	🛛 Chamber G		
	Chamber H		

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://ts.nist.gov/standards/scopes/2000650.htm</u>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided: Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB) 36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	± 3.52 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.94 dB
Radiated Disturbance, 1 to 6 GHz	± 3.86 dB
Radiated Disturbance, 6 to 18 GHz	± 4.23 dB
Radiated Disturbance, 18 to 26 GHz	± 5.30 dB
Radiated Disturbance, 26 to 40 GHz	± 5.23 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 tablet with multimedia functions (music, application support, and video), IEEE 802.11a/b/g/n/ac radio, and Bluetooth radio. The rechargeable battery is not user accessible.

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 1TX	18.97	78.89
2412 - 2472	802.11g 1TX	Covered by	11n HT20 1TX
2412 - 2472	802.11g 2TX	Covered by	11n HT20 2TX
2412 - 2472	802.11n HT20 1TX	23.19	208.45
2412 - 2472	802.11n HT20 2TX	26.22	418.79

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Frequency Band	Antenna Gain		
(GHz)	Antenna 1	Antenna 2	
2.4	-0.60	-0.50	

5.4. SOFTWARE AND FIRMWARE

The software installed in the EUT during testing was 13B72.

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5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT 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 Y (Landscape) orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in Y 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 target power for 802.11g and 802.11n HT20 1TX are the same and use the same modulation (OFDM).

The following configurations were investigated on AC line conducted test

Configuration	Descriptions
1	EUT powered by AC/DC adapter via USB cable
2	EUT powered by host PC via USB cable

There are two vendors of the WiFi/Bluetooth radio modules: variant 1 and variant 2 and they have the same mechanical outline, same on board antenna, matching circuit, antenna structure and same specification. Baseline testing was performed on all two variants to determine the worst case on all conducted power and radiated emissions

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5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List							
Description Manufacturer Model Serial Number FCC							
Laptop AC/DC adapter	Lenovo	92P1160	11S92P1160Z1ZBGH798B12	N/A			
Laptop	Lenovo	7659	L3-AL664 08/03	N/A			
Earphone	Apple	N/A	N/A	N/A			
EUT AC/CD adapter	Apple	A1385	D293062F3WVDHLHCF	N/A			

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	SMA	Un-Shielded	0.2	To spectrum Analyzer			
2	USB	1	USB	Shielded	1	N/A			
3	AC	1	AC	Un-shielded	3	N/A			

I/O CABLES (RADIATED ABOVE 1 GHZ)

	I/O Cable List							
Cable No	Cable Port # of identical Connector Cable Type Cable Remarks							
None U	None Used							

I/O CABLES (RADAITED BELOW 1 GHZ)

	I/O Cable List								
Cable	Port	# of	# of Connector Cable Type			Remarks			
No		identical	Туре		Length (m)				
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A			
2	AC	1	AC	Un-shielded	3	N/A			

I/O CABLES (AC LINE CONDUCTED: AC/DC ADAPTER)

	I/O Cable List								
Cable	Port	# of	Connector	Cable Type	Cable	Remarks			
No		identical	Туре		Length (m)				
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A			
2	AC	1	AC	Un-shielded	3	N/A			

I/O CABLES (AC LINE CONDUCTED: LAPTOP CONFIGUARTION)

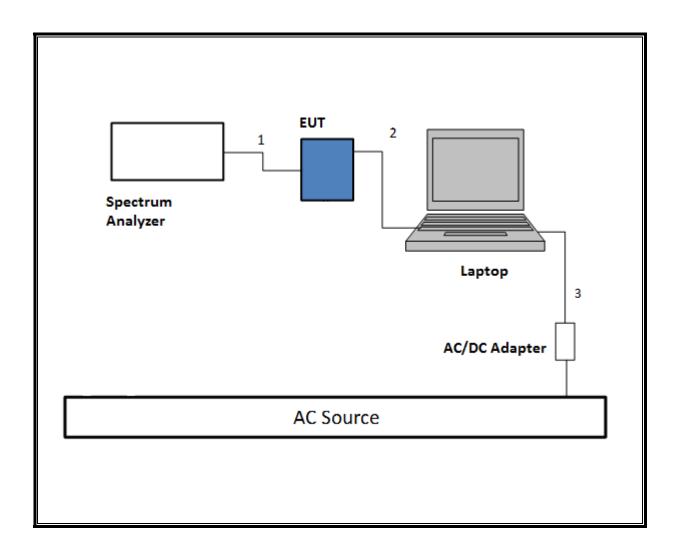
	I/O Cable List								
Cable	Port	# of	Connector	Cable Type	Cable	Remarks			
No		identical	Туре		Length (m)				
1	Headphones Jack	1	3.5mm Audio	Shielded	0.9	N/A			
2	USB	1	USB	Shielded	1	N/A			
3	AC	1	AC	Un-shielded	3	N/A			

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TEST SETUP - CONDUCTED TESTS

The EUT was tested connected to a host Laptop via USB cable adapter and spectrum analyzer to antenna port. Test software exercised the EUT.

SETUP DIAGRAM

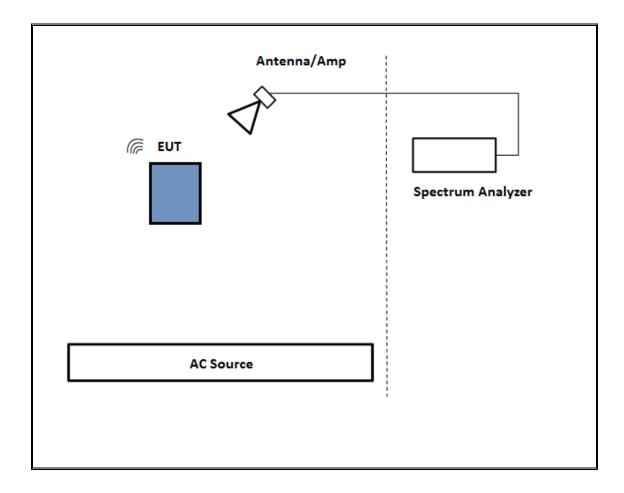


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TEST SETUP- RADIATED-ABOVE 1 GHZ

The EUT was tested battery powered. Test software exercised the EUT.

SETUP DIAGRAM



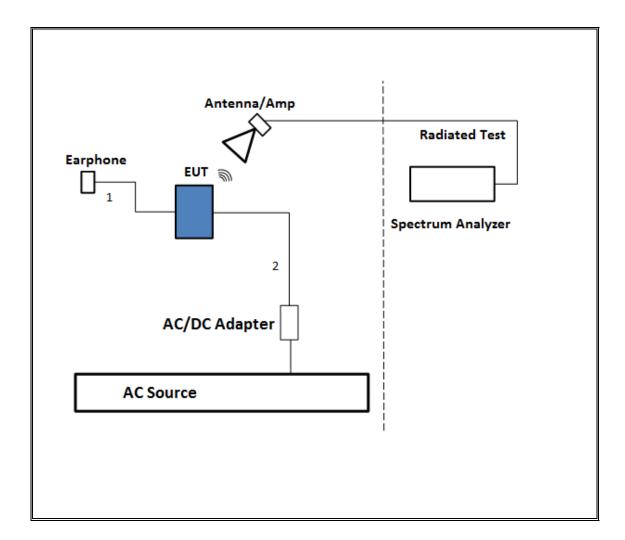
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TEST SETUP- BELOW 1GHz

The EUT was tested with earphone connected and powered by AC adapter. Test software exercised the EUT.

SETUP DIAGRAM



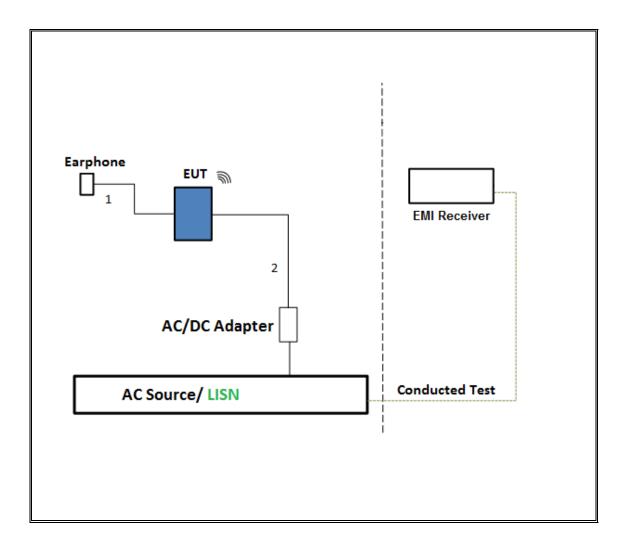
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TEST SETUP- AC LINE CONDUCTED: AC/DC ADAPTER

The EUT was tested with earphone connected and powered by AC/DC adapter via USB cable. Test software exercised the EUT.

SETUP DIAGRAM



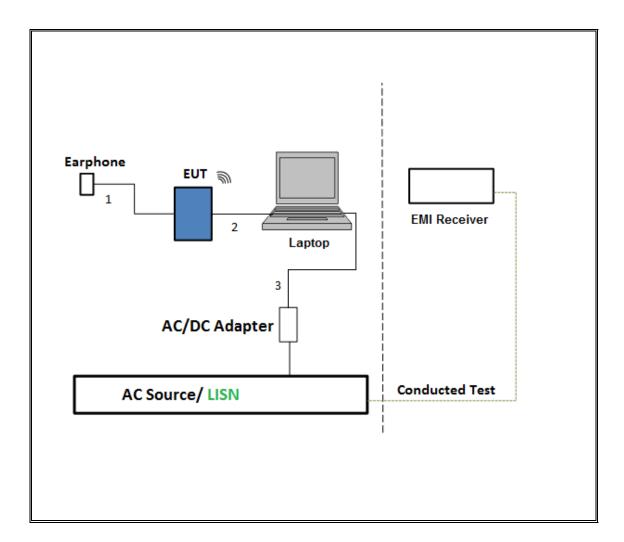
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TEST SETUP- AC LINE CONDUCTED: LAPTOP CONFIGURATION

The EUT was tested with earphone connected and powered by host PC via USB cable. Test software exercised the EUT.

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 Equi	ipment List		
Description	Manufacturer	Model	Asset	Cal Due
Antenna, Horn 1-18GHz	ETS Lindgren	ETS Lindgren 3117		2/10/2016
Antenna, Broadband Hybrid, 30MHz to 2000MHz	Sunol Sciences	JB3	A022813-1	1/14/2016
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25- S-42	1782158	1/26/2016
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	171202	11/1/2015
Spectrum Analyzer, PXA, 3Hz to 50GHz	Agilent	N9030A	MY52350427	9/13/2015
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	325118	2/14/2016
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	MY52350675	3/16/2016
Power Meter, P-series single channel	Agilent	N1911A	GB45100212	10/9/2015
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Agilent	N1921A	MY53260010	4/7/2016
Antenna, Horn 18 to 26.5GHz	ARA	MWH-1826	1049	12/17/2015
Amplifier, 1 to 26.5GHz, 23.5dB Gain minimum	Agilent	8449B	3008A01114	10/4/2015
	AC Line (Conducted		
EMI Test Receiver 9Khz-7GHz	Rohde & Schwarz	ESCI7	100935	9/16/2015
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	114	1/16/2016
Power Cable, Line Conducted Emissions ANSI 63.4	UL	PG1	N/A	7/28/2015
	UL SO	FTWARE		
*Radiated Software	UL	UL EMC	Ver 9.5, July	22, 2014
*Conducted Software	UL	UL EMC	Ver 2.2, Marc	h 31, 2015
*AC Line Conducted Software	UL	UL EMC	Ver 9.5, Apr	il 3, 2015

Note: * indicates automation software version used in the compliance certification testing

7. MEASUREMENT METHODS

<u>6 dB BW</u>: KDB 558074 D01 v03r03, Section 8.1.

Output Power: KDB 558074 D01 v03r03, Section 9.1.2

Power Spectral Density: KDB 558074 D01 v03r03, Section 10.2.

Out-of-band emissions in non-restricted bands: KDB 558074 D01 v03r03, Section 11.0.

Out-of-band emissions in restricted bands: KDB 558074 D01 v03r03, Section 12.1.

Band-edge: KDB 558074 D01 v03r03, Section 12.1

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8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

<u>LIMITS</u>

None; for reporting purposes only.

PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method.

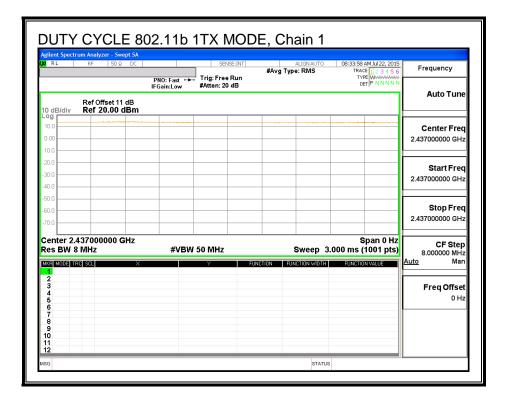
ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle	1/B
	В		x	Cycle	Correction Factor	Minimum VBW
	(msec)	(msec)	(linear)	(%)	(dB)	(kHz)
2.4GHz Band						
802.11b, chain 0	1.000	1.000	1.000	100.00%	0.00	0.010
802.11b, chain 1	1.000	1.000	1.000	100.00%	0.00	0.010
802.11n HT20 1TX,chain 0	1.920	1.941	0.989	98.92%	0.00	0.010
802.11n HT20 1TX,chain 1	1.917	1.938	0.989	98.92%	0.00	0.010
802.11n HT20 CDD,chain 0	1.917	1.941	0.988	98.76%	0.00	0.010
802.11n HT20 CDD,chain 1	1.917	1.941	0.988	98.76%	0.00	0.010

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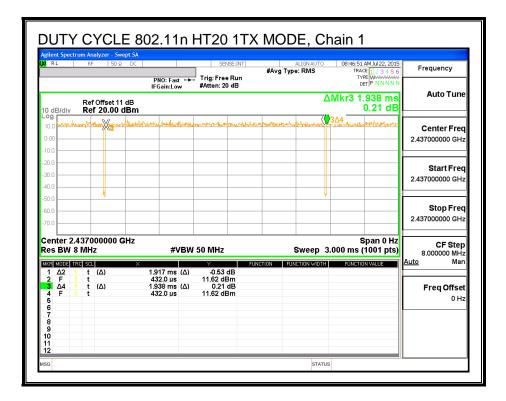
DUTY CYCLE PLOTS

RL	RF 50 Ω DC	PNO: Fast ↔	SENSE:INT	ALIGN AUTO #Avg Type: RMS	08:31:04 AM Jul 22, 2015 TRACE 1 2 3 4 5 6 TYPE WWWWWWW DET P N N N N N	Frequency
) dB/div	Ref Offset 11 dB Ref 20.00 dBm	IFGain:Low	#Atten: 20 dB			Auto Tuno
						Center Free
0.0						2.437000000 GH
0.0						Start Fre
0.0						2.437000000 GH
0.0						
0.0						Stop Free 2.437000000 GH
	2.437000000 GHz 8 MHz	#VBV	V 50 MHz	Sweep 3.	Span 0 Hz 000 ms (1001 pts)	CF Stej 8.000000 MH
KR MODE	TRC SCL X		Y FL	INCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Ma
2 3 4 5						Freq Offse
5 7						
3 9 0						
0 1 2						



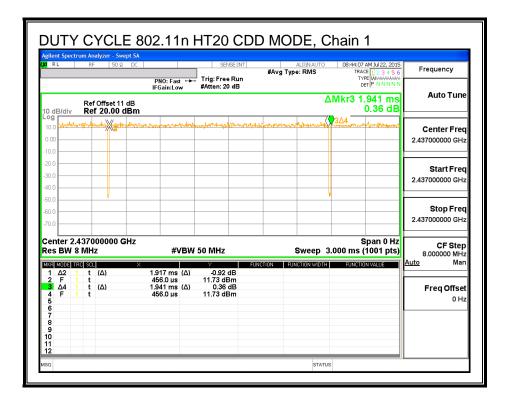
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RL	RF 50 Ω	PNO: Fast IFGain:Lot		sense:INT ree Run : 20 dB	ALIGNAUTO #Avg Type: RMS	08:36:04 AM Jul22, 2015 TRACE 1 2 3 4 5 6 TYPE WWWWWW DET P N N N N N	Frequency
0 dB/div	Ref Offset 11 d Ref 20.00 df				۵	Mkr3 1.941 ms -0.15 dB	Auto Tune
og 10.0 	mouthingulation	and the floor the patheone	manlimantu	ky the man lightly	for a for your the transmission of the second se	LOND AND AND AND AND AND AND AND AND AND A	Center Fred 2.437000000 GHz
0.0							
10.0							Start Fred 2.437000000 GHz
io.o		<u>ہ</u>				<u>ү</u>	Stop Free
0.0							2.437000000 GHz
es BW 8		#\	'BW 50 MH		-	Span 0 Hz .000 ms (1001 pts)	CF Step 8.000000 MHz Auto Mar
KR MODE T 1 Δ2 2 F 3 Δ4 4 F 5	RC SCL t (Δ) t t t (Δ)	× 1.920 ms 645.0 μs 1.941 ms 645.0 μs	11.79	35 dB dBm 15 dB	NCTION FUNCTION WIDTH	FUNCTION VALUE	Freq Offset
6 7 8 9 0 1							



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RL	RF	50Ω DC	PNO: Fast		SENSE	lun	#Avg Typ	ALIGN AUTO e: RMS	TRA	AM Jul 22, 2015 CE 1 2 3 4 5 6 PE WWWWWWWWW DET P N N N N N	Frequency
		set 11 dB	IFGain:Lov	,	#Atten: 20 c	8		2	Mkr3 1	.941 ms -0.43 dB	Auto Tune
0 dB/div .og		0.00 dBm	uplem have	week la	hakademeteter	NUMBER	unednadel	month	<u>3∆4</u>	www.	0
0.00		////									Center Free 2.437000000 GH:
20.0											
io.o											Start Free 2.437000000 GH:
				-							
50.0											Stop Free 2.437000000 GH:
	2.437000	000 GHz								Span 0 Hz	CF Ster
les BW		×	#V	BW :	50 MHz	FUNC		Sweep 3		(1001 pts)	8.000000 MH Auto Mar
1 Δ2 2 F 3 Δ4 4 F 5	1 t (Δ) 1 t 1 t 1 t (Δ) 1 t)	1.917 ms 456.0 µs 1.941 ms 456.0 µs		-0.70 dE 11.77 dBn -0.43 dE 11.77 dBn	3			FONCT		Freq Offse
6 7 8 9 0											
11 12											



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8.2. 802.11b SISO MODE IN THE 2.4 GHz BAND

8.2.1. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

IC RSS-247 (5.2) (1)

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

RESULTS for Chain 0

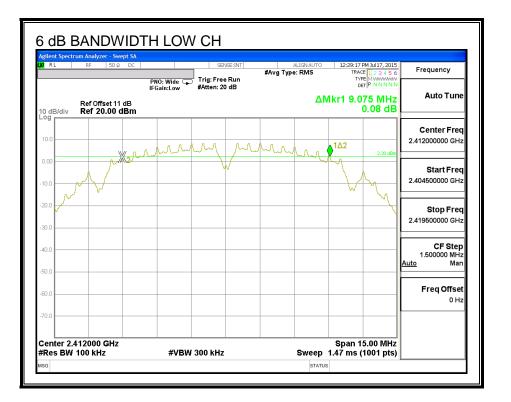
Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	9.075	0.5
Mid	2437	9.075	0.5
High_11	2462	9.030	0.5
High_12	2467	9.075	0.5
High_13	2472	9.075	0.5

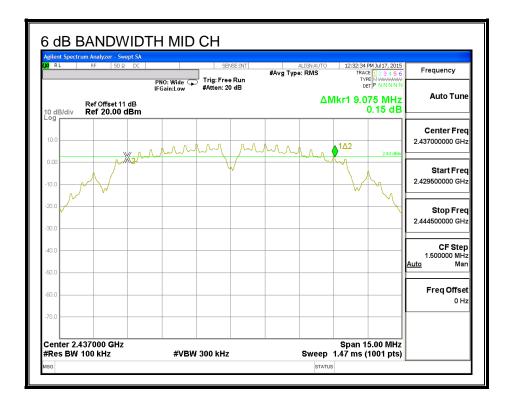
RESULTS for Chain 1

Channel	Frequency	6 dB Bandwidth	Minimum Limit
	(MHz)	(MHz)	(MHz)
Low	2412	9.090	0.5
Mid	2437	9.090	0.5
High_11	2462	9.060	0.5
High_12	2467	9.090	0.5
High_13	2472	9.090	0.5

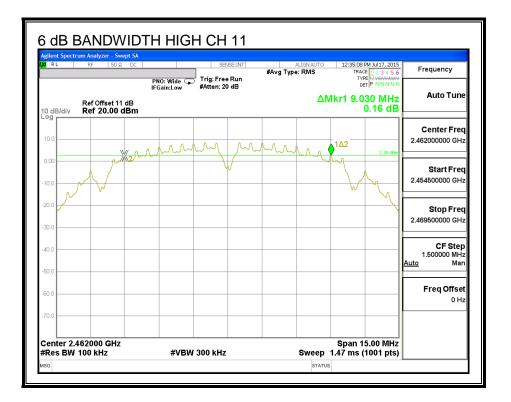
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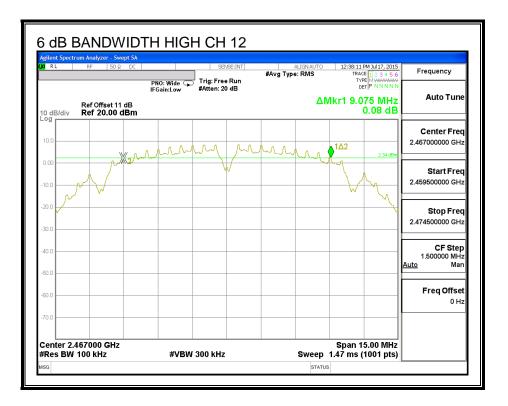
6 dB BANDWIDTH, Chain 0



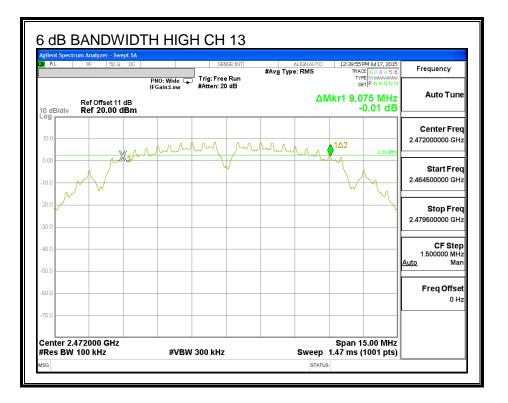


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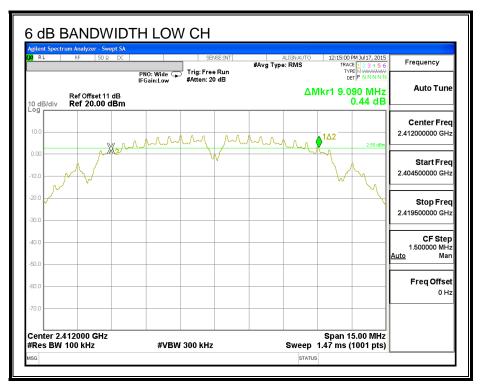




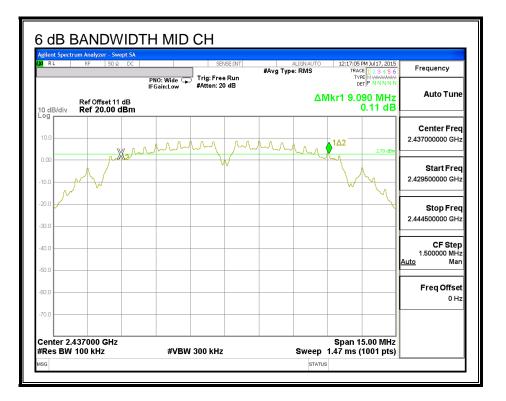
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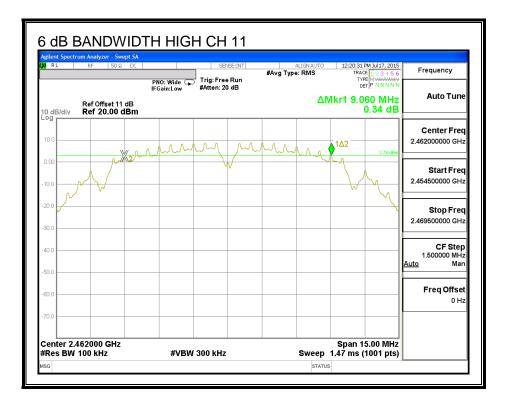


6 dB BANDWIDTH, Chain 1

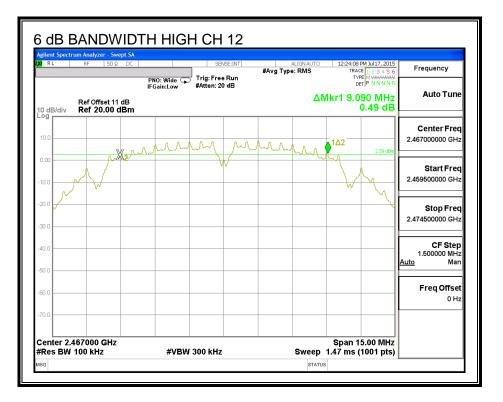


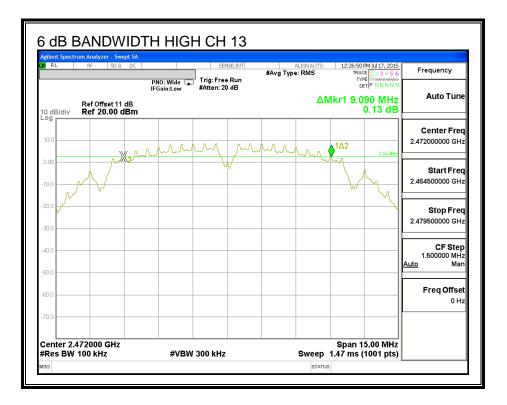
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8.2.2. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

RESULTS for Chain 0

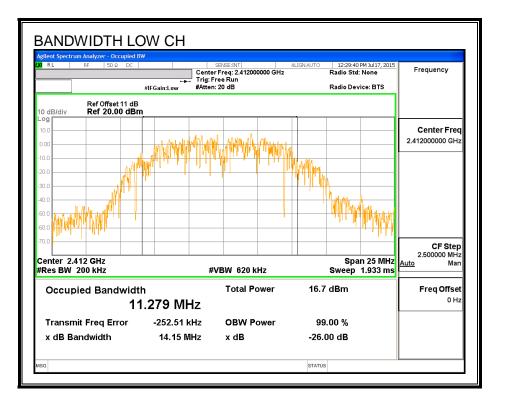
Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	11.279
Mid	2437	11.899
High_11	2462	11.739
High_12	2467	11.553
High_13	2472	11.712

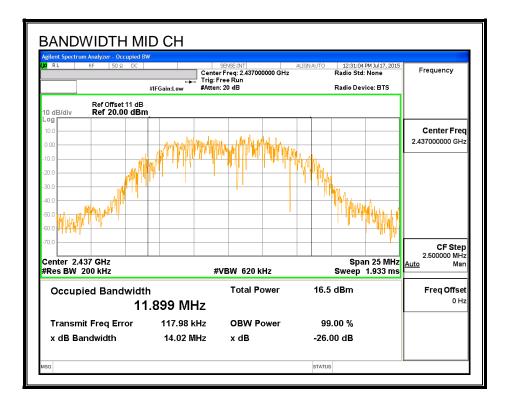
RESULTS for Chain 1

Channel	Frequency	99% Bandwidth
	(MHz)	(MHz)
Low	2412	11.587
Mid	2437	11.829
High_11	2462	10.956
High_12	2467	11.290
High_13	2472	11.747

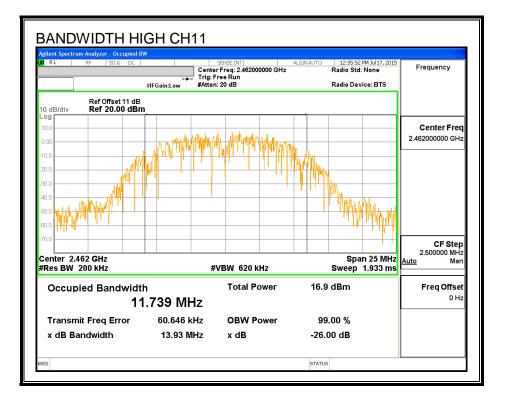
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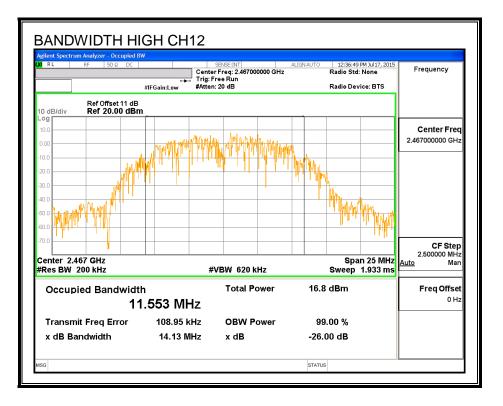
99% BANDWIDTH, Chain 0





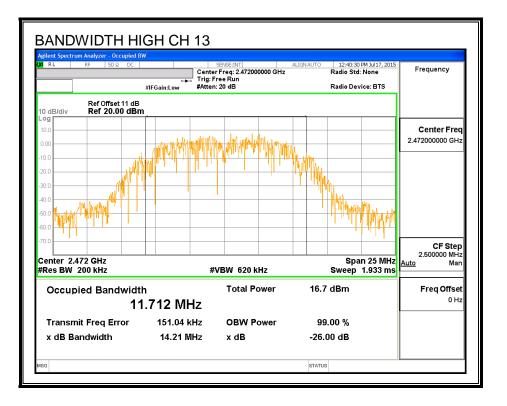
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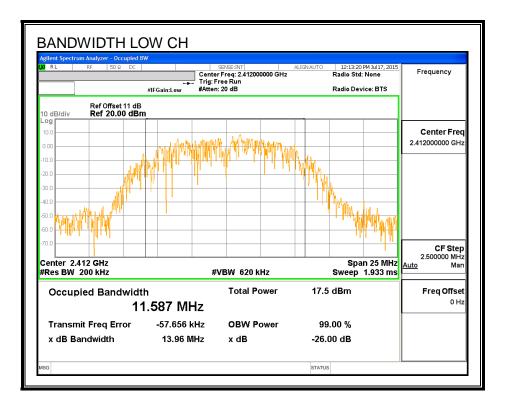


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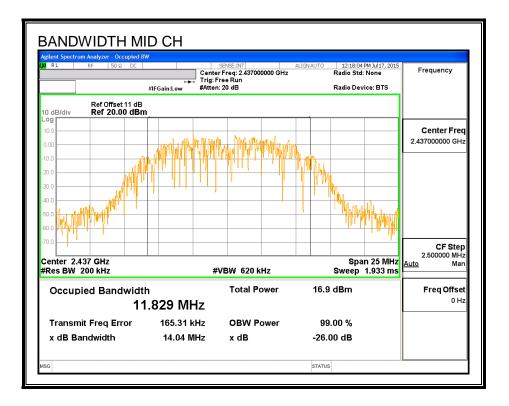
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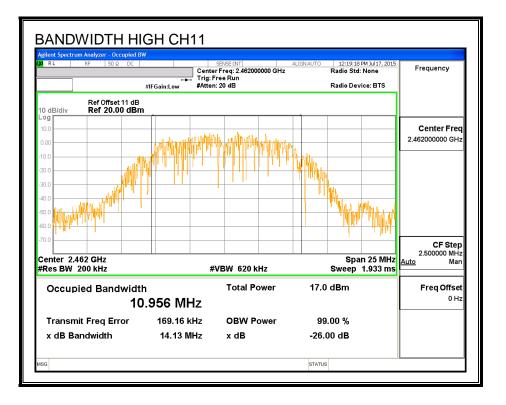


99% BANDWIDTH, Chain 1



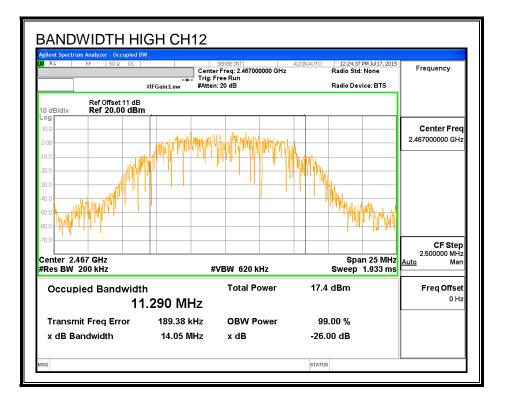
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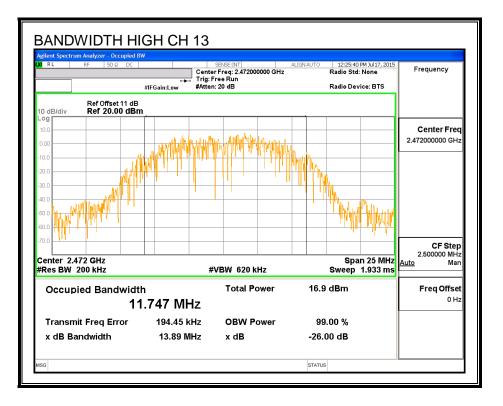




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8.2.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

RESULTS for Chain 0

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	15.89
Mid	2437	16.00
High_11	2462	15.99
High_12	2467	15.98
High_13	2472	12.89

RESULTS for Chain 1

Channel	Frequency	Power
	(MHz)	(dBm)
Low	2412	15.93
Mid	2437	15.83
High_11	2462	15.98
High_12	2467	15.96
High_13	2472	12.88

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8.2.4. OUTPUT POWER

LIMITS

FCC §15.247

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.

DIRECTIONAL ANTENNA GAIN

There is only one transmitter output therefore the directional gain is equal to the antenna gain.

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RESULTS for Chain 0

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	-0.60	30.00	30	36	30.00
Mid	2437	-0.60	30.00	30	36	30.00
High_11	2462	-0.60	30.00	30	36	30.00
High_12	2467	-0.60	30.00	30	36	30.00
High_13	2472	-0.60	30.00	30	36	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power
--------------------	------	--

Results

Channel	Frequency	Chain 0	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	18.83	18.83	30.00	-11.17
Mid	2437	18.97	18.97	30.00	-11.03
High_11	2462	18.96	18.96	30.00	-11.04
High_12	2467	18.93	18.93	30.00	-11.07
High_13	2472	15.82	15.82	30.00	-14.18

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RESULTS for Chain 1

Limits

Channel	Frequency	Directional	FCC	IC	IC	Max
		Gain	Power	Power	EIRP	Power
			Limit	Limit	Limit	
	(MHz)	(dBi)	(dBm)	(dBm)	(dBm)	(dBm)
Low	2412	-0.50	30.00	30	36	30.00
Mid	2437	-0.50	30.00	30	36	30.00
High_11	2462	-0.50	30.00	30	36	30.00
High_12	2467	-0.50	30.00	30	36	30.00
High_13	2472	-0.50	30.00	30	36	30.00

Duty Cycle CF (dB)	0.00	Included in Calculations of Corr'd Power
--------------------	------	--

Results

Channel	Frequency	Chain 1	Total	Power	Margin
		Meas	Corr'd	Limit	
		Power	Power		
	(MHz)	(dBm)	(dBm)	(dBm)	(dB)
Low	2412	18.95	18.95	30.00	-11.05
Mid	2437	18.86	18.86	30.00	-11.14
High_11	2462	18.94	18.94	30.00	-11.06
High_12	2467	18.91	18.91	30.00	-11.09
High_13	2472	15.78	15.78	30.00	-14.22

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8.2.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247

IC RSS-247 (5.2) (2)

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 for Chain 0

Duty C	Cycle CF (dB)	0.00	Included	in Calc	ulations	of Corr'd PSD
PSD Resul	ts					
Channel	Frequency	Chain 0	Total	Limit	Margin	
			Corr'd			
	(MHz)	(dBm)	PSD			
			(dBm)	(dBm)	(dB)	
Low	2412	-6.55	-6.55	8.0	-14.6	
Mid	2437	-7.46	-7.46	8.0	-15.5	
High_11	2462	-7.08	-7.08	8.0	-15.1	
High_12	2467	-6.79	-6.79	8.0	-14.8	
High_13	2472	-10.15	-10.15	8.0	-18.2	

RESULTS for Chain 1

High_11

2462

Duty C	Cycle CF (dB)	0.00	Included	in Calc	ulations	of Corr'd PSD
PSD Resul	ts					
Channel	Frequency	Chain 1	Total	Limit	Margin	
		Meas	Corr'd			
	(MHz)	(dBm)	PSD			
			(dBm)	(dBm)	(dB)	
Low	2412	-6.86	-6.86	8.0	-14.9	
Mid	2437	-7.51	-7.51	8.0	-15.5	

-7.34

High_12	2467	-7.02	-7.02	8.0	-15.0
High_13	2472	-10.38	-10.38	8.0	-18.4

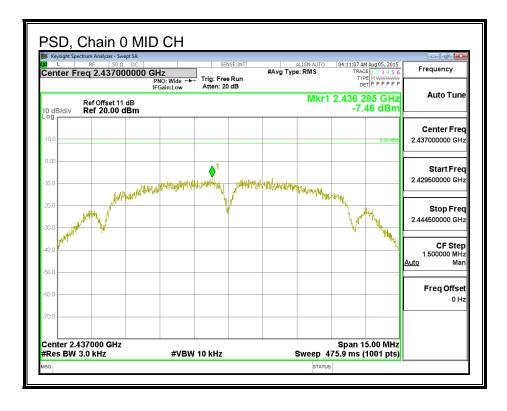
-7.34

8.0

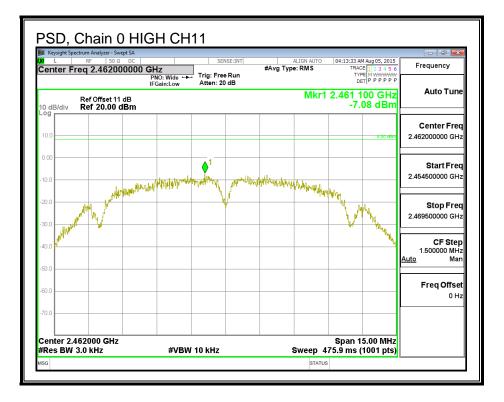
-15.3

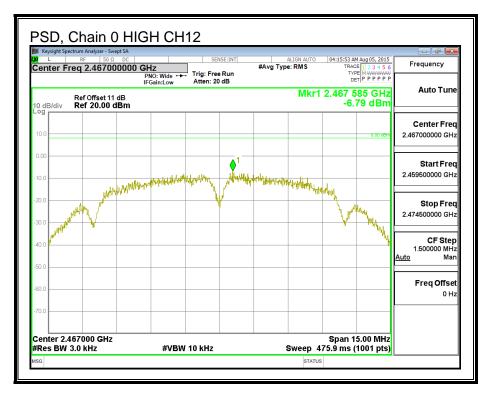
PSD, Chain 0

KI L	-	1	RF	yzer - Swe 50 Ω	DC				SENSE:INT		ALIGN AUT		5 AM Aug 05, 2015	
Cent	er	Fre	q 2.4	1200	0000		:Wide ↔	Tria: F	ree Run	#Avg	Type: RMS	т	RACE 1 2 3 4 5 6	Frequency
							in:Low	Atten:					DETPPPPP	6
Ref Offset 11 dB Mkr1 2.412 705 GHz 10 dB/div Ref 20.00 dBm -6.55 dBm													Auto Tune	
10.0													8.00 dBm	Center Fred
0.00									1					2.412000000 GHz
-10.0							downth who	and here where the states of t	ales	des sure of				
-20.0				MA	Notway	ALAN T	(in the second sec	1	V		howard	how they		
-30.0		المعيد	at the second	N.					1			\	MWW	Start Freq 2.404500000 GHz
-40.0	poph												and the second s	2.404500000 GHz
-50.0														
-60.0 -									_					Stop Free
-70.0														2.419500000 GHz
Cent	or (2 / 1	2000	GHz								Snar	15.00 MHz	CF Step
#Res							#VB\	V 10 kHz			Sweep		s (1001 pts)	1.500000 MHz
MKR M		TRC	SCL		х			Y		UNCTION	FUNCTION WID	TH FUN	CTION VALUE	<u>Auto</u> Man
1 1	N N		f			412 0 824 0		5.003 -53.207						
3	N N		f		7.3	236 0 397 7	GHz	-55.056 -46.335						Freq Offset
5					2.,	5511	3112	-40.000	ubiii				E	0 Hz
6 7														
8 9														
10 11														
<u>ا</u>								m					-	



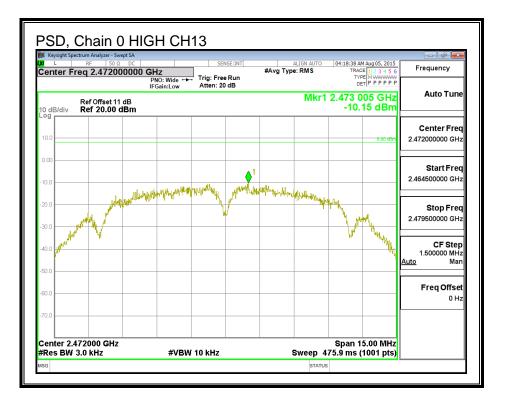
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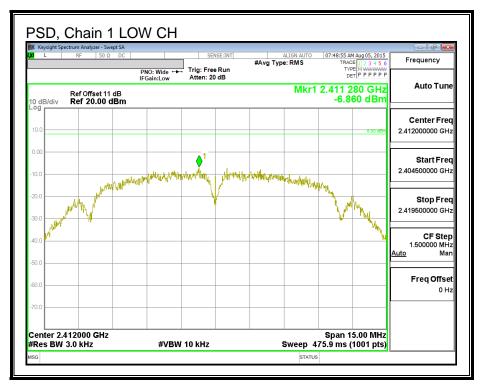


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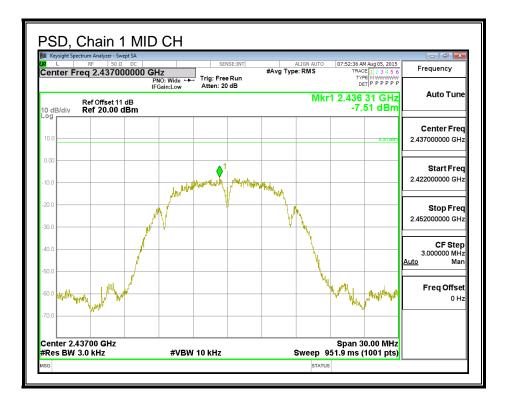
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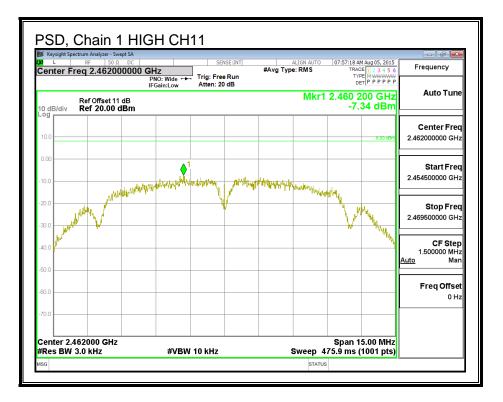


PSD, Chain 1



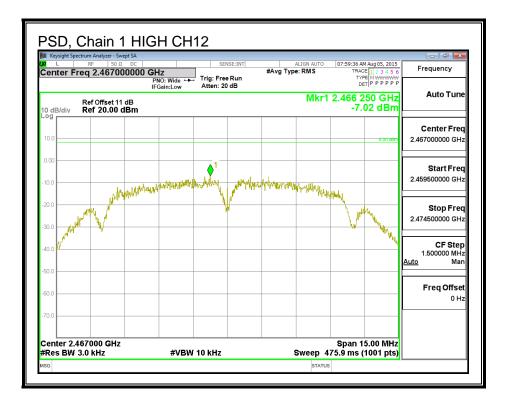
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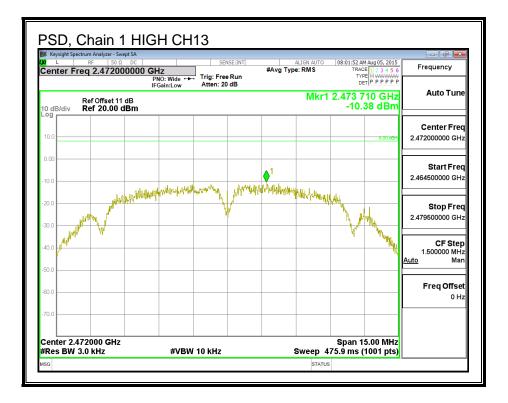




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8.2.6. OUT-OF-BAND EMISSIONS

LIMITS

FCC §15.247 (d)

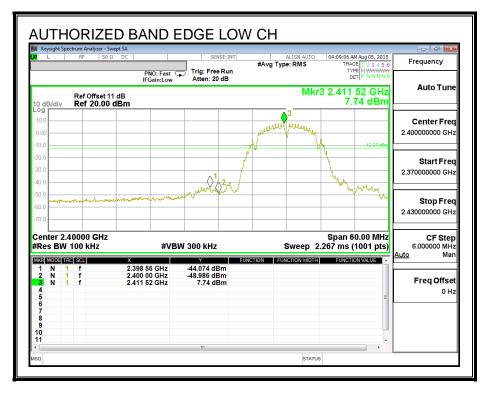
IC RSS-247 (5.5)

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

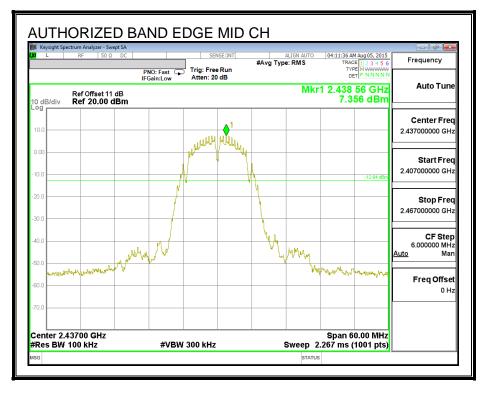
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RESULTS for Chain 0

LOW CHANNEL BANDEDGE

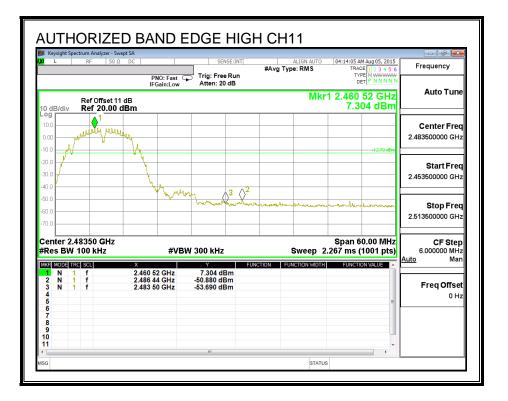


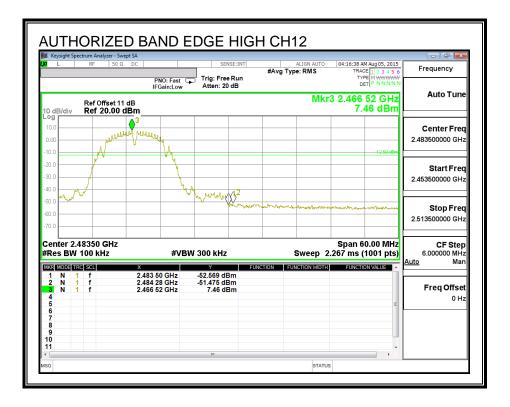
MID CHANNEL BANDEDGE



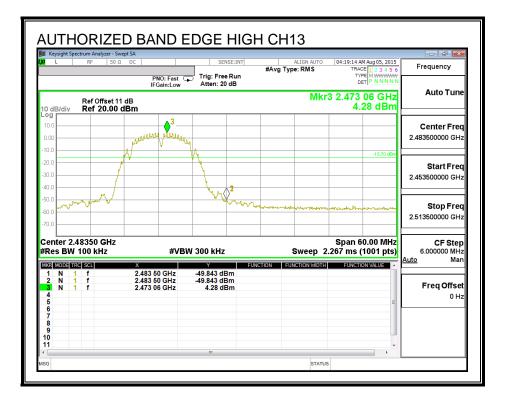
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HIGH CHANNEL BANDEDGE





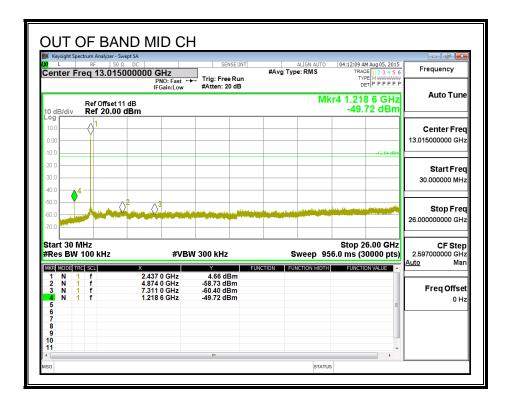
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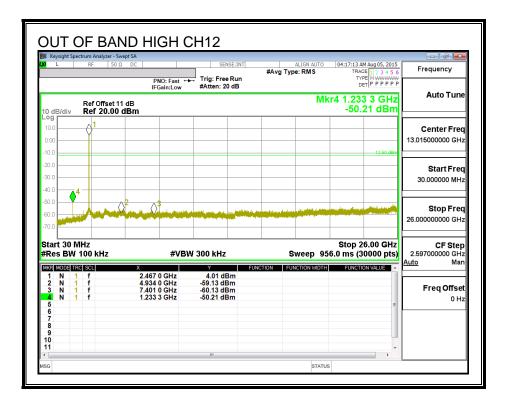
OUT-OF-BAND EMISSIONS

Keysight S	pectrum Analyzer - RF 5	Swept SA 0 Ω DC		SEN	SE:INT	01	IGN AUTO	04-10-02.0	M Aug 05, 2015	
					#/	Avg Type:		TRA	CE 1 2 3 4 5 6	Frequency
			O: Fast ↔ ain:Low	#Atten: 20				D	ETPPPPPP	
0 dB/div	Ref Offset Ref 20.0						Mk		5 6 GHz 05 dBm	Auto Tune
og 10.0	1									Center Fred
0.00	Y									13.015000000 GHz
10.0									12.27 dBm	
20.0										Start Fred
0.0										30.000000 MHz
10.0	4									
i0.0	/	A ² A3								
0.0	-And An	$\mathcal{M} = \mathcal{O}^{\dagger}$								Stop Fred 26.00000000 GHz
'0.0 					·					20.00000000000
tart 30	MHz							Stop 2	6.00 GHz	CF Step
	V 100 kHz		#VB۱	№ 300 kHz		Sw	eep 95		0000 pts)	2.597000000 GH
KR MODE		x		Y	FUNCTION	FUNC	TION WIDTH	FUNCTI	ON VALUE	<u>Auto</u> Mar
1 N 2 N	1 f 1 f	2.412 0		4.31 dB -58.94 dB	m					
3 N 4 N	1 f 1 f	7.236 0		-61.11 dB -49.05 dB						Freq Offse
5	· ·	1.200 0		-40.00 dB					E	0 H2
7										
8 9										
1										
				III					- F	



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Keysigh L	t Spectru	m Analyzer - Sv		_	SEN	SE:INT		ALIGN AUTO	04:14:35 A	M Aug 05, 2015	- # X
enter	Fre		000000 G				#Avg Typ		TRA	CE 1 2 3 4 5 6	Frequency
				IO: Fast ↔ Jain:Low	Trig: Free #Atten: 20				D	ETPPPPPP	
		Ref Offset 1	1 dB					Mk		0 7 GHz	Auto Tune
0 dB/di		Ref 20.00							-49.	50 dBm	
10.0		∕ 1									Center Fred
0.00		Υ									13.015000000 GH;
10.0										-12.70 dBm	
20.0											0 44-
30.0											Start Free 30.000000 MH
40.0	4 -										30.000000 MH
50.0	•										
60.0		Andres	X 🔿	بالعريمينيدان	and the Martin States	and second states		and the second second	dependent of		Stop Fred
70.0											26.00000000 GH
Start 3 Res B				#\/B)	N 300 kHz			woon 05	Stop 2	6.00 GHz 0000 pts)	CF Step 2.597000000 GH
MKRI MODI			x	<i>"</i> (D	N 300 KHZ			VICEP 30	· ·		Auto Mar
1 N	1	f	2.462 (4.38 dB	m	FUN		FUNCT		
2 N 3 N	1	f f	4.924 (-59.80 dB -61.81 dB						Freq Offse
4 N 5	1	f	1.230		-49.50 dB					E	он:
6										=	
7 8											
9 10											
11										-	



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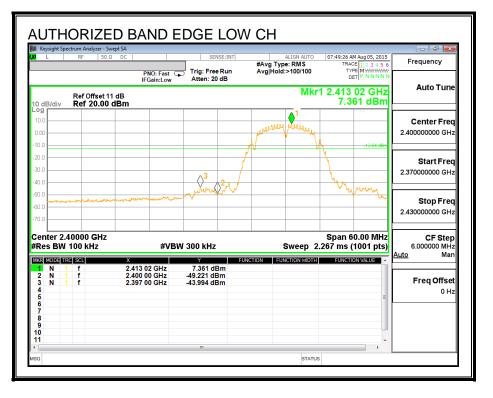
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L	rum Analyzer - Swept SA RF 50 Ω DC	PNO: Fast ↔	SENSE:INT	ALIGN AUTO #Avg Type: RMS	04:19:57 AM Aug 05, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P	Frequency
	Ref Offset 11 dB Ref 20.00 dBm	IFGain:Low	#Atten: 20 dB	М	kr4 1.235 9 GHz -55.35 dBm	Auto Tune
°g 10.0 0.00						Center Fred 13.015000000 GHz
0.0					-15.70 dBm	
						Start Fred 30.000000 MHz
i0.0 4 i0.0						Stop Fred 26.00000000 GHz
tart 30 Mi Res BW 1	00 kHz	#VB\	₩ 300 kHz	Sweep 9:	Stop 26.00 GHz 56.0 ms (30000 pts)	CF Step 2.597000000 GHz <u>Auto</u> Mar
1 N 1 2 N 1 3 N 1	f :	2.472 0 GHz 4.944 0 GHz 7.416 0 GHz	-2.26 dBm -59.50 dBm -60.98 dBm	FUNCTION FUNCTION WIDTE		Freq Offse
4 N 1 5 6 7		1.235 9 GHz	-55.35 dBm		E	0 Hz
7 8 9						

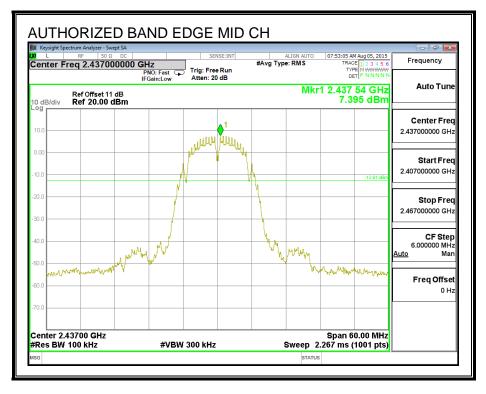
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RESULTS for Chain 1

LOW CHANNEL BANDEDGE

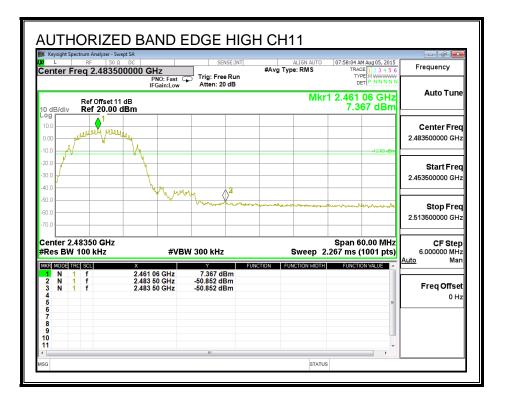


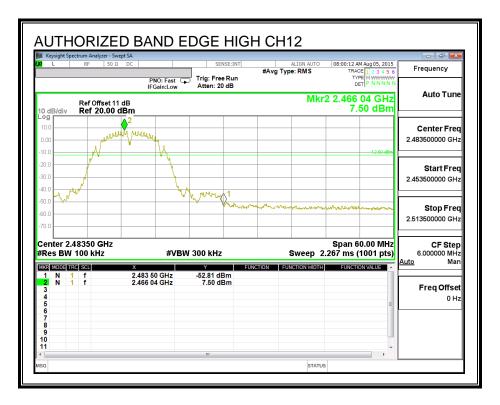
MID CHANNEL BANDEDGE



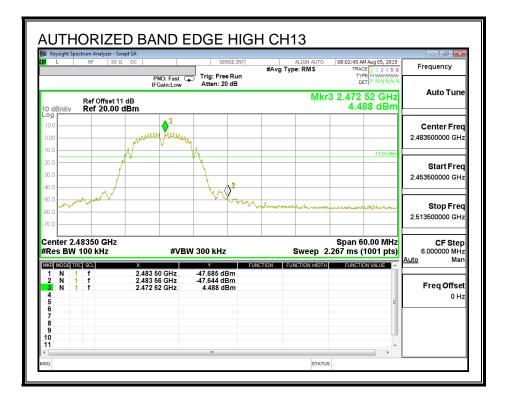
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HIGH CHANNEL BANDEDGE





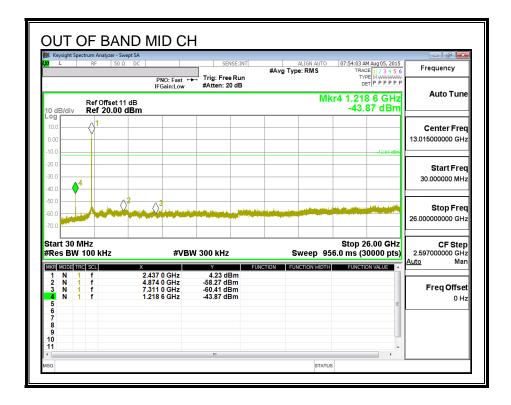
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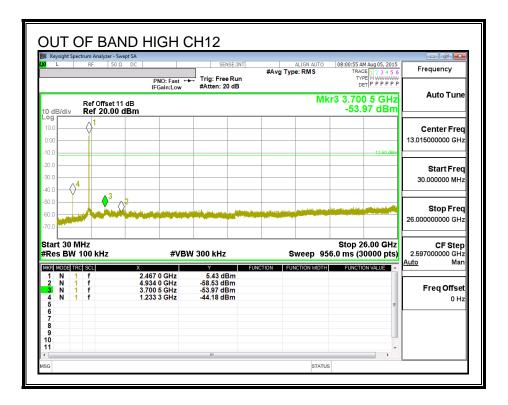
OUT-OF-BAND EMISSIONS

	pectrum Analyzer - S					1				- 6 💌
L	RF 50	ΩDC			SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Aug 05, 2015 DE 1 2 3 4 5 6	Frequency
			NO:Fast ← Gain:Low	Trig: Free #Atten: 20				TY	ET P P P P P P	
0 dB/div	Ref Offset Ref 20.00						Mk		5 6 GHz 80 dBm	Auto Tune
°g	1									Center Fred
	Y									13.015000000 GHz
10.0									-12.64 dBm	
20.0										04
80.0										Start Fred 30.000000 MHz
40.0	4									50.000000 Wir12
50.0		∧ <mark>2</mark>								
50.0	and whether	M. data and						and all all and a state of the	and the second sec	Stop Fred 26.00000000 GHz
70.0										26.00000000 GH2
tart 30	MU-7							Stop 2	6.00 GHz	OF Otom
	100 kHz		#VB۱	N 300 kHz		s	weep 95		0000 pts)	CF Step 2.597000000 GHz
IKR MODE	TRC SCL	x		Y	FUNC	TION FUI	NCTION WIDTH	FUNCTI	ON VALUE	<u>Auto</u> Mar
1 N 2 N	1 f 1 f		0 GHz 0 GHz	4.59 dB -57.56 dB						
	1 f 1 f	3.618	3 GHz 6 GHz	-52.19 dB -44.80 dB	m					Freq Offset
5	1 1	1.205	o GHZ	-44.80 dB	m				E	0 Hz
6 7										
8										
10										
									- · ·	



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	ght S	pectru	m Analyzer - S											
L	_		RF 50	Ω DC				SENSE	:INT	#Ava Tv	ALIGN AUTO pe: RMS		AM Aug 05, 2015	
						O: Fast ain:Low		: Free R en: 20 c			peritatio			P
0 dB/	ldiv		tef Offset Ref 20.00								М		41 1 GHz 6.76 dBm	
^{og} [-		. 1											
10.0		(-		Center Fred
0.00							_					-		13.015000000 GHz
10.0								_					-12.63 dBm	
20.0														Start Fred
30.0														30.000000 MHz
40.0	_	\ <mark>4</mark>												
50.0		3	\wedge^2											
50.0		Υ.		and been	ميافين	فسيقاله وسعاء	and the second		p. Lanna and	a lander to prove				Stop Fred
70.0	20		And a set		1	ann an an Annailte	and the second							26.00000000 GHz
10.0														
tart													26.00 GHz	
Res	B۷	V 10	0 kHz			#VE	W 300	kHz		1	Sweep 9	56.0 ms	(30000 pts)	
ikr MC	_			X			Y			CTION FU	JNCTION WIDTH	FUNC	TION VALUE	Auto Mar
1 N 2 N			f f		2.462 (3.692 8			91 dBn 06 dBm						
3 N	N	1	f		1.641 1	GHz	-56.	76 dBm	1					Freq Offset
4 N 5	N	1	f		1.230 7	GHz	-44.	21 dBm	1				=	0 Hz
6]	
7 8														
9 10														
10														
								11				1	•	



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L RF 50 \$	wept SA 2 DC PNO: Fast ←	SENSE:INT	ALIGN AUTO #Avg Type: RMS	08:03:23 AM Aug 05, 2015 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P P P P P P	Frequency
Ref Offset 1		#Atten: 20 dB	Mł	(r3 6.421 4 GHz -55.03 dBm	Auto Tune
					Center Fred 13.015000000 GHz
0.0				-15.50 dBm	
					Start Fred 30.000000 MHz
	2 3				Stop Fred 26.000000000 GHz
tart 30 MHz Res BW 100 kHz	#VB	₩ 300 kHz	Sweep 95	Stop 26.00 GHz 6.0 ms (30000 pts)	CF Step 2.597000000 GHz Auto Mar
KR MODE TRC SCL 1 N 1 f	× 2.472 0 GHz	0.99 dBm	INCTION FUNCTION WIDTH	FUNCTION VALUE	
2 N 1 f 3 N 1 f 4 N 1 f 5 6	4.944 0 GHz 6.421 4 GHz 1.236 8 GHz	-58.61 dBm -55.03 dBm -50.88 dBm		E	Freq Offset 0 Hz
7 8 9 0 1					

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8.3. 802.11g SISO MODE IN THE 2.4 GHz BAND

Note: Covered by 802.11n HT20 SISO MODE.

8.4. 802.11g 2TX MODE IN THE 2.4 GHz BAND

Note: Covered by 802.11n HT20 2TX CDD MODE.

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