FCC 47 CFR PART 15 SUBPART E

CLASS III PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

Intelligent Backhaul Radio UNII 5.2GHz Band

MODEL NUMBER: IBR-121x-38-NA

FCC ID: 2AAEH-106

REPORT NUMBER: 15U20219-3 Revision A

ISSUE DATE: MARCH 30, 2015

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
---	3/20/15	Initial release	F. de Anda
A	3/30/15	Updated LISN cal date	F. de Anda

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	CBF NETWORKS, INC., DBA FASTBACK NETWORKS 2460 N. FIRST STREET, SUITE 200 SAN JOSE, CA 95131, USA
EUT DESCRIPTION:	Intelligent Backhaul Radio
MODEL:	IBR-120x-38-NA, IBR-120x-83-NA IBR-121x-38-NA, IBR-121x-83-NA
SERIAL NUMBER:	40314380088 (conducted), 40314390023 (radiated)
DATE TESTED:	February 20, 2015 – March 3, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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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PROJECT LEAD/ PROGRAM MANAGER
UL VERIFICATION SERVICES INC.

Tested By:

Chris Xiong
EMC 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, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009.

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 G
☐ Chamber B	☐ Chamber E	☐ Chamber H
☐ Chamber C	☐ Chamber F	

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. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

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

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Fixed Point-to-Point radio in 5.2GHz unlicensed band with a proprietary communication management interface Intelligent Backhaul Radio.

This device uses 40MHz, 20MHz and 10MHz bandwidths with QAM4, QAM16, QAM64, QAM256 modulation. It transmits dual stream uncorrelated MIMO.

5.2. CLASS III PERMISSIVE CHANGE

Additional frequencies added to 5.2GHz band to enable product to support wider frequency ranges.

FCC ID: 2AAEH-106, Model: IBR-121x-38-NA

5.2 GHz Band

Granted Frequency Ranges			Proposed CLASS III PERMISSIVE CHANGE
Bandwidth (MHz)	Frequency Range (MHz)		Frequency Range (MHz)
10	5166-5240		5160-5250
20	5181-5235		5165-5250
40	5190-5225		5175-5250

The additional frequencies for the 5.2 GHz Band are:

10 MHZ BW Frequency (MHz)	20 MHZ BW Frequency (MHz)	40 MHZ BW Frequency (MHz)
5160	5165	5175
5165	5170	5250
5250	5175	
	5250	

5.3. MAXIMUM OUTPUT POWER

For the additional frequencies, the transmitter has a maximum conducted output power as follows;

5.2 GHz BAND

Bandwidth (MHz)	Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5.2 GHz Band, 2Tx - IBR-121x-38-NA				
10	5160	FDD	17.06	50.82
10	5165	FDD	21.71	148.25
10	5250	FDD	10.42	11.02
20	5165	FDD	13.72	23.55
20	5170	FDD	15.89	38.82
20	5175	FDD	20.85	121.62
20	5250	FDD	13.44	22.08
40	5175	FDD	14.25	26.61
40	5250	FDD	15.33	34.12

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Dipole array antenna, with a maximum gain of 14.5dBi for IBR-121x-38-NA.
oi

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Build SVN Revision: 5248

The test utility software used during testing was Micro monitor 1.6.0

5.6. 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.

All radiated testing was performed with the EUT in normal use orientation.

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

10MHz bandwidth QAM 4
20MHz bandwidth QAM 4
40MHz bandwidth QAM 4
Data rate 30 Msamples/s for all bandwidths

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Lenovo	Think Pad	R9-D497T 11/04	QDS-BRCM 1046
POE	PHIHONG	POE36U-1AT-R	P21601123D1	N/A
AC/DC Adapter	Lenovo	N/A	11S45N0113Z1ZH819P0FN	N/A

I/O CABLES

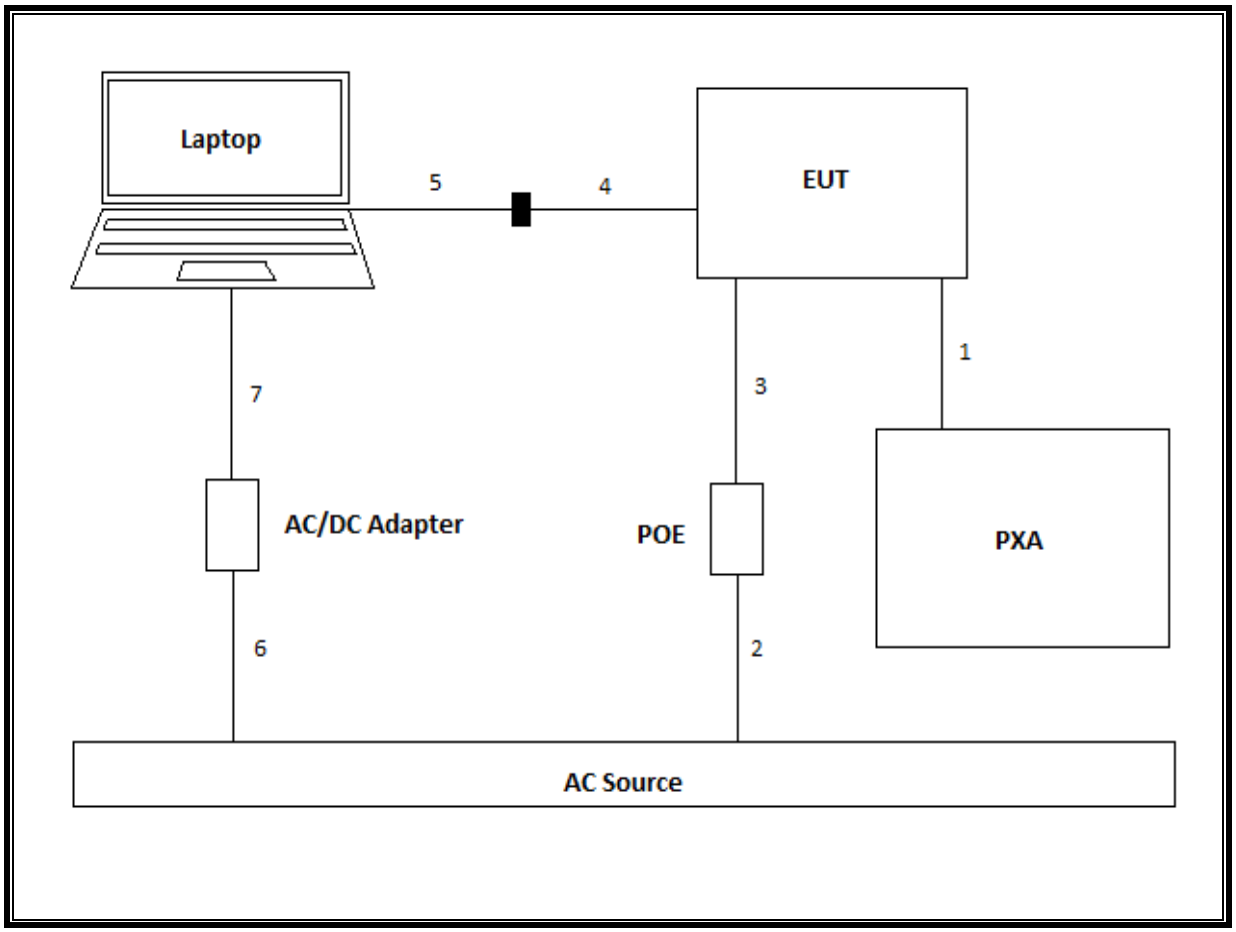
I/O Cable List						
Cable No	Port	# of identical	Connector Type	Cable Type	Cable Length (m)	Remarks
1	Antenna	1	U.FL	Sheilded	0.3	N/A
2	AC	2	3 Prong	Un-Sheilded	1	N/A
3	POE/LAN	1	RJ45	Sheilded	1	N/A
4	USB	1	USB	Sheilded	0.3	N/A
5	Serial	1	9 Pin Sub D	Sheilded	1	N/A
6	AC	2	3 Prong	Un-Sheilded	1	N/A
7	DC	1	Barrel	Un-Sheilded	1	N/A

TEST SETUP

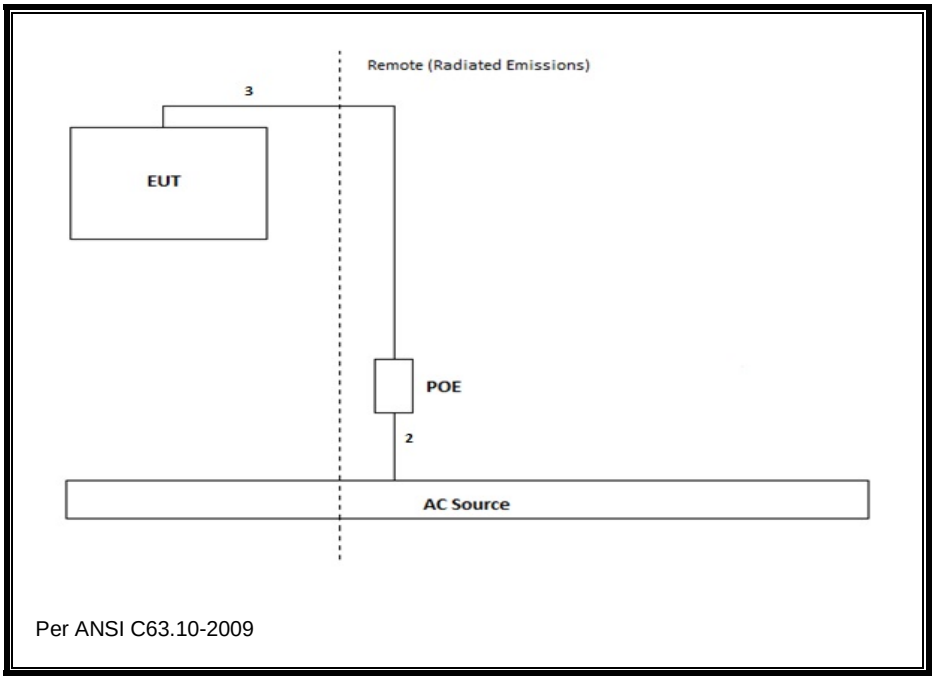
The EUT is a P-P outdoor radio used as a stand-alone device. Test software exercised the radio module.

SETUP DIAGRAM FOR TESTS

CONDUCTED

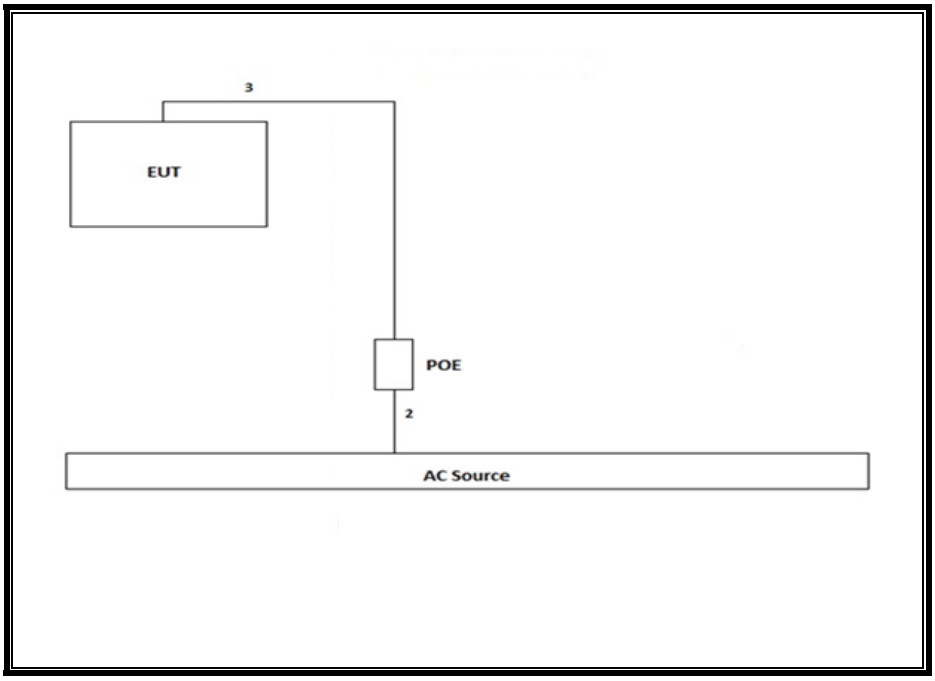


RADIATED



Per ANSI C63.10-2009

AC LINE CONDUCTED



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**	**T No.**	**Cal Date**	**Cal Due**
Chamber G					
Antenna, Horn 18 GHz	ETS Lindgren	3117	862	04/14/14	04/14/15
Antenna, Biconolog, 30MHz-1GHz	Sunol Sciences	JB3	899	05/14/14	04/27/15
High Pass Filter, fc: 3.0GHz, 50 Ohms	Micro-Tronics	HPM17543	898	05/13/14	05/13/15
Low Pass Filter, fc: 5GHz, 50 Ohms	Micro-Tronics	LPS17541	892	05/13/14	05/13/15
High Pass Filter, fc: 6GHz, 50 Ohms	Micro-Tronics	HPS17542	893	05/14/14	05/13/15
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	491	05/15/15	06/05/15
Preamp, 1000MHz	Sonoma	310N	834	05/16/15	06/05/15
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	905	05/17/15	05/17/15
Conducted					
Spectrum Anaylyzer	Agilent	E4440A	189	05/09/14	05/09/15
Power Meter, P-series single channel	Agilent	N1911A	382	04/09/14	04/09/15
Power Sensor, Peak and average, 50 MHz to 6 GHz, 5 MHz BW	Agilent	E9323A	400	05/02/14	05/02/15
Power Meter, P-series single channel	Agilent	N1911A	385	04/30/14	04/30/15
Power Sensor, Peak and average, 50 MHz to 18 GHz, 5 MHz BW	Agilent	E9327A	117	05/15/14	05/15/15
LISN for Conducted Emissions CISPR-16	FCC	50/250-25-2	24	01/16/15	01/16/16
Rohde & Schwarz	ESCI 7	100773	212	08/14/14	08/14/15

7. MEASUREMENT METHODS

26 dB Emission BW: KDB 789033 D02 v01r, Section C.

Conducted Output Power: KDB 789033 D02 v01, Section E.2.b (Method SA-1).

Power Spectral Density: KDB 789033 D02 v01, Section F.

Unwanted emissions in restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, G.5, and G.6.

Unwanted emissions in non-restricted bands: KDB 789033 D02 v01, Sections G.3, G.4, and G.6.

KDB 662911 D02 MIMO with Cross-Polarized Antennas v01

8. ANTENNA PORT TEST RESULTS

8.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

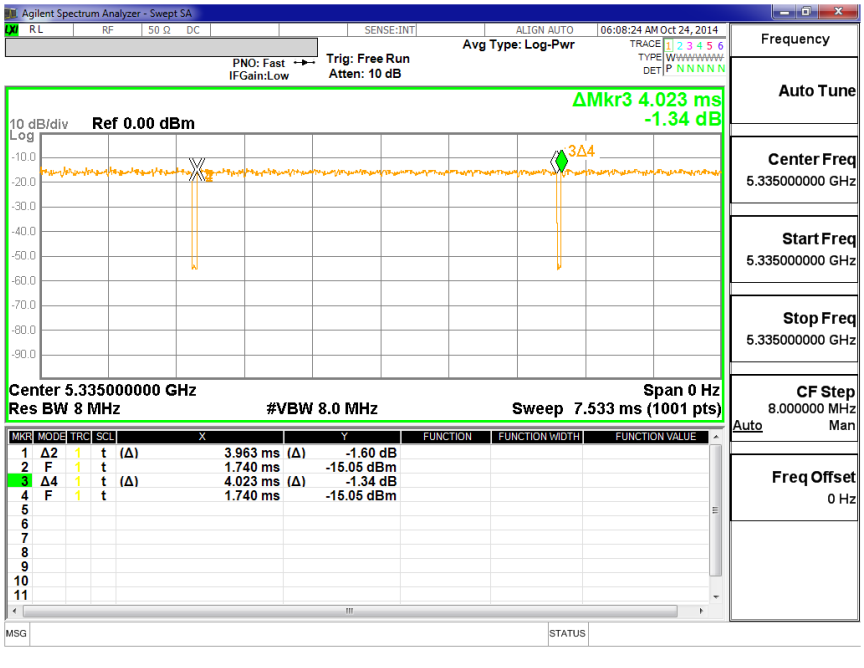
KDB 789033 Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

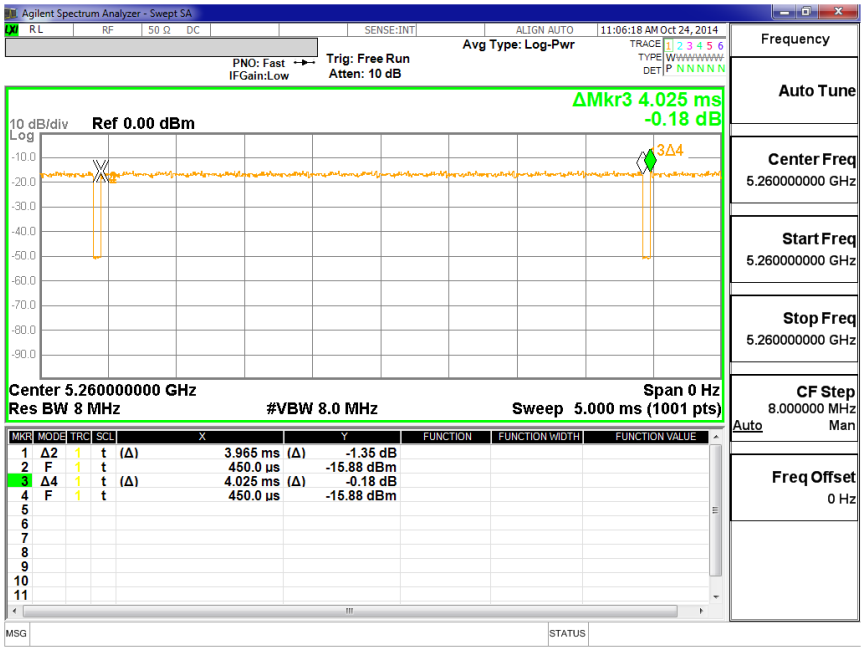
Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
802.11a 10MHz 2TX	3.963	4.023	0.985	98.51%	0.00	0.010
802.11n 20MHz 2TX	3.965	4.025	0.985	98.51%	0.00	0.010
802.11n 40MHz 2TX	3.970	4.030	0.985	98.51%	0.00	0.010

DUTY CYCLE PLOTS

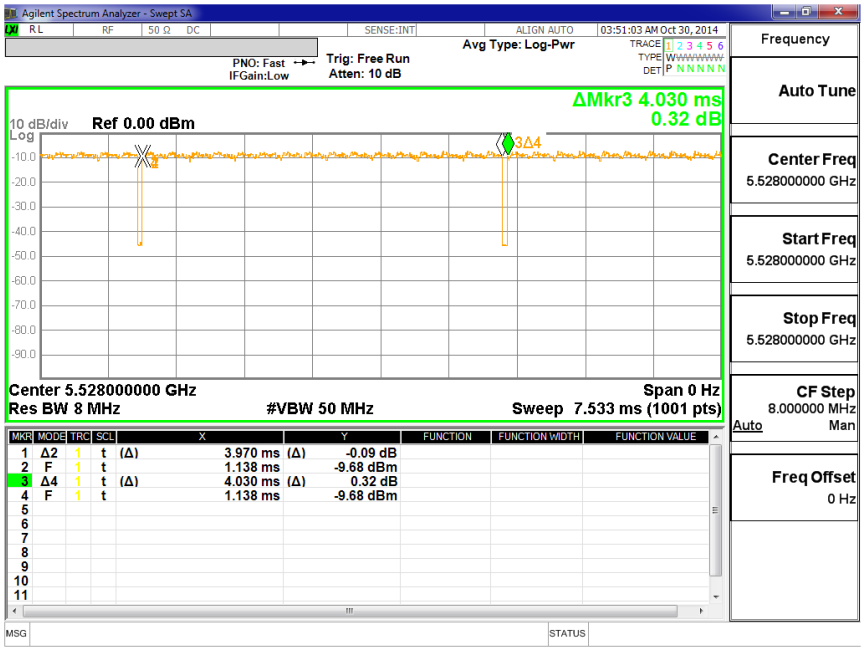
DUTY CYCLE 802.11a 10MHz 2TX MODE



DUTY CYCLE 802.11n 20Hz 2TX MODE



DUTY CYCLE 802.11n 40MHz 2TX MODE



8.2. 10MHz 2Tx MODE IN THE 5.2 GHz BAND (IBR-121x-38-NA)

8.2.1. **26 dB BANDWIDTH**

LIMITS

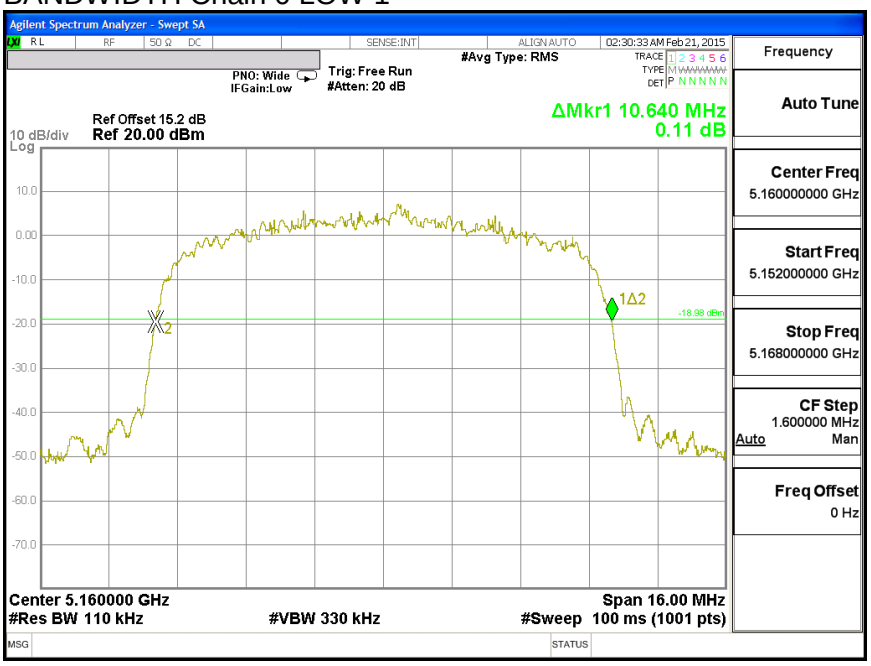
None; for reporting purposes only.

RESULTS

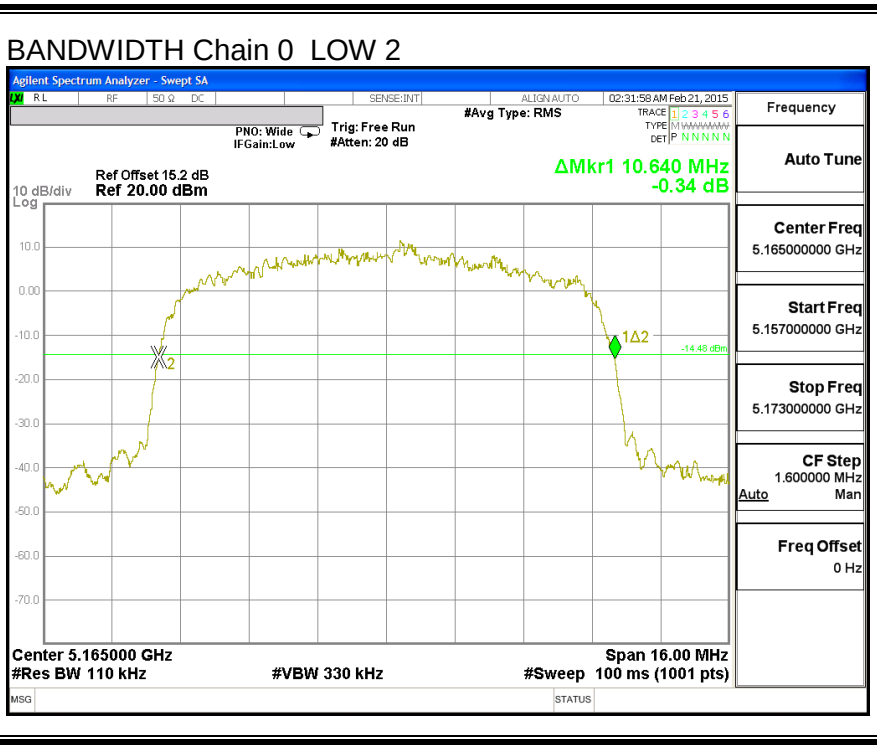
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low 1	5160	10.64	10.61
Low 2	5165	10.64	10.67
Straddle	5250	10.88	10.90

26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW 1

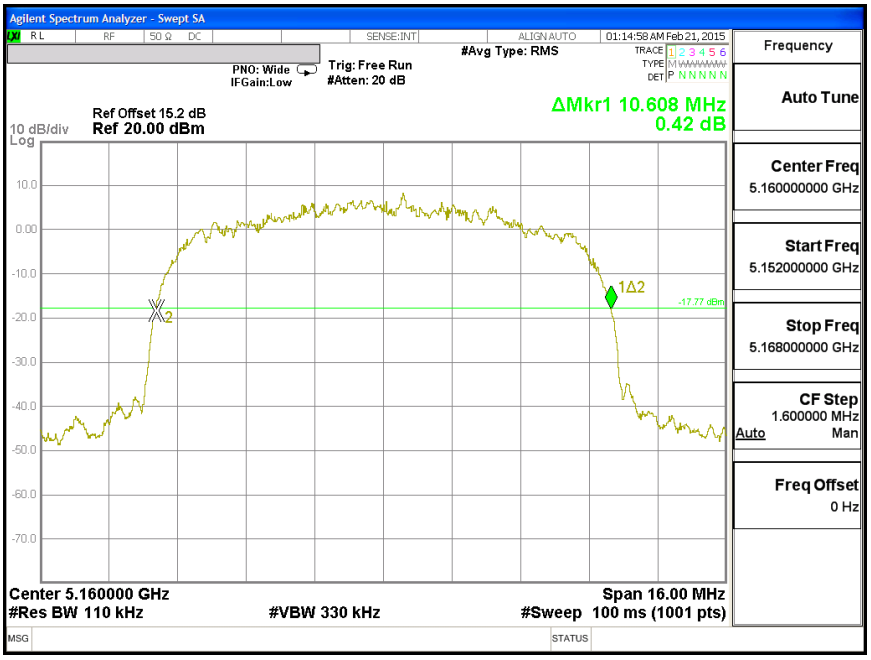


BANDWIDTH Chain 0 LOW 2

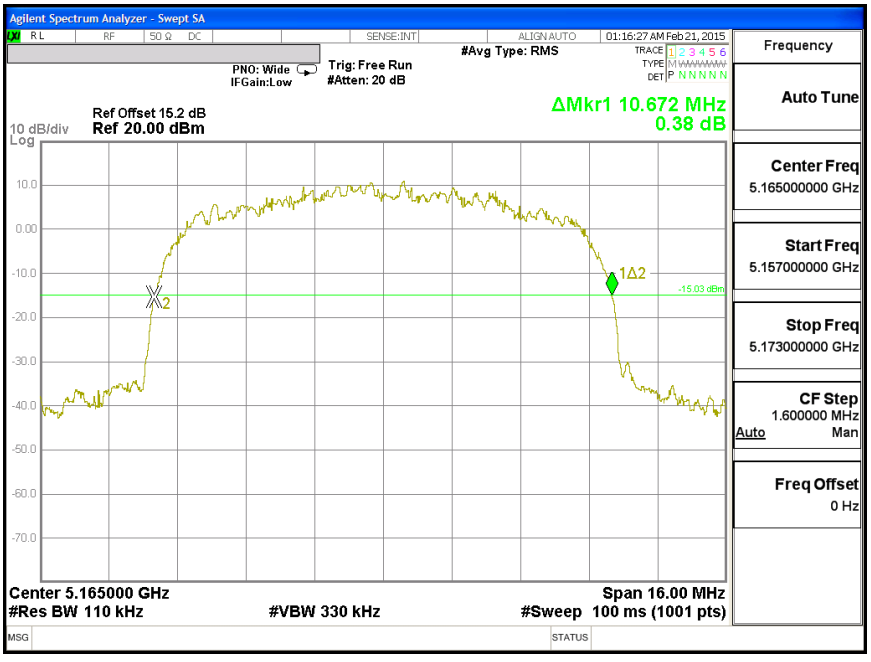


26 dB BANDWIDTH, Chain 1

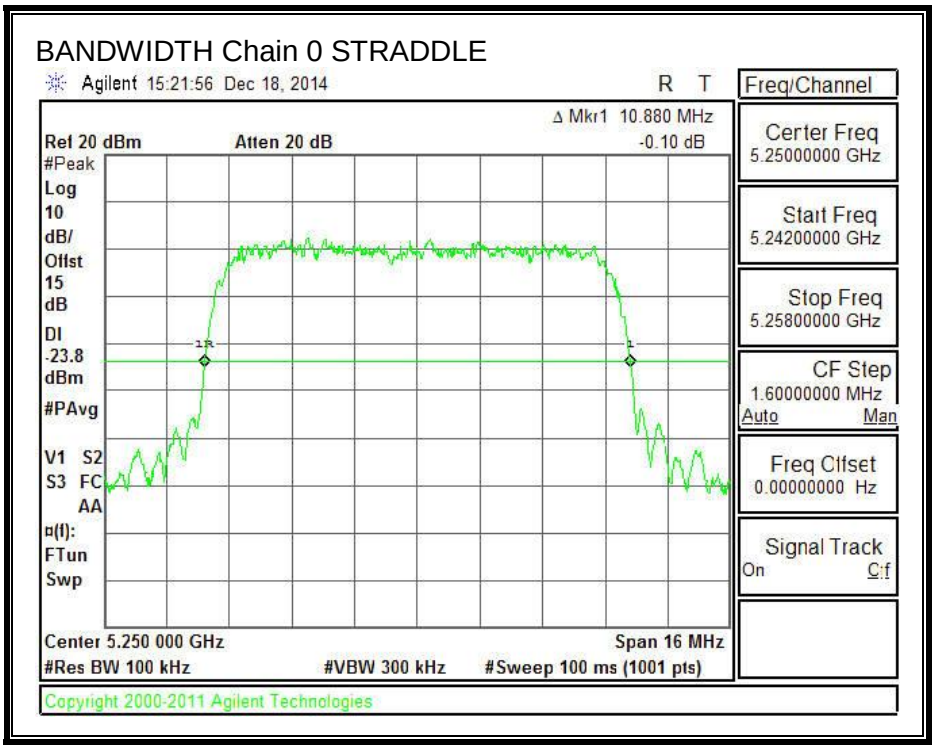
BANDWIDTH Chain 1 LOW 1



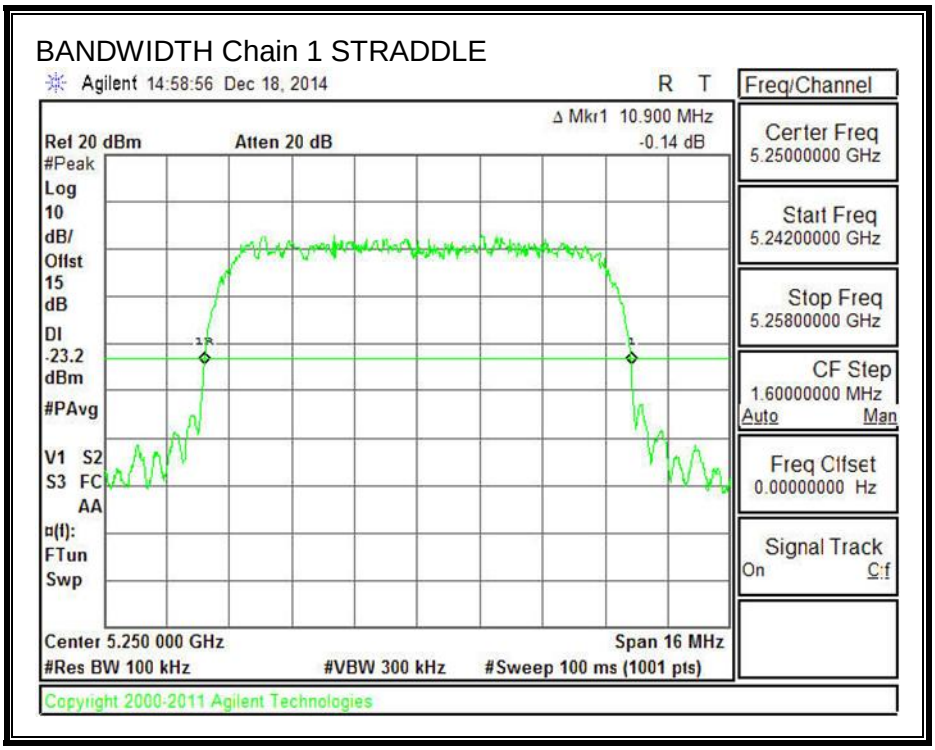
BANDWIDTH Chain 1 LOW 2



26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



8.2.2. **OUTPUT POWER AND PSD**

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
14.50	14.50	14.50

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low 1	5160	14.50	14.50	30.00	17.00
Low 2	5165	14.50	14.50	30.00	17.00
Straddle	5250	14.50	14.50	30.00	17.00

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

Output Power Results

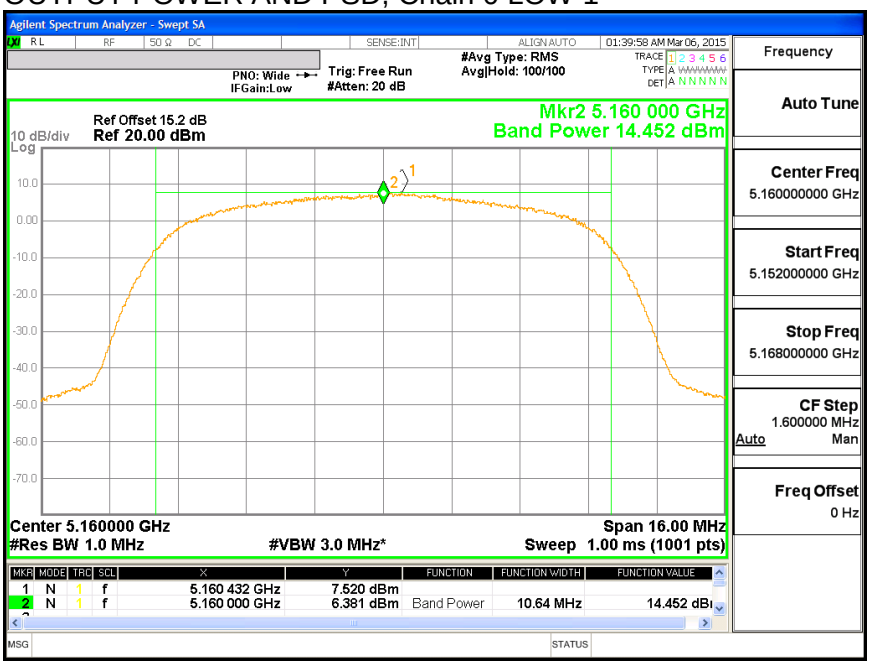
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low 1	5160	14.45	13.60	17.06	30.00	-12.94
Low 2	5165	18.60	18.80	21.71	30.00	-8.29
Straddle	5250	7.40	7.42	10.42	30.00	-19.58

PSD Results

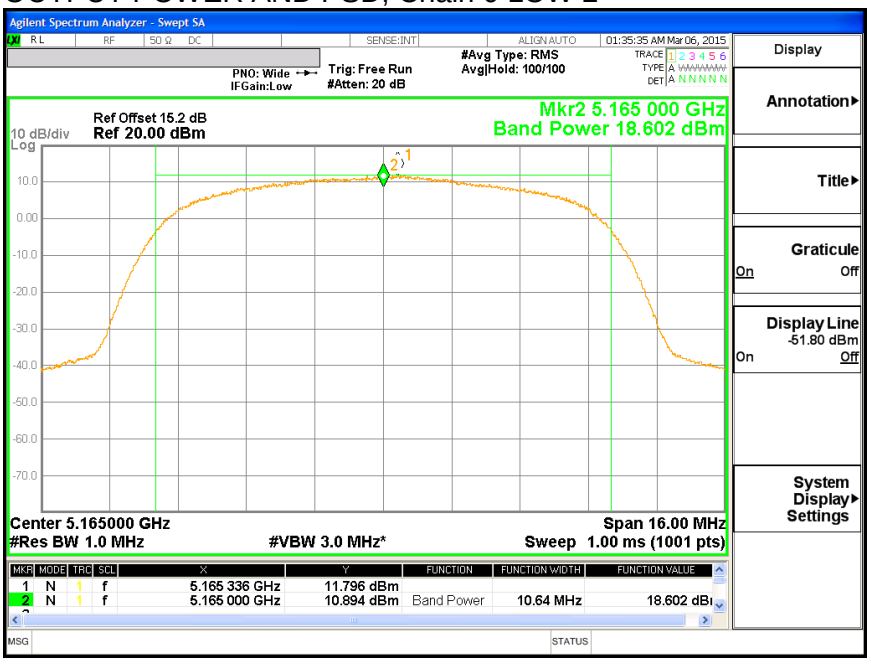
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low 1	5160	7.52	6.90	10.23	17.00	-6.77
Low 2	5165	11.80	12.21	15.02	17.00	-1.98

OUTPUT POWER AND PSD, Chain 0

OUTPUT POWER AND PSD, Chain 0 LOW 1

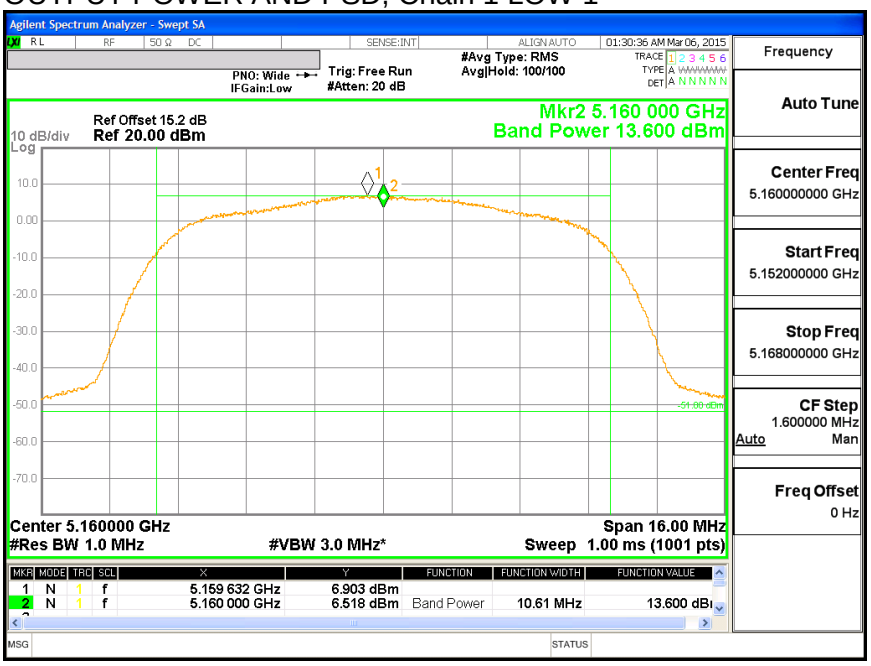


OUTPUT POWER AND PSD, Chain 0 LOW 2

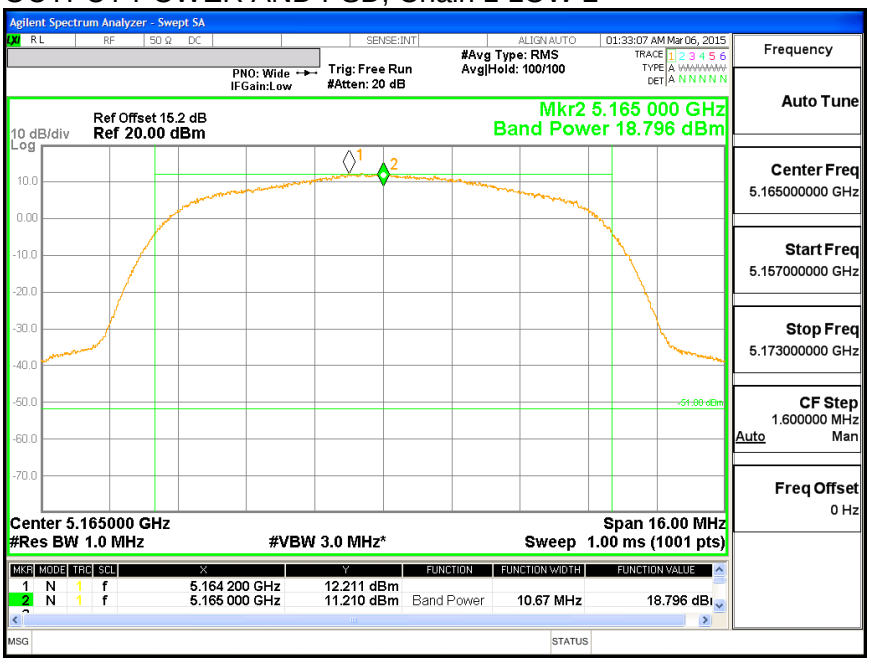


OUTPUT POWER AND PSD, Chain 1

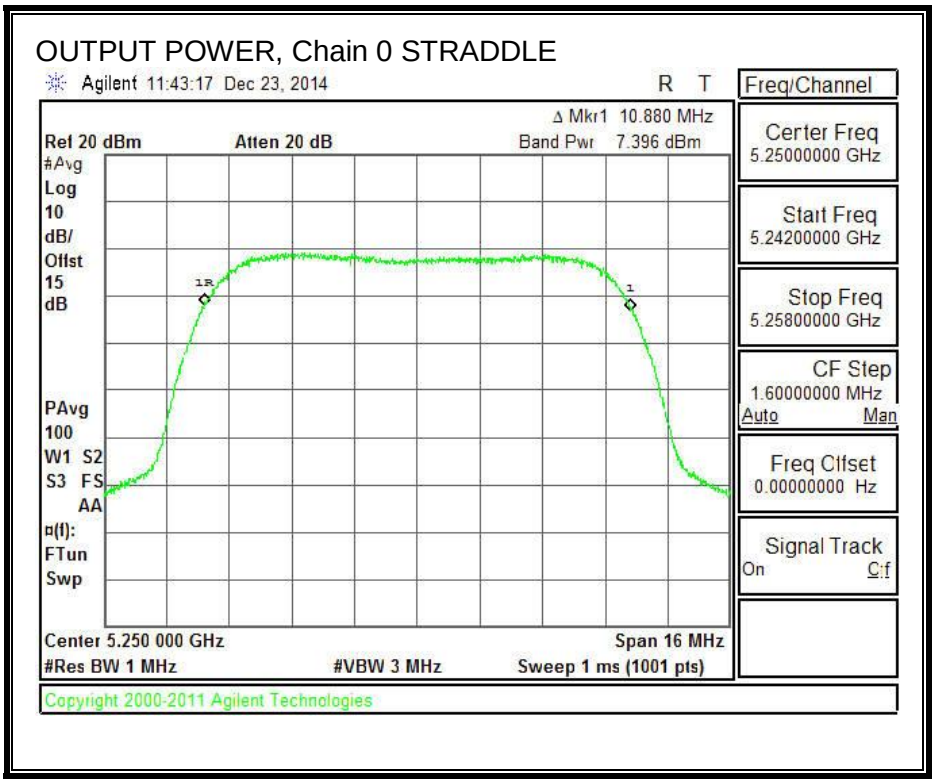
OUTPUT POWER AND PSD, Chain 1 LOW 1



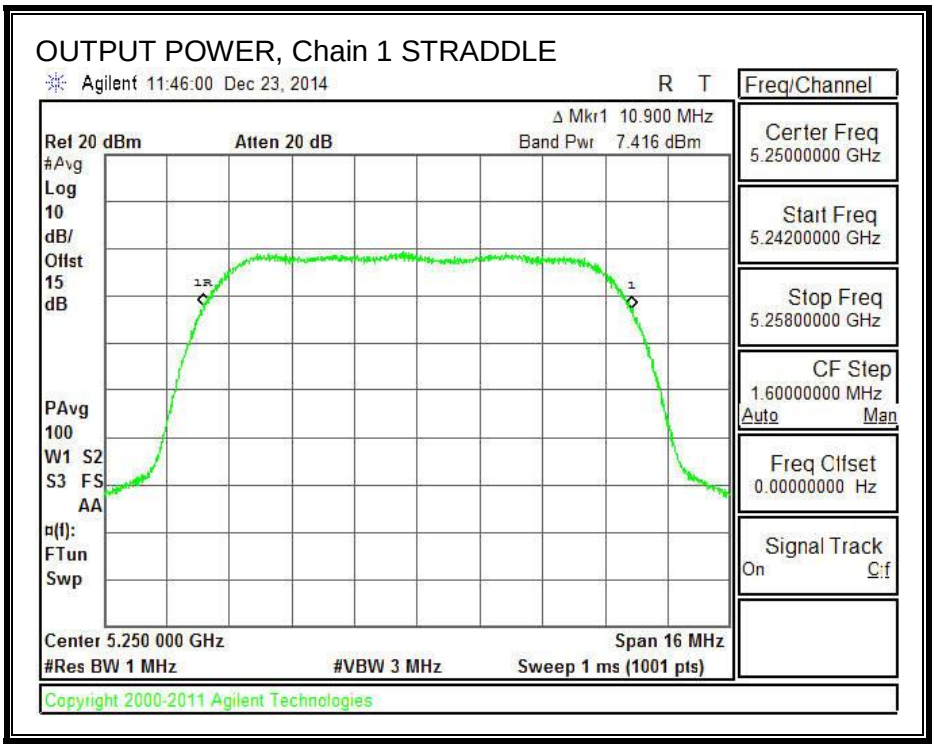
OUTPUT POWER AND PSD, Chain 1 LOW 2



STRADDLE CHANNEL CHANNEL OUTPUT POWER, Chain 0



STRADDLE CHANNEL OUTPUT POWER, Chain 1



8.2.3. **STRADDLE CHANNEL RESULTS**

UNII-1 BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5250	5.44	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSD Limit (dBm)
5250	30.00	17.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd Power & PPSD**

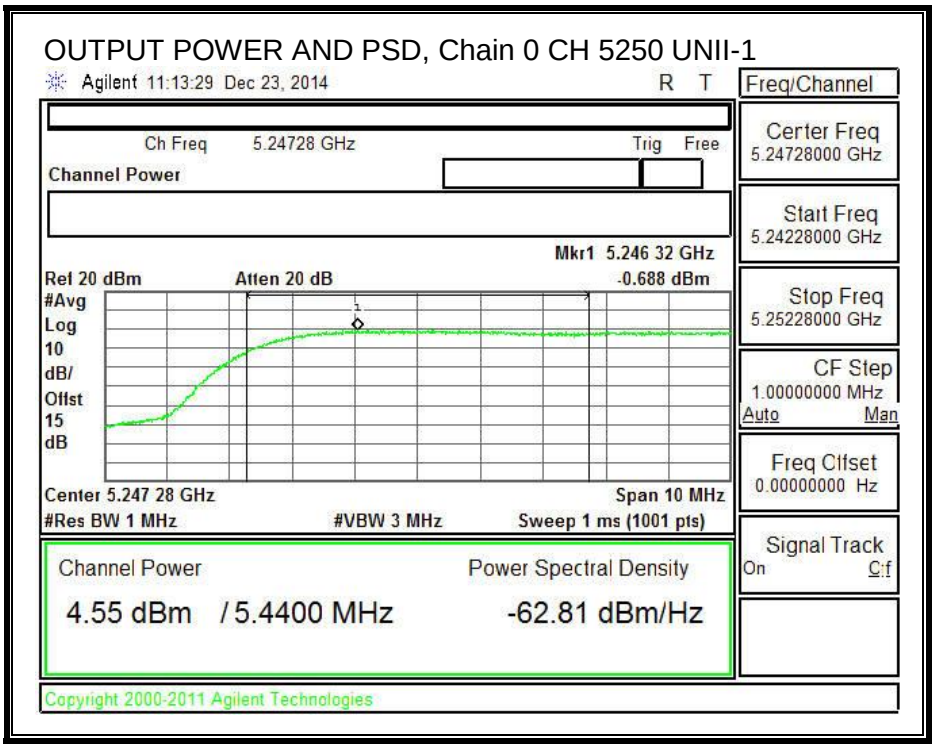
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	4.55	4.76	7.67	30.00	-22.33

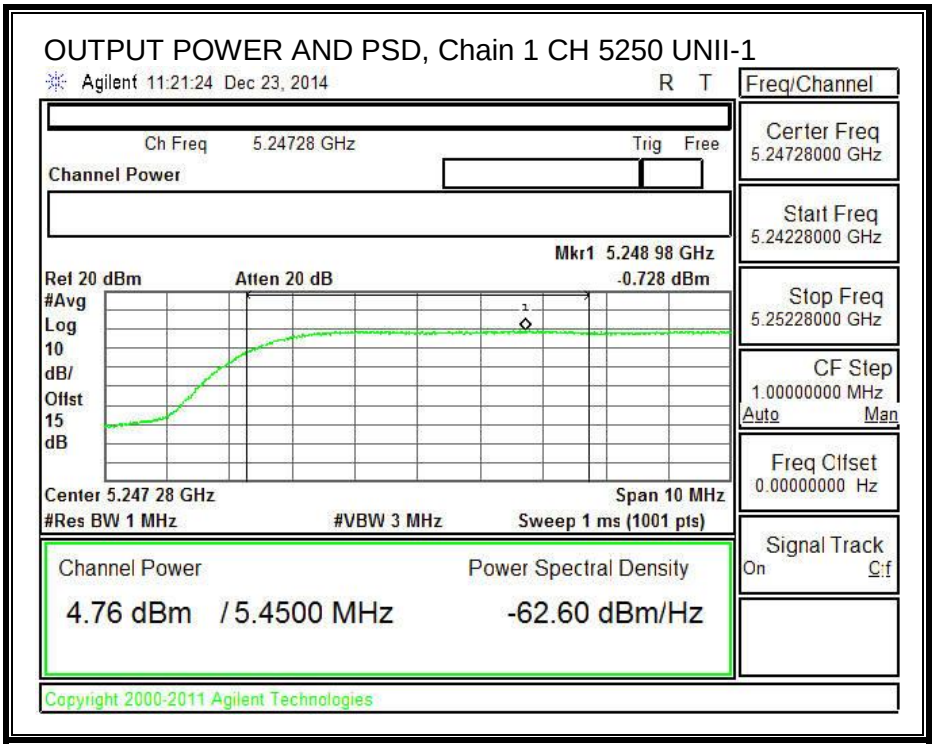
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.69	-0.73	2.30	17.00	-14.70

OUTPUT POWER AND PSD, Chain 0 CH 5250 UNII-1



OUTPUT POWER AND PSD, Chain 1 CH 5250 UNII-1



UNII-2A BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5250	5.44	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5250	9.86	2.50

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd Power & PPSD**

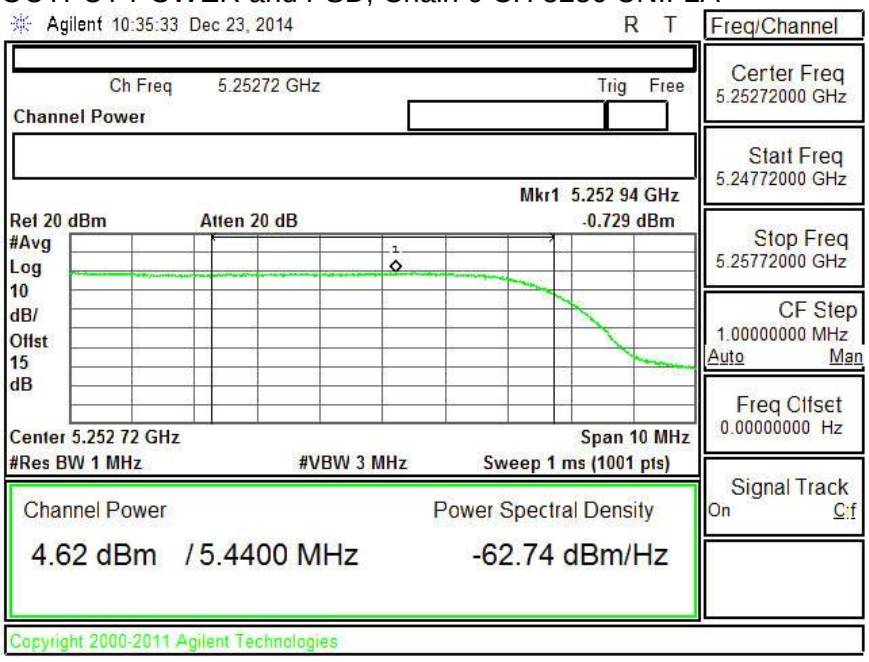
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	4.62	4.36	7.50	9.86	-2.35

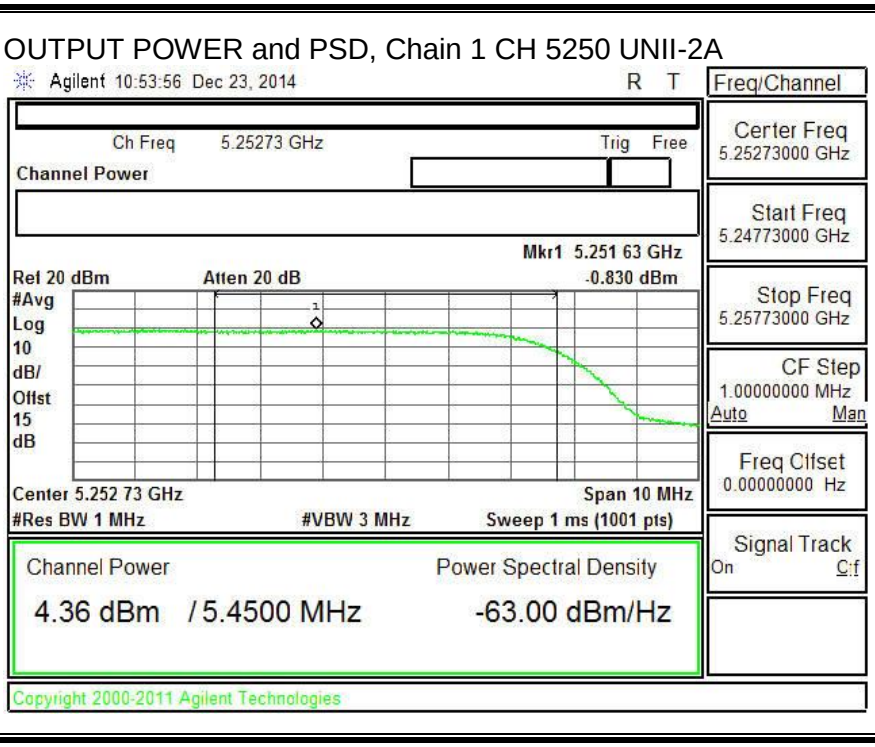
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.73	-0.83	2.23	2.50	-0.27

OUTPUT POWER and PSD, Chain 0 CH 5250 UNII-2A



OUTPUT POWER and PSD, Chain 1 CH 5250 UNII-2A



8.2.4. **OUT-OF-BAND EMISSIONS**

LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

Procedure

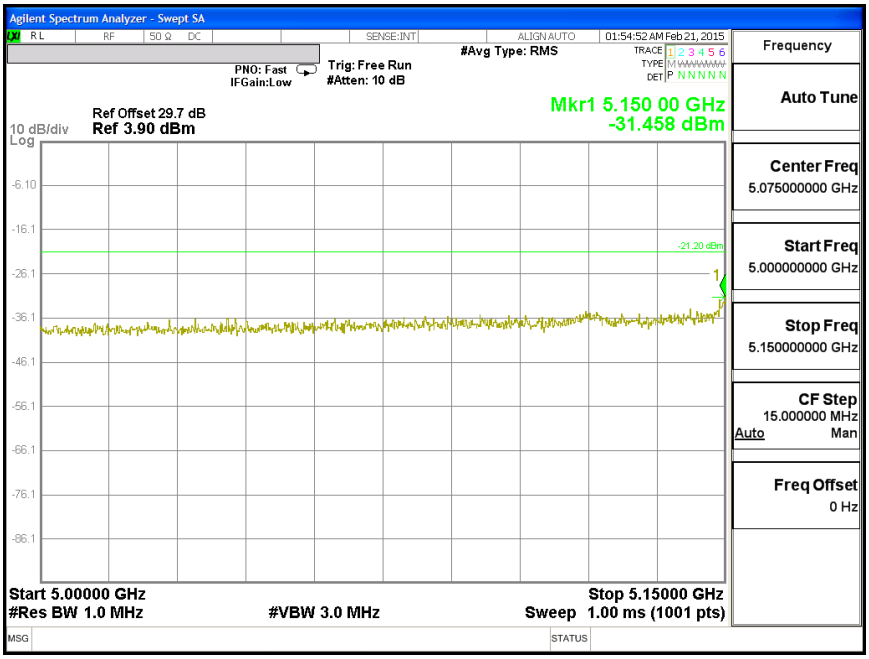
KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54dBuV/m average and 74dBuV/m peak, which are equivalent to eirp of -41.2 dBm and -21.2dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

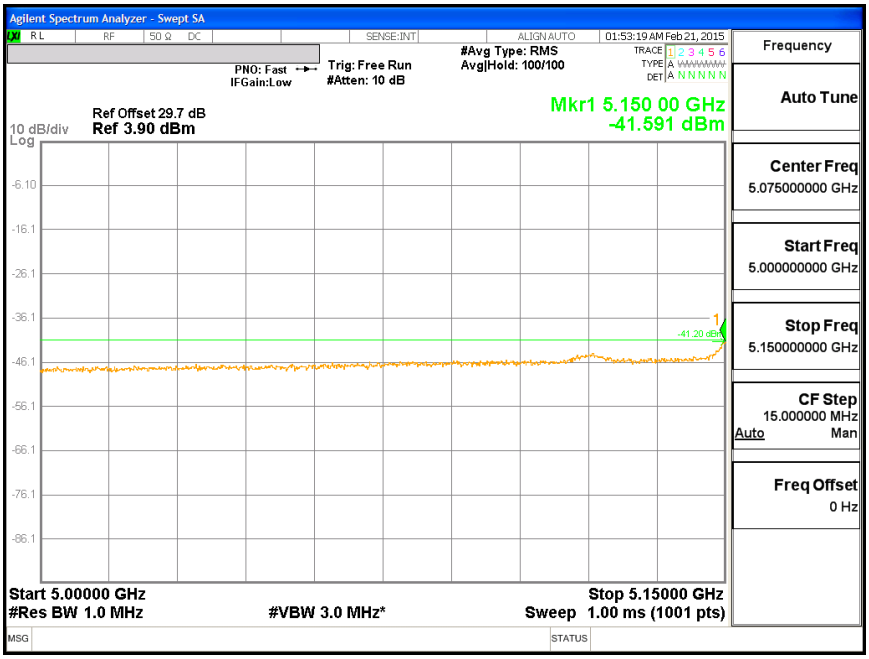
RESULTS

LOW CHANNEL BANDEDGE, Chain 0

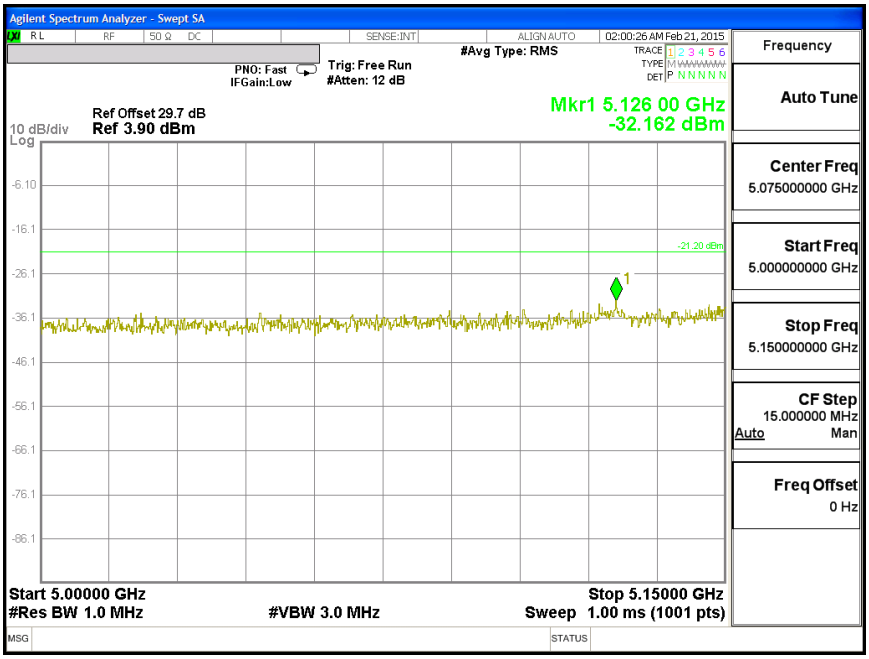
AUTHORIZED BAND EDGE Chain 0 LOW 1 PEAK



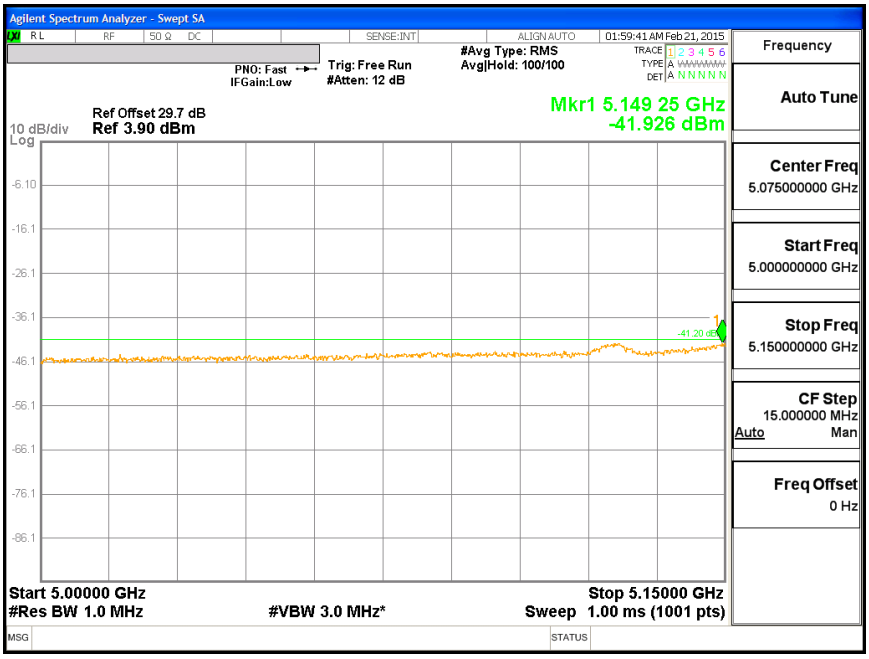
AUTHORIZED BAND EDGE Chain 0 LOW 1 AVERAGE



AUTHORIZED BAND EDGE Chain 0 LOW 2 PEAK

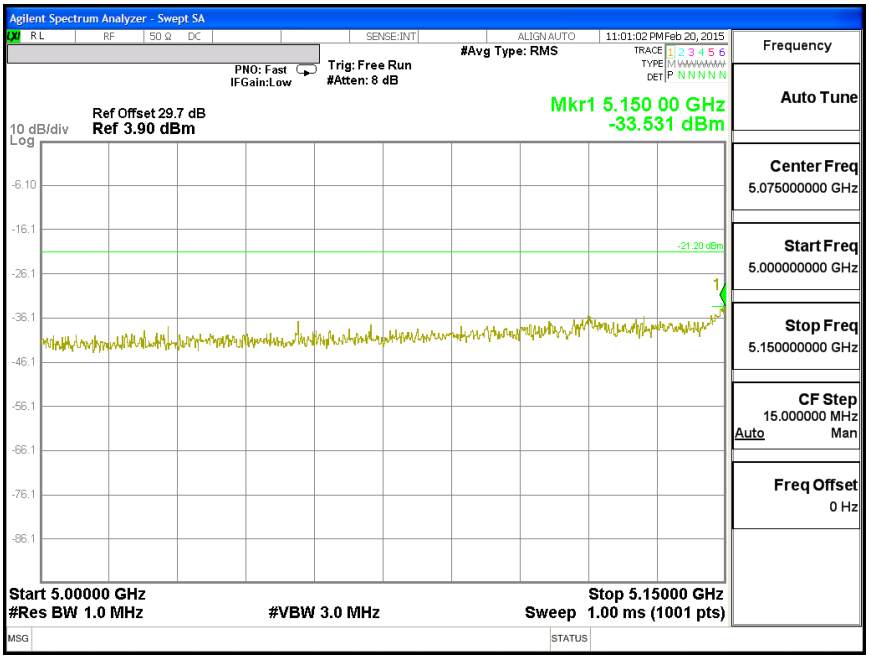


AUTHORIZED BAND EDGE Chain 0 LOW 2 AVERAGE

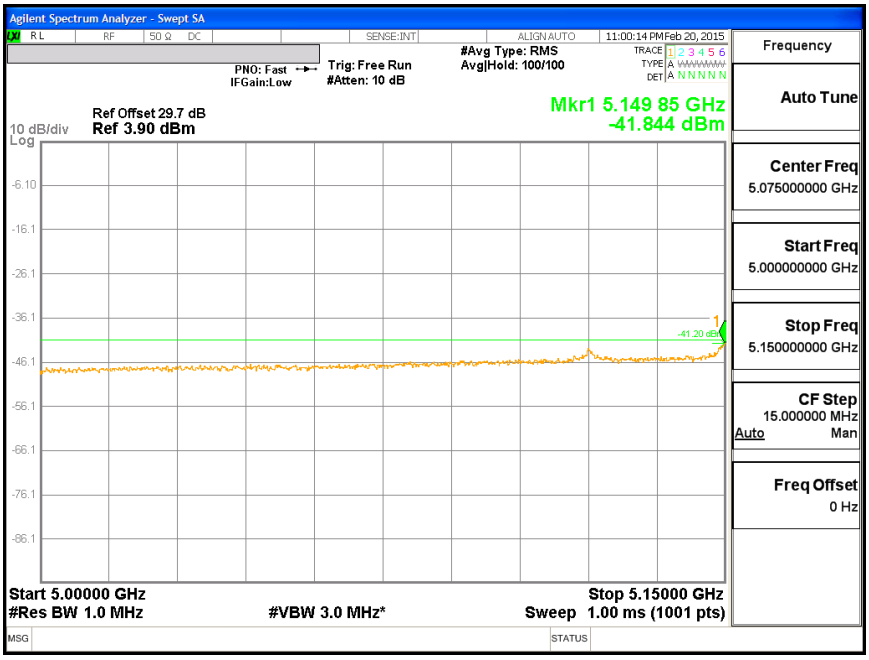


LOW CHANNEL BANDEDGE, Chain 1

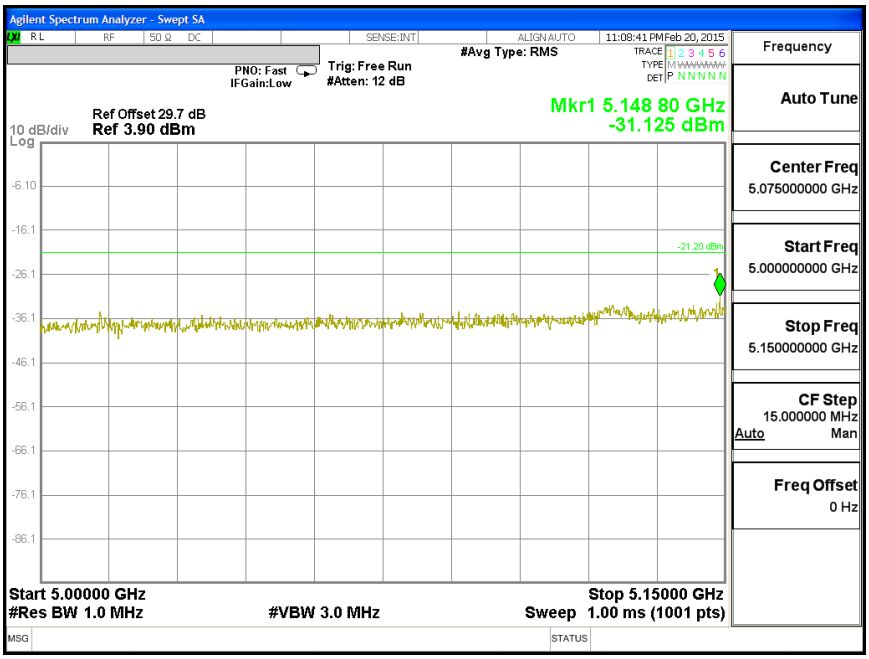
AUTHORIZED BAND EDGE Chain 1 LOW 1 PEAK



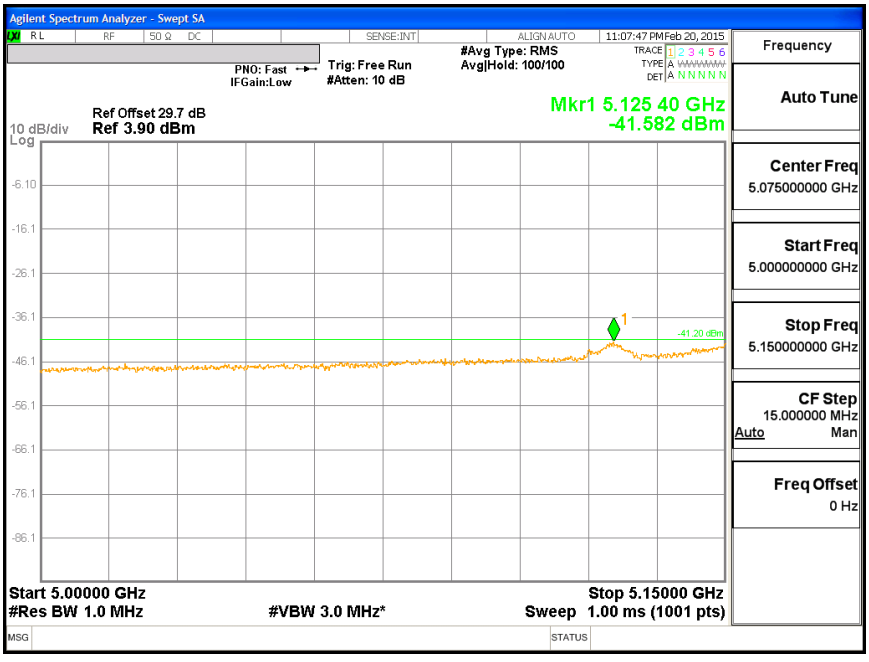
AUTHORIZED BAND EDGE Chain 1 LOW 1 AVERAGE



AUTHORIZED BAND EDGE Chain 1 LOW 2 PEAK



AUTHORIZED BAND EDGE Chain 1 LOW 2 AVERAGE



8.3. 20MHz 2Tx MODE IN THE 5.2 GHz BAND (IBR-121x-38-NA)

8.3.1. **26 dB BANDWIDTH**

LIMITS

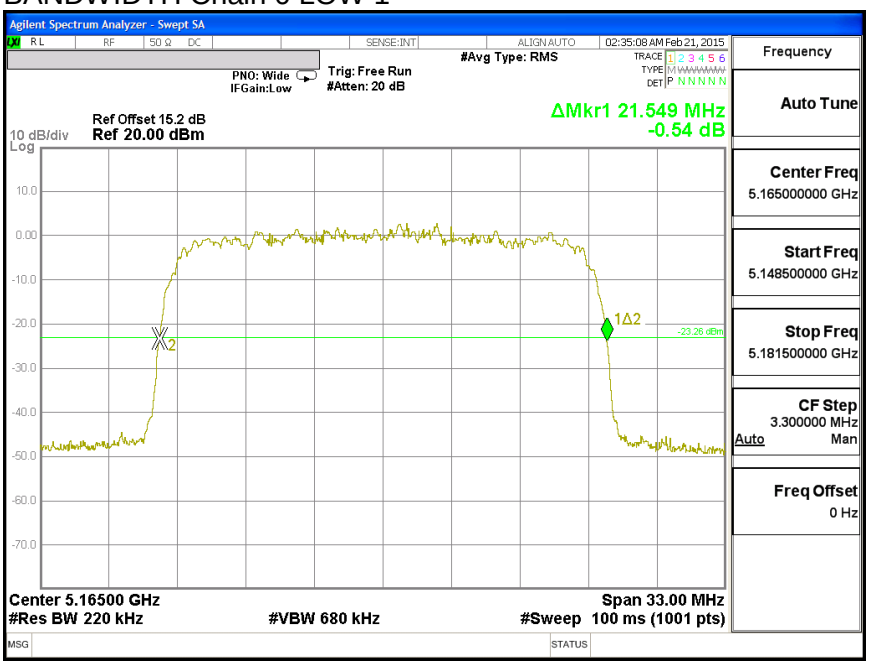
None; for reporting purposes only.

RESULTS

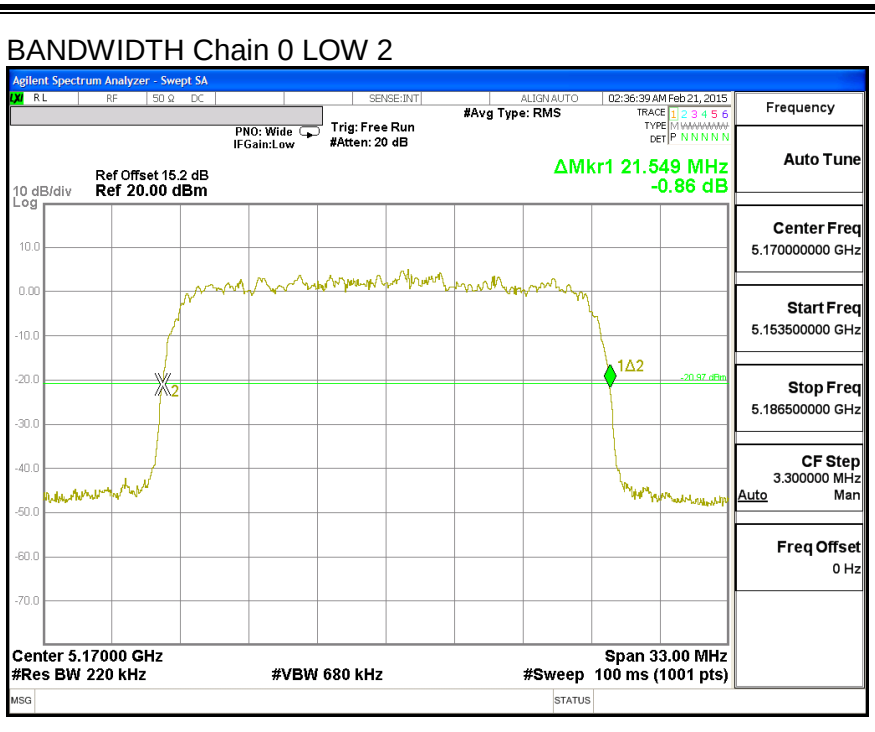
Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low 1	5165	21.55	21.55
Low 2	5170	21.55	21.58
Low 3	5175	21.15	21.09
Mid	5200	21.58	21.62
Straddle	5250	21.66	21.66

26 dB BANDWIDTH, Chain 0

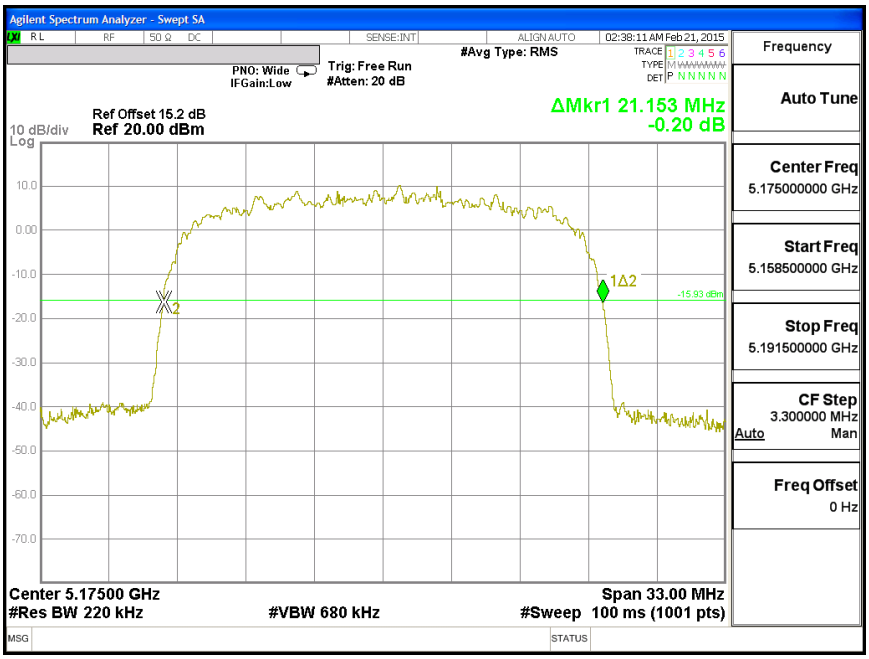
BANDWIDTH Chain 0 LOW 1



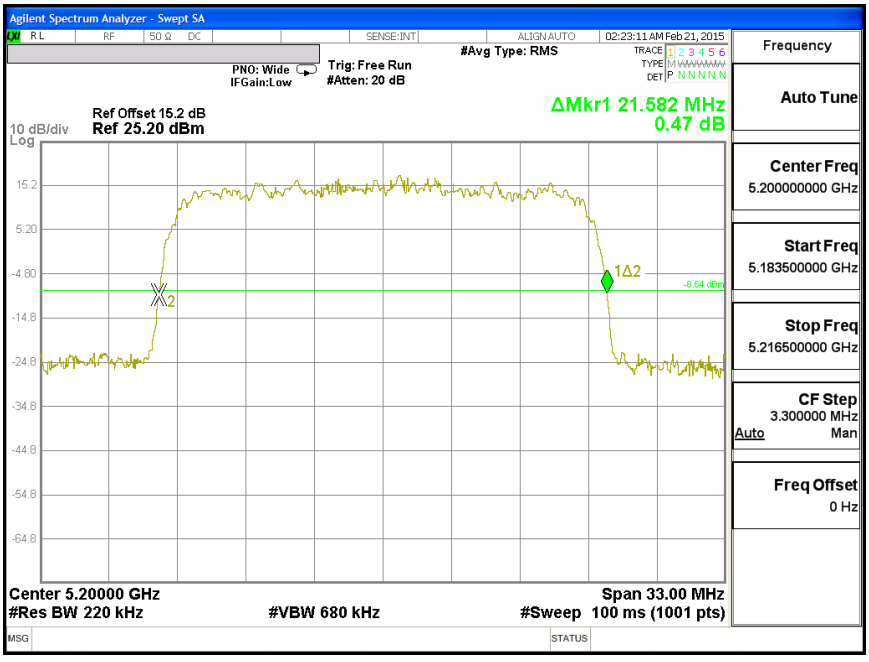
BANDWIDTH Chain 0 LOW 2



BANDWIDTH Chain 0 LOW 3

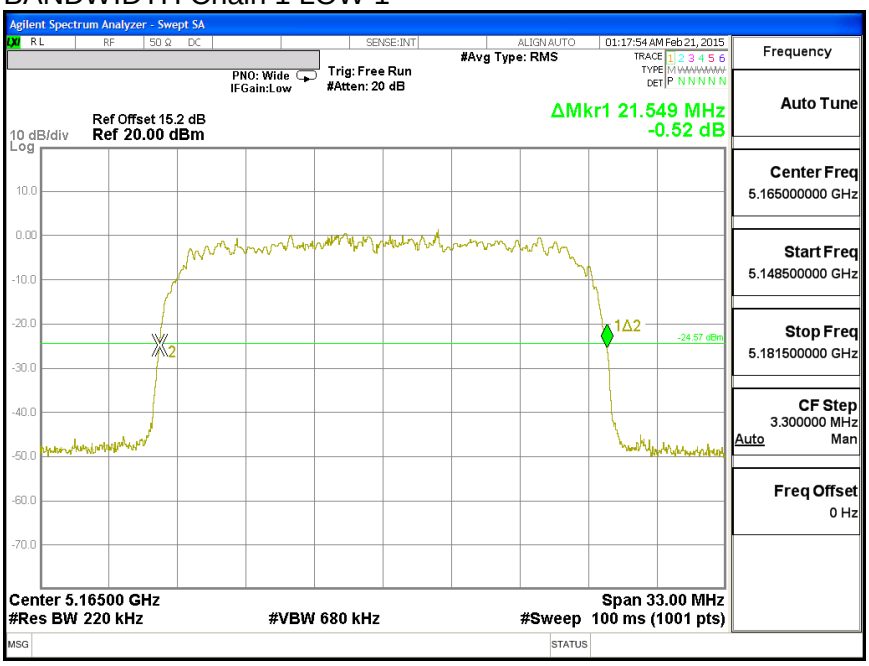


BANDWIDTH Chain 0 MID

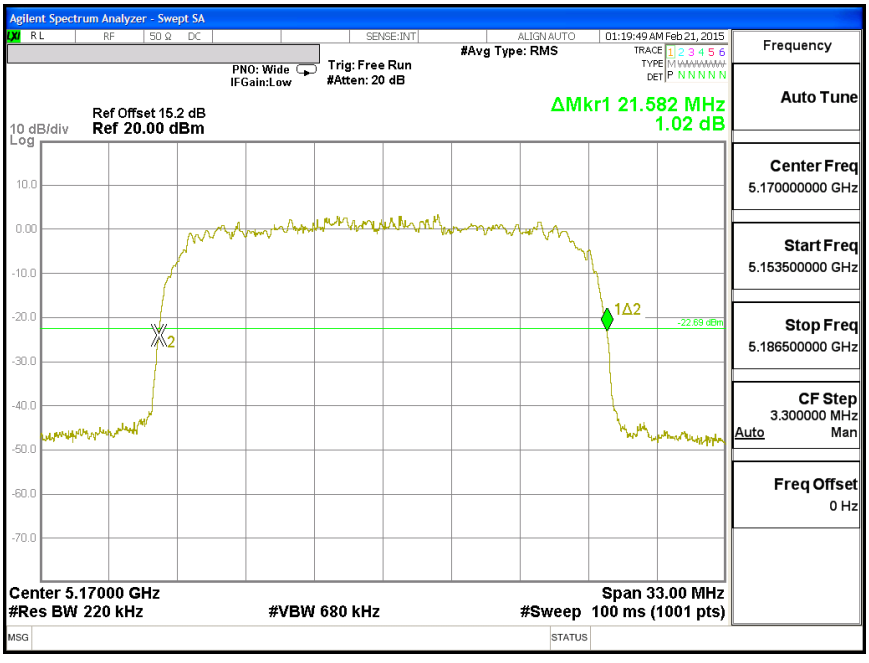


26 dB BANDWIDTH, Chain 1

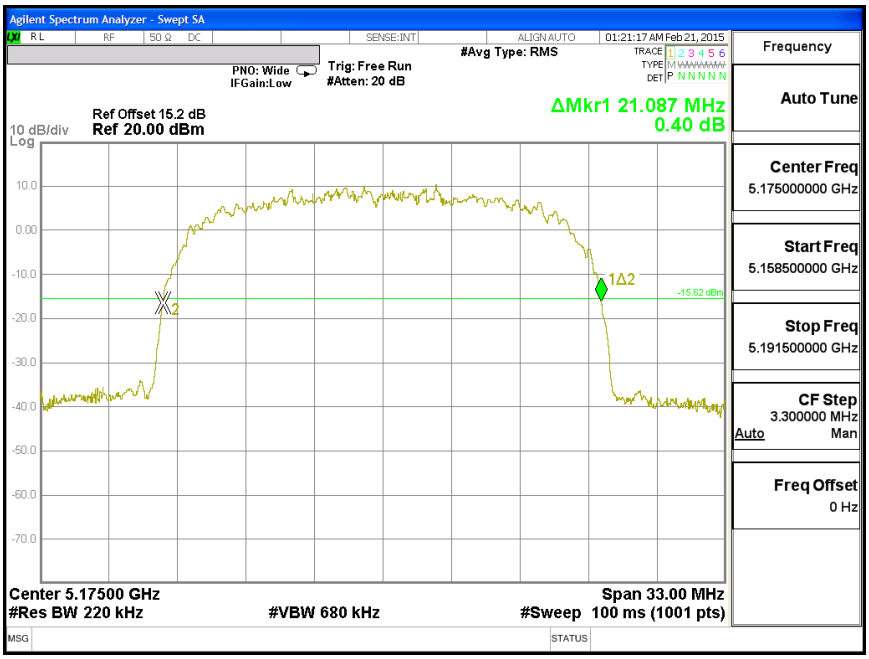
BANDWIDTH Chain 1 LOW 1



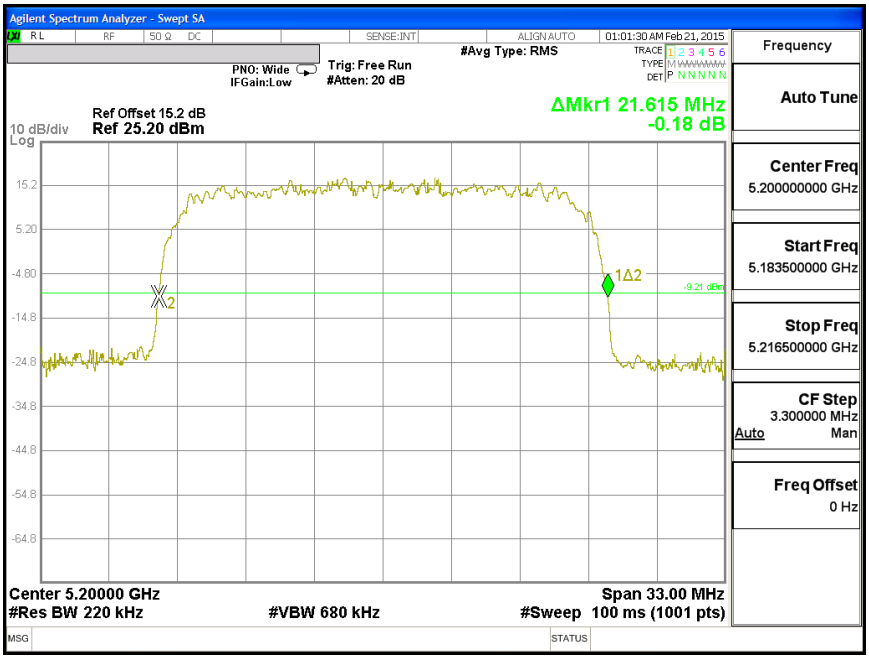
BANDWIDTH Chain 1 LOW 2



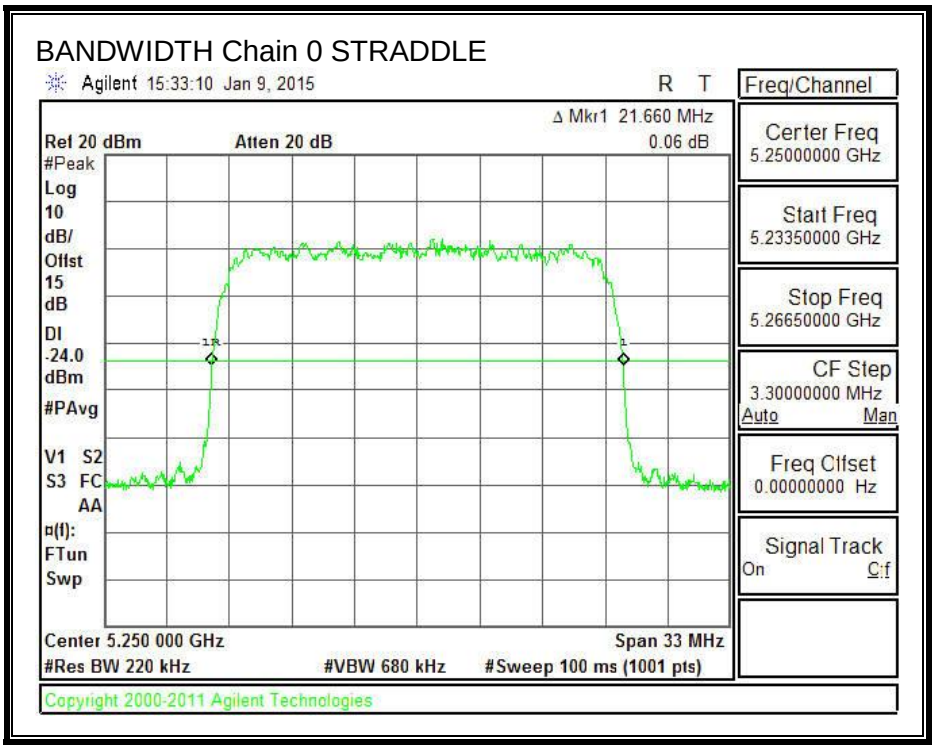
BANDWIDTH Chain 1 LOW 3



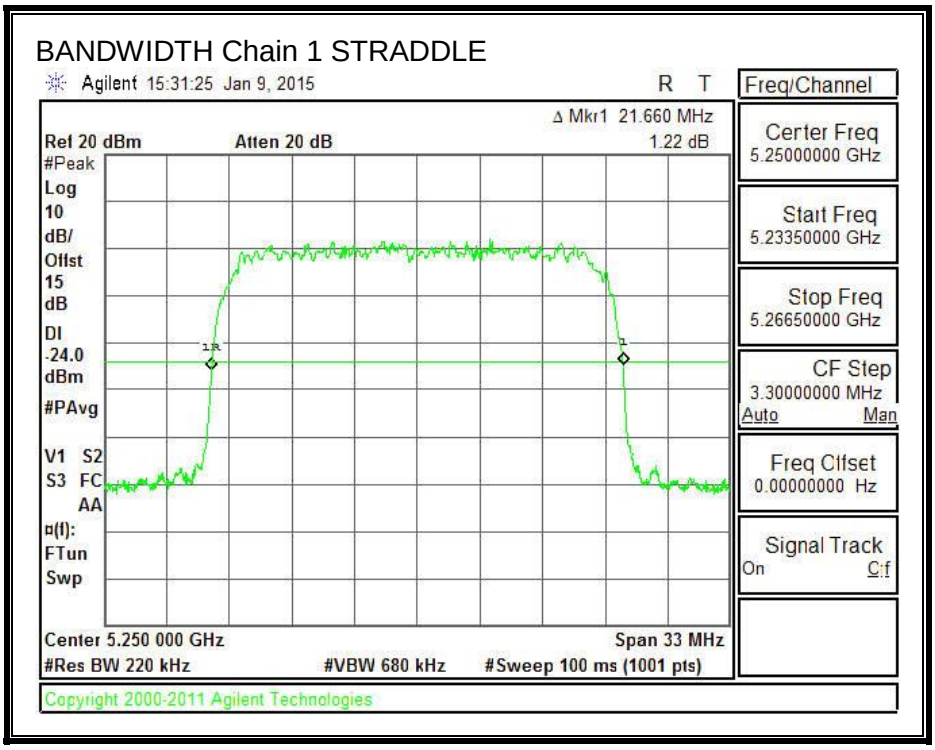
BANDWIDTH Chain 1 MID



26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



8.3.2. **OUTPUT POWER AND PSD**

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
14.50	14.50	14.50

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low 1	5165	14.50	14.50	30.00	17.00
Low 2	5170	14.50	14.50	30.00	17.00
Low 3	5175	14.50	14.50	30.00	17.00
Straddle	5250	14.50	14.50	30.00	17.00

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

Output Power Results

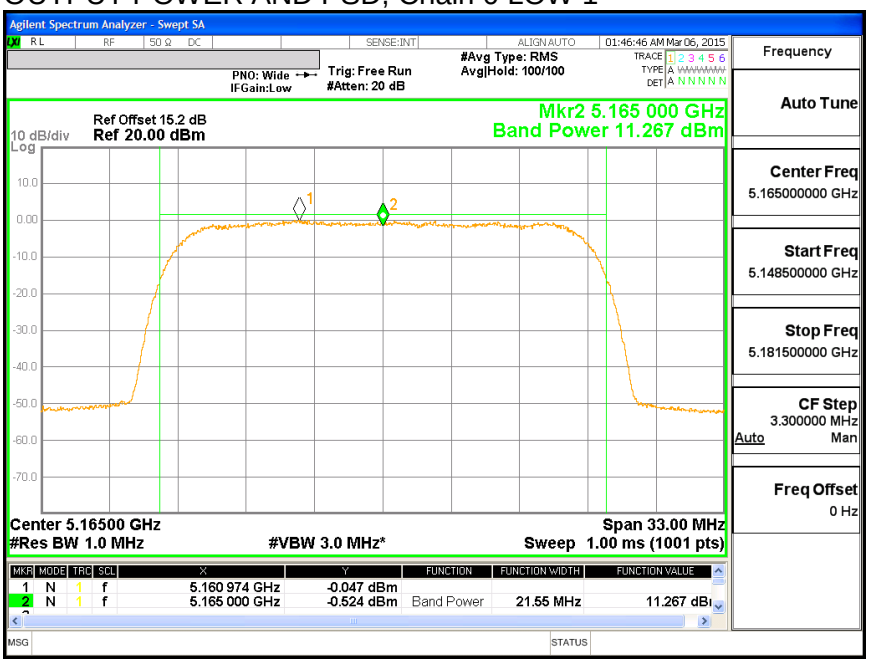
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low 1	5165	11.27	10.06	13.72	30.00	-16.28
Low 2	5170	13.51	12.15	15.89	30.00	-14.11
Low 3	5175	18.00	17.66	20.85	30.00	-9.15
Straddle	5250	10.35	10.50	13.44	30.00	-16.56

PSD Results

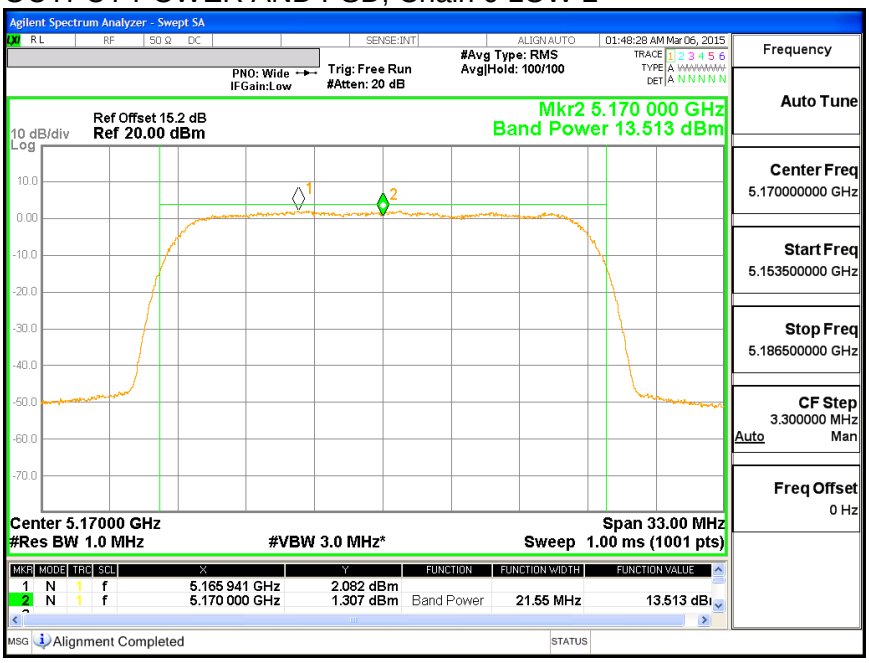
Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low 1	5165	-0.05	-1.15	2.45	17.00	-14.55
Low 2	5170	2.08	0.81	4.50	17.00	-12.50
Low 3	5175	7.34	6.99	10.18	17.00	-6.82
Straddle	5250	13.87	13.90	16.90	17.00	-0.10

OUTPUT POWER AND PSD, Chain 0

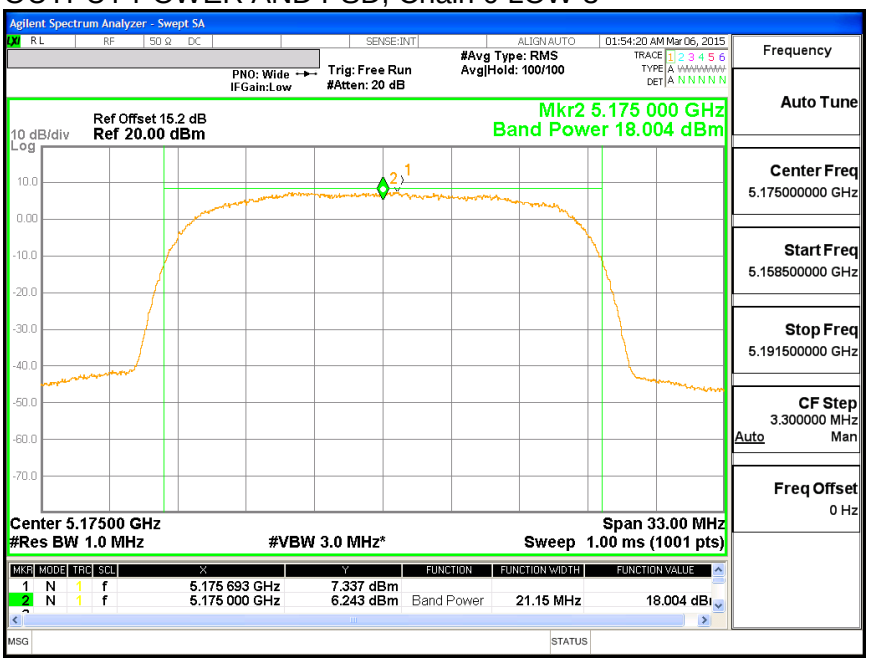
OUTPUT POWER AND PSD, Chain 0 LOW 1



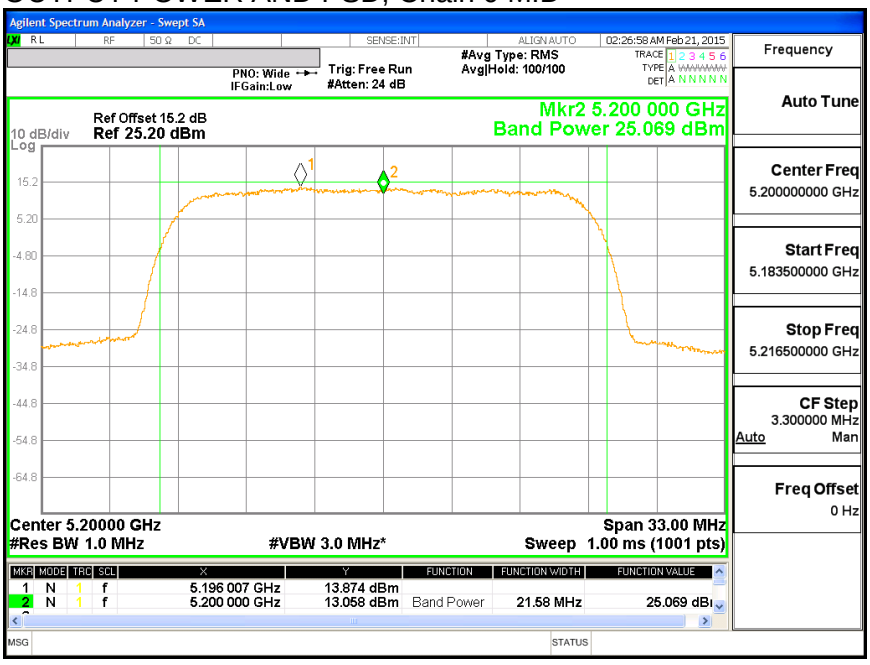
OUTPUT POWER AND PSD, Chain 0 LOW 2



OUTPUT POWER AND PSD, Chain 0 LOW 3

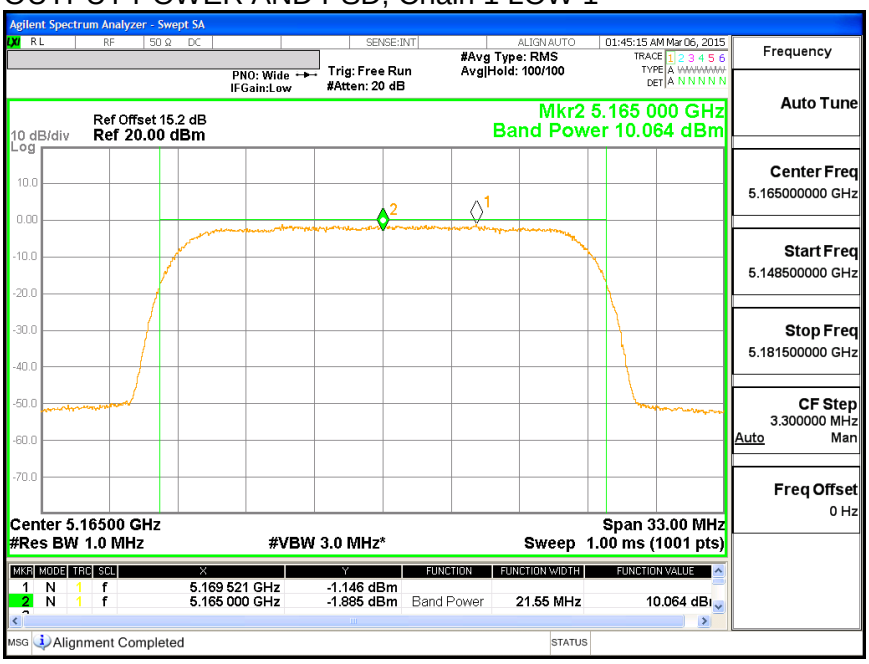


OUTPUT POWER AND PSD, Chain 0 MID

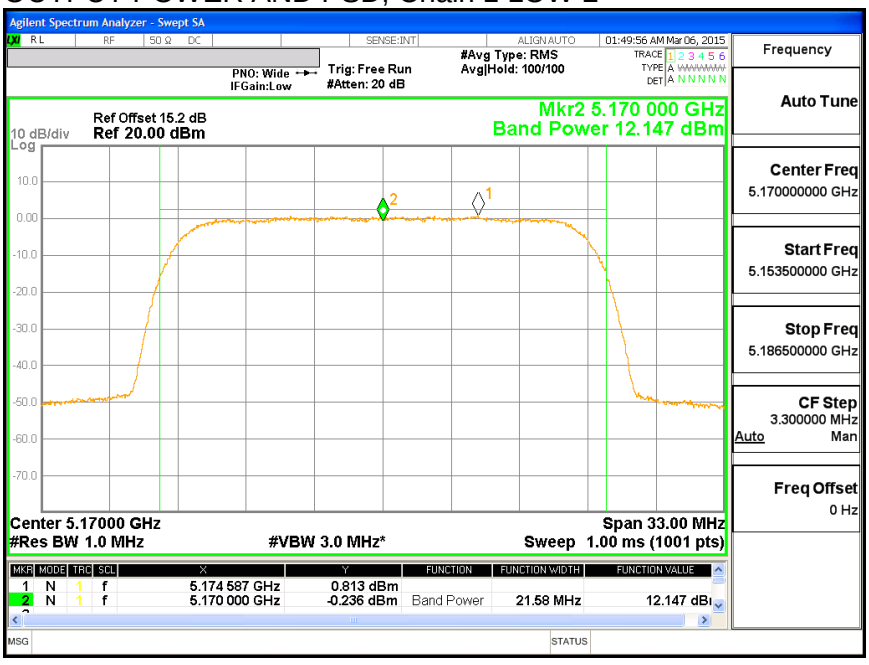


OUTPUT POWER AND PSD, Chain 1

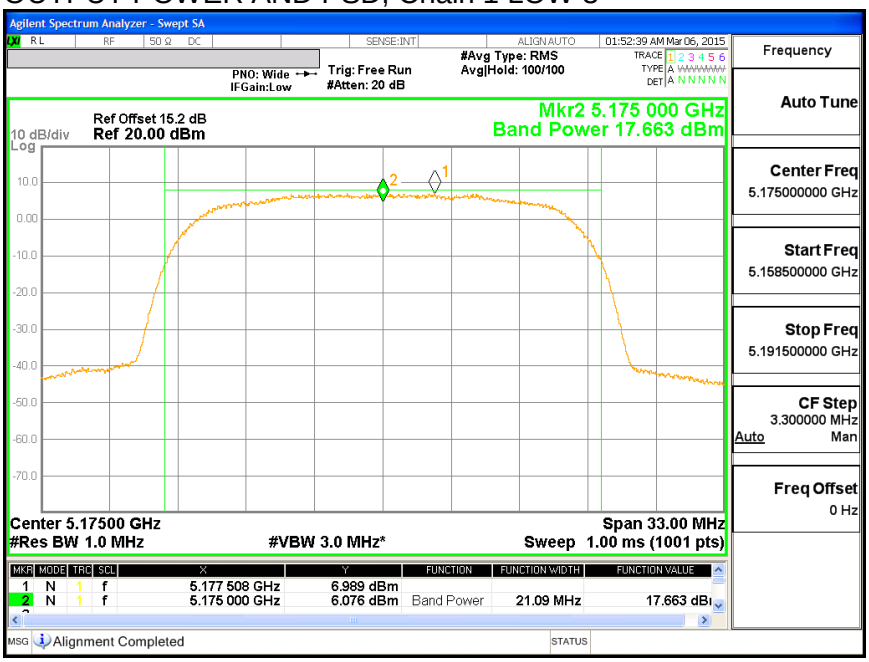
OUTPUT POWER AND PSD, Chain 1 LOW 1



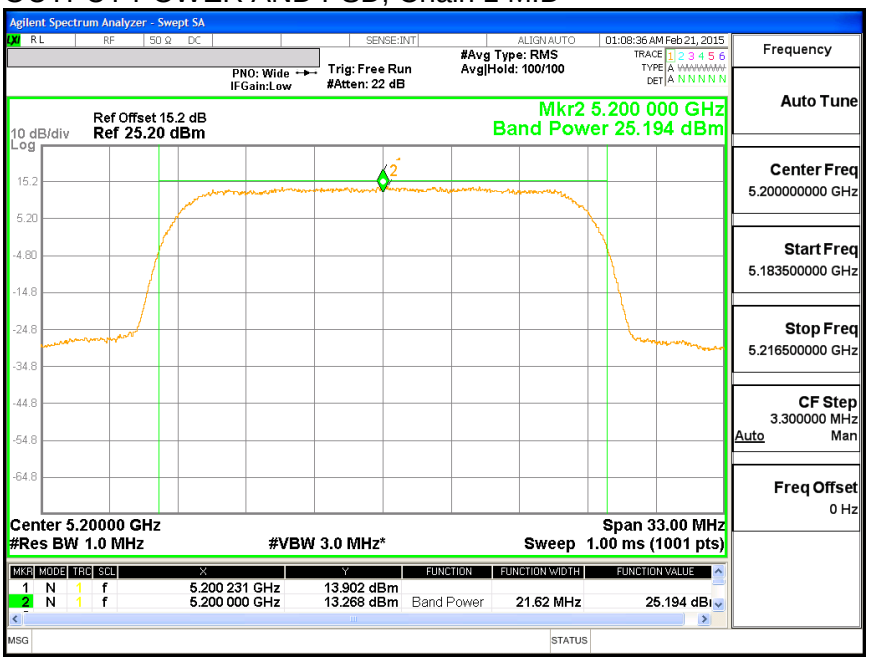
OUTPUT POWER AND PSD, Chain 1 LOW 2



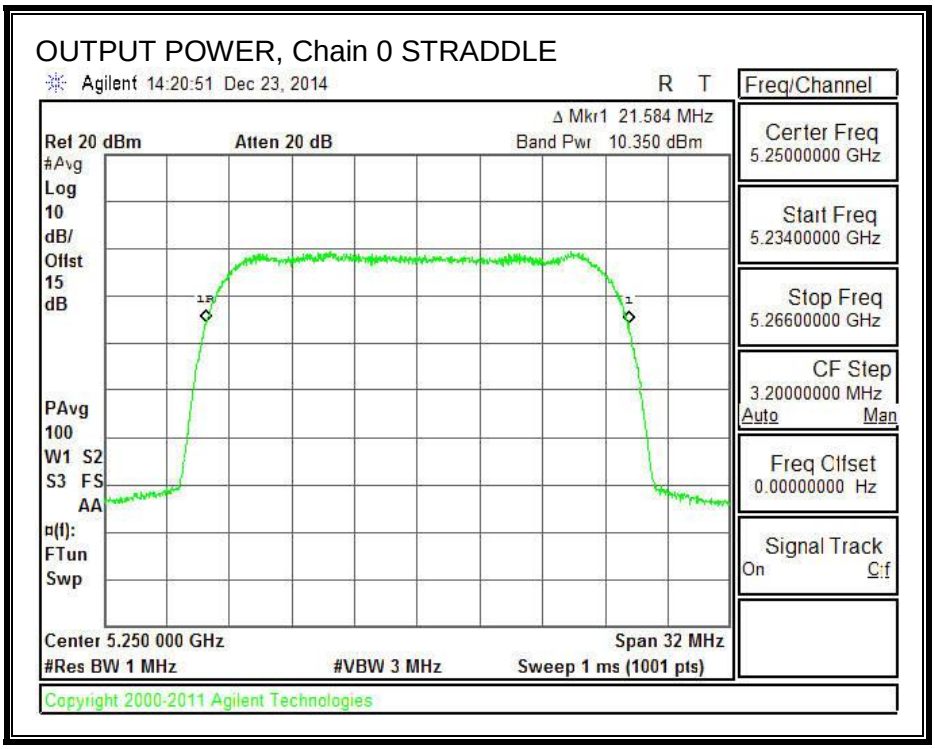
OUTPUT POWER AND PSD, Chain 1 LOW 3



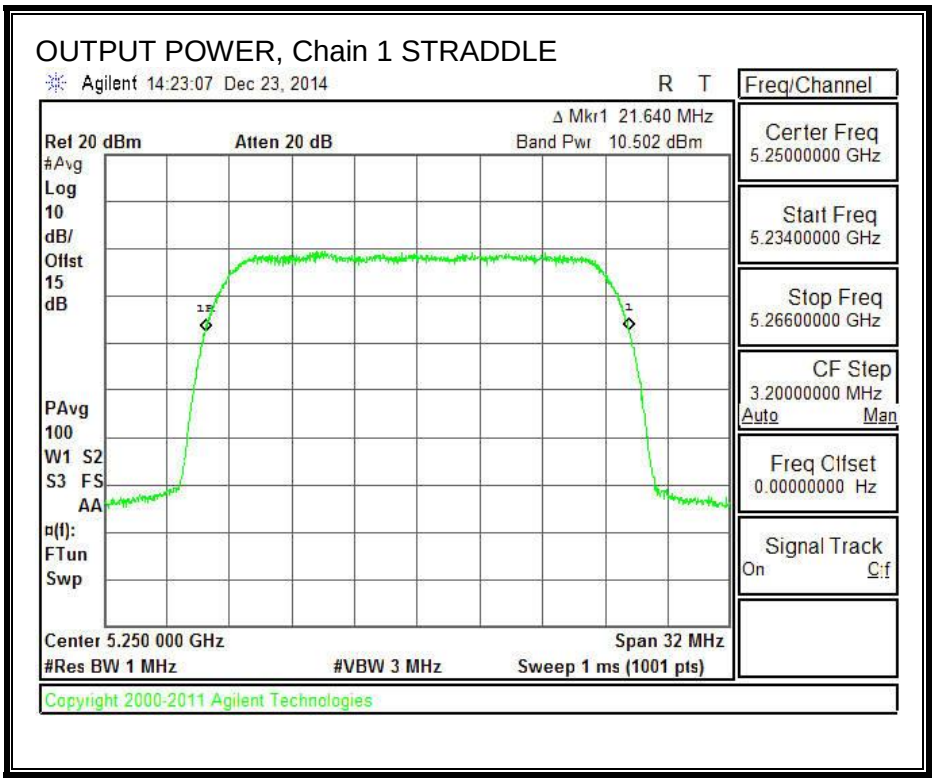
OUTPUT POWER AND PSD, Chain 1 MID



STRADDLE CHANNEL OUTPUT POWER, Chain 0



STRADDLE CHANNEL OUTPUT POWER, Chain 1



8.3.3. **STRADDLE CHANNEL RESULTS**

UNII-1 BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5250	10.83	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSD Limit (dBm)
5250	30.00	17.00

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

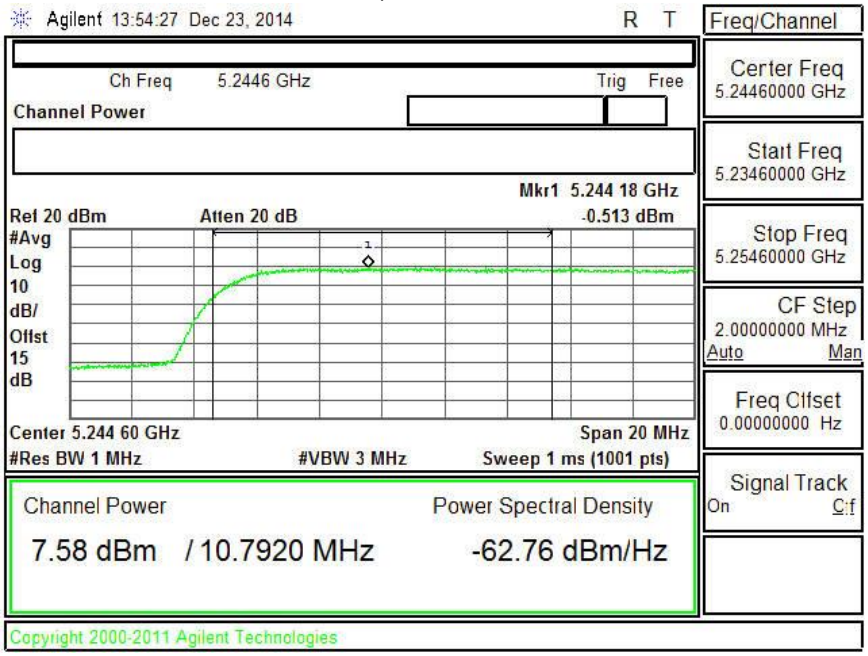
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	7.58	7.29	10.45	30.00	-19.55

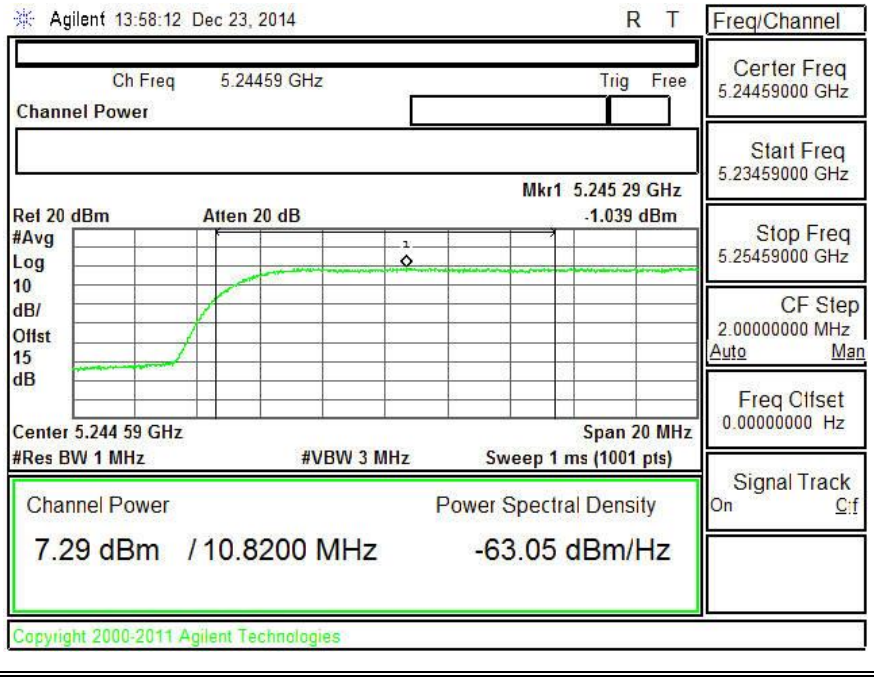
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.51	-1.04	2.24	17.00	-14.76

OUTPUT POWER AND PSD, Chain 0 CH 5250 UNII-1



OUTPUT POWER AND PSD, Chain 1 CH 5250 UNII-1



UNII-2A BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5250	10.83	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5250	12.85	2.50

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

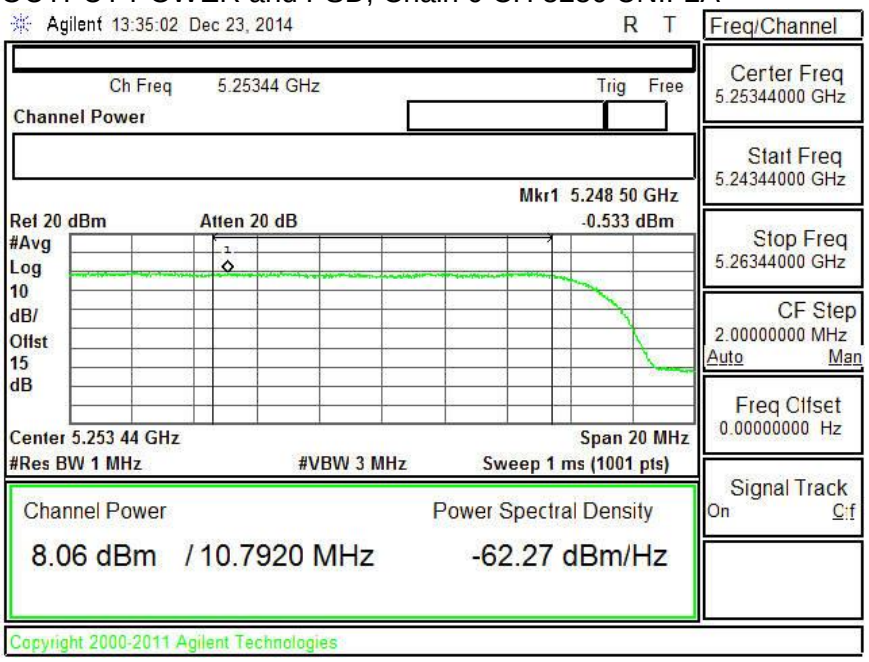
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	8.06	7.85	10.97	12.85	-1.88

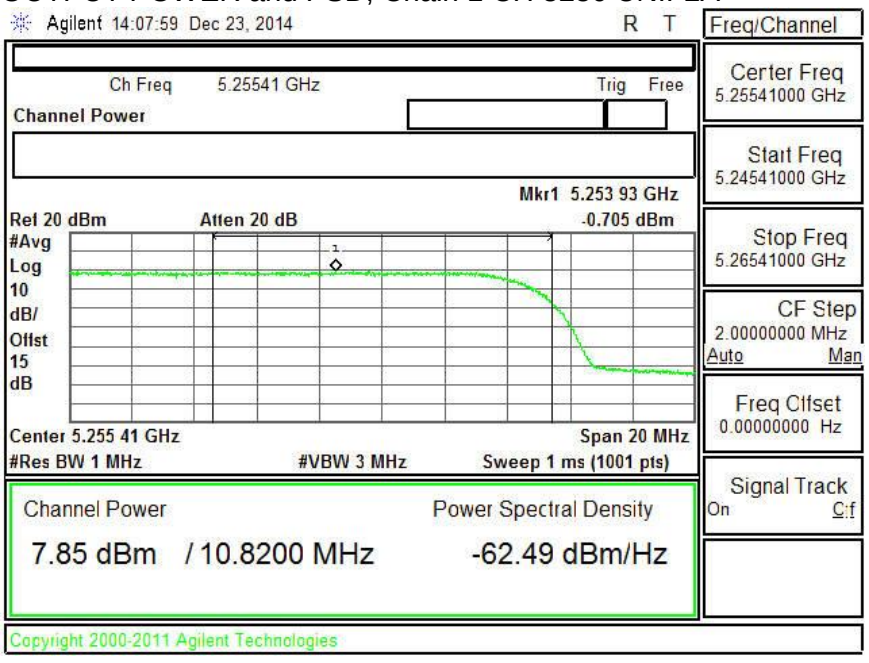
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.53	-0.71	2.39	2.50	-0.11

OUTPUT POWER and PSD, Chain 0 CH 5250 UNII-2A



OUTPUT POWER and PSD, Chain 1 CH 5250 UNII-2A



8.3.4. **OUT-OF-BAND EMISSIONS**

LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

Procedure

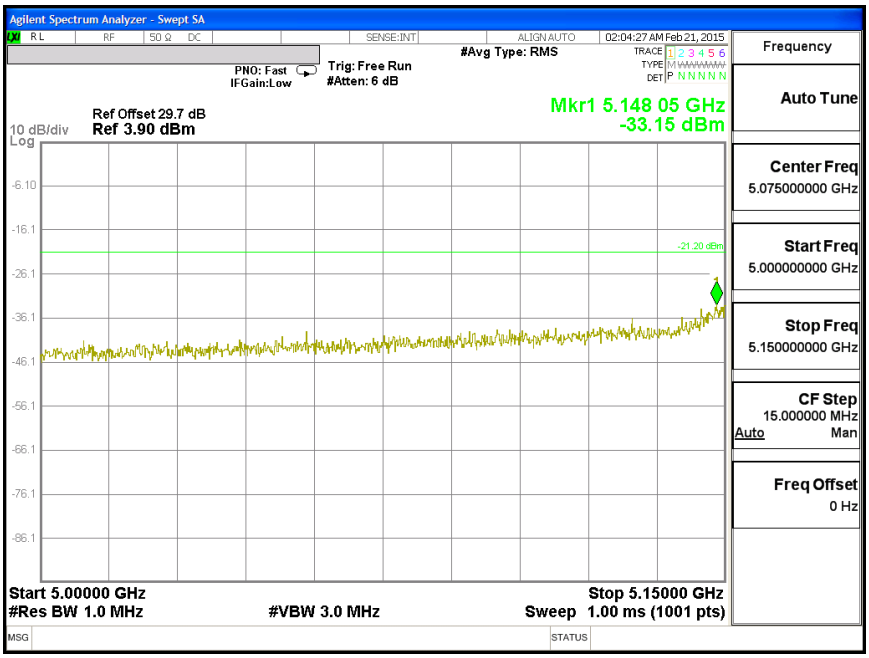
KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54dBuV/m average and 74dBuV/m peak, which are equivalent to eirp of -41.2 dBm and -21.2dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

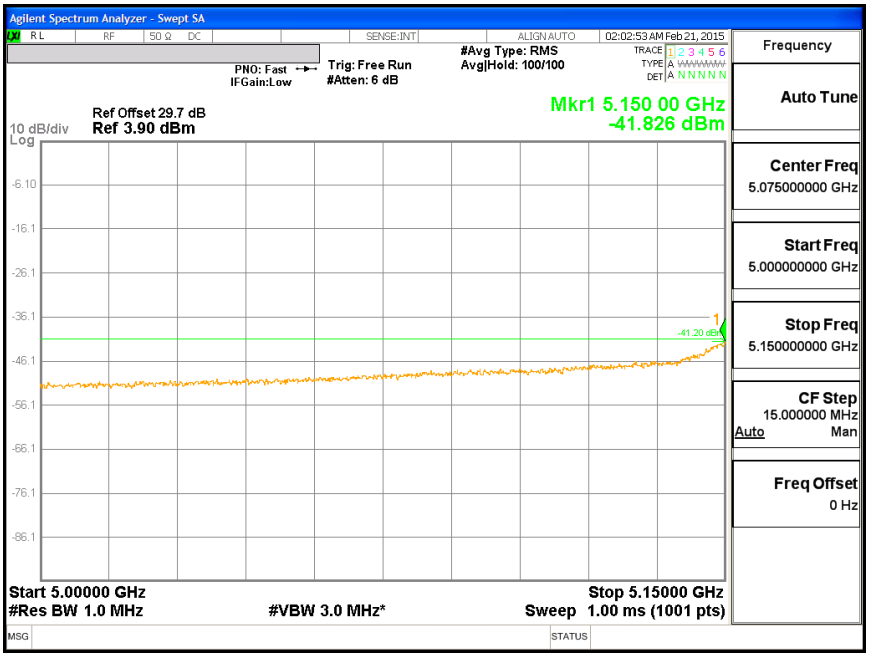
RESULTS

LOW CHANNEL BANDEDGE, Chain 0

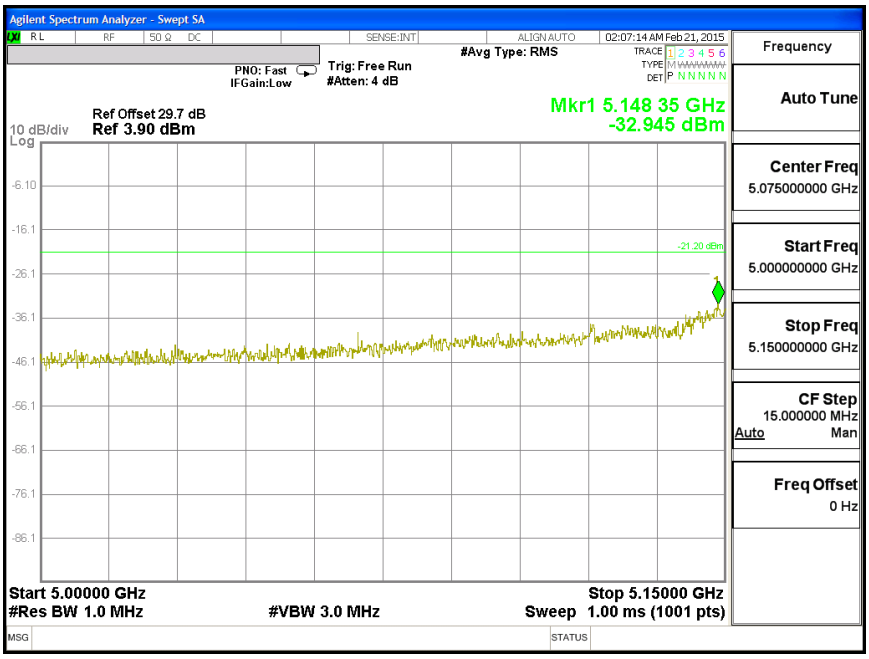
AUTHORIZED BAND EDGE Chain 0 LOW 1 PEAK



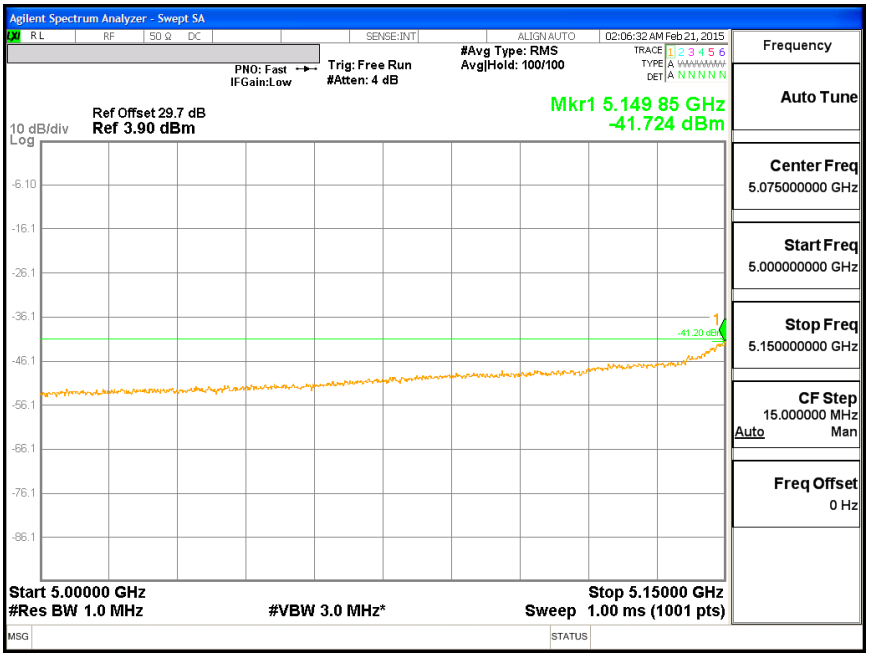
AUTHORIZED BAND EDGE Chain 0 LOW 1 AVERAGE



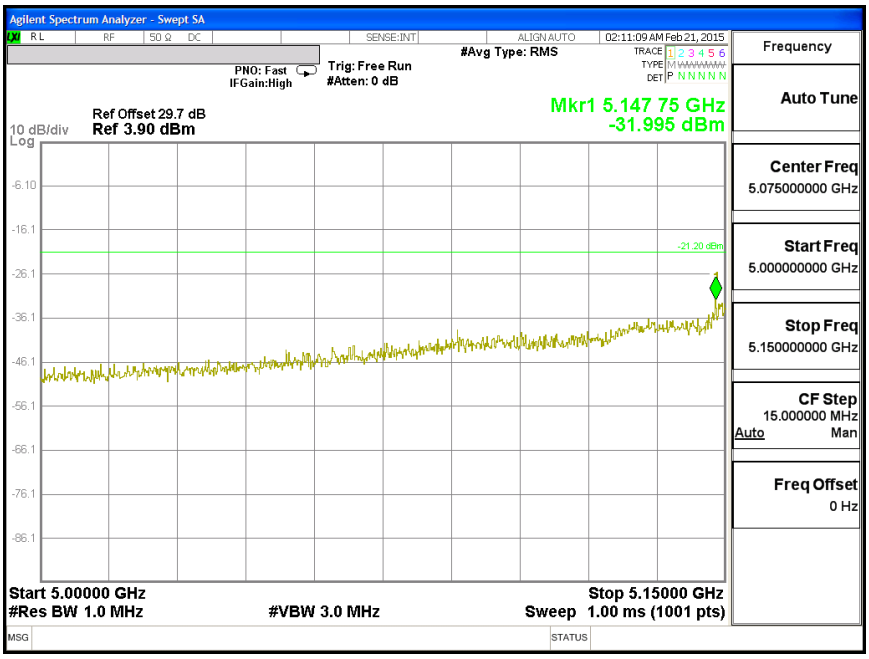
AUTHORIZED BAND EDGE Chain 0 LOW 2 PEAK



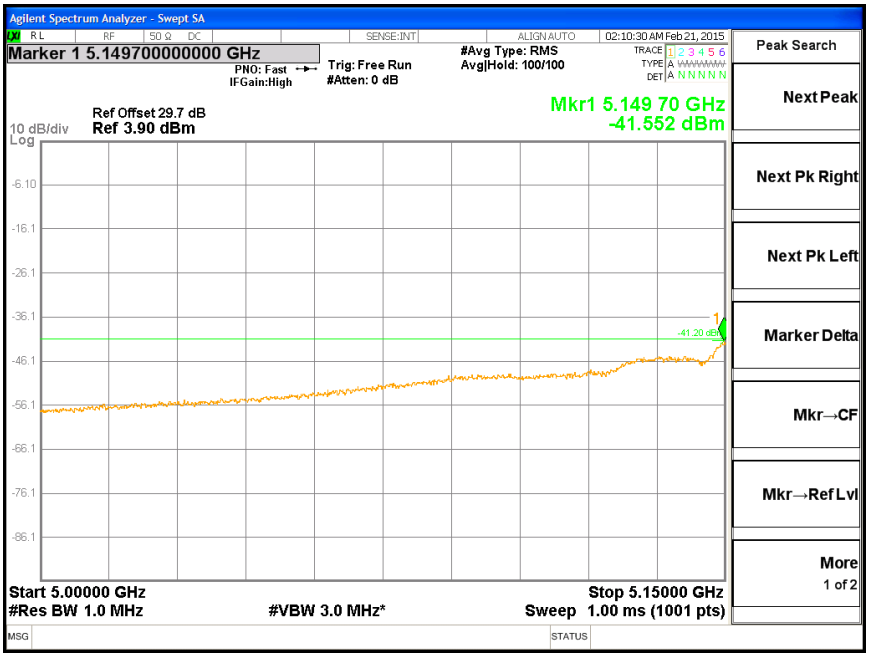
AUTHORIZED BAND EDGE Chain 0 LOW 2 AVERAGE



AUTHORIZED BAND EDGE Chain 0 LOW 3 PEAK

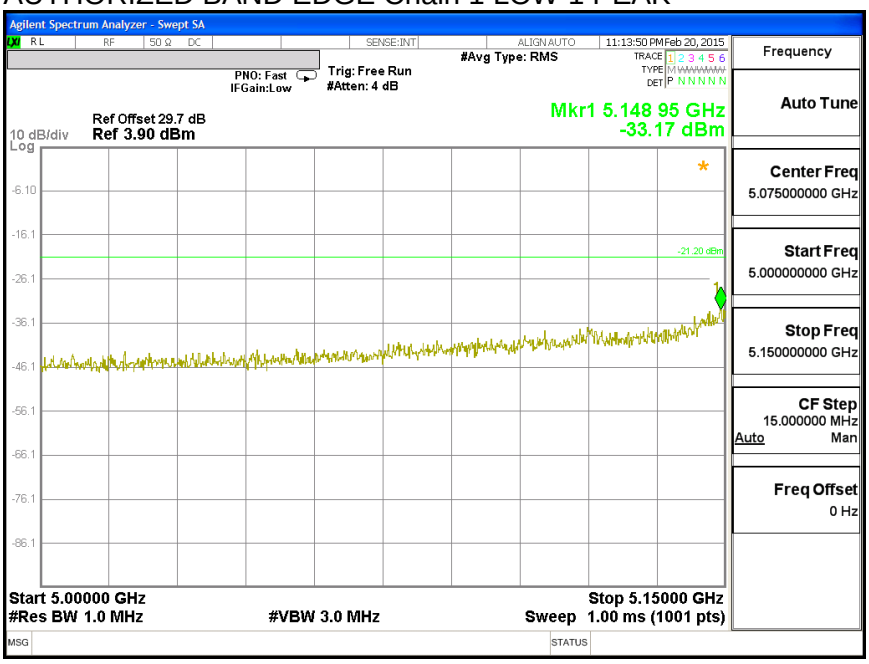


AUTHORIZED BAND EDGE Chain 0 LOW 2 AVERAGE

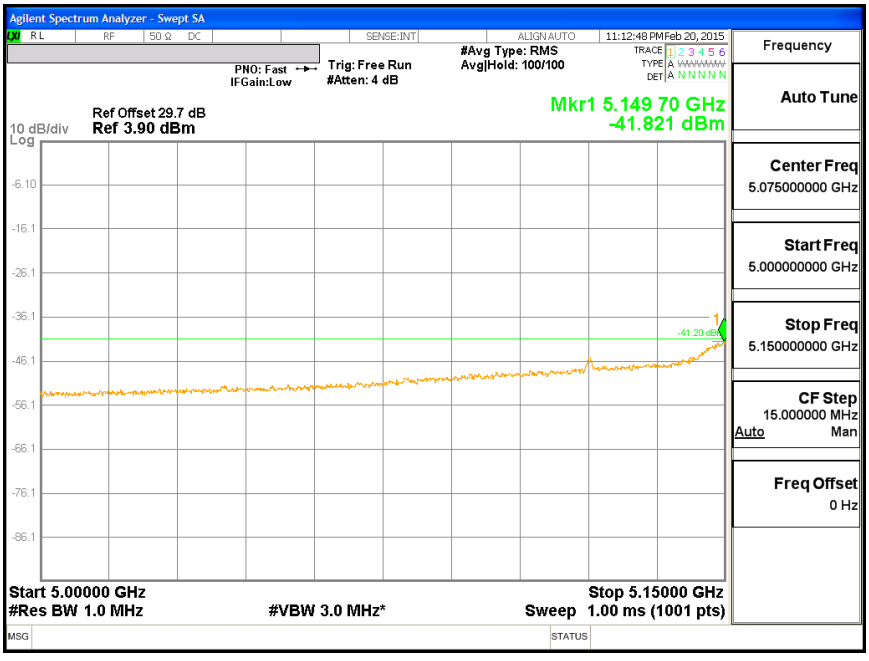


LOW CHANNEL BANDEDGE, Chain 1

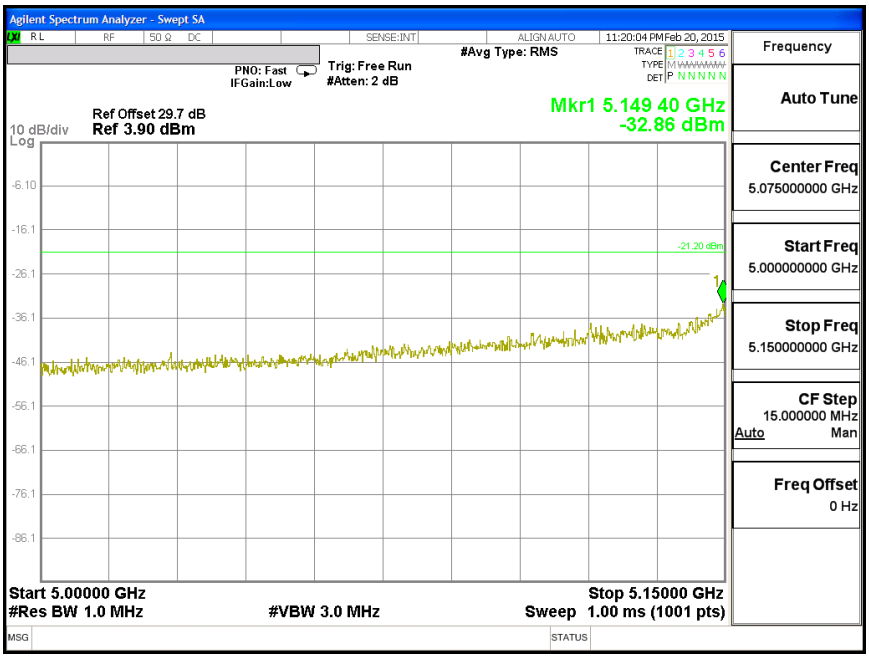
AUTHORIZED BAND EDGE Chain 1 LOW 1 PEAK



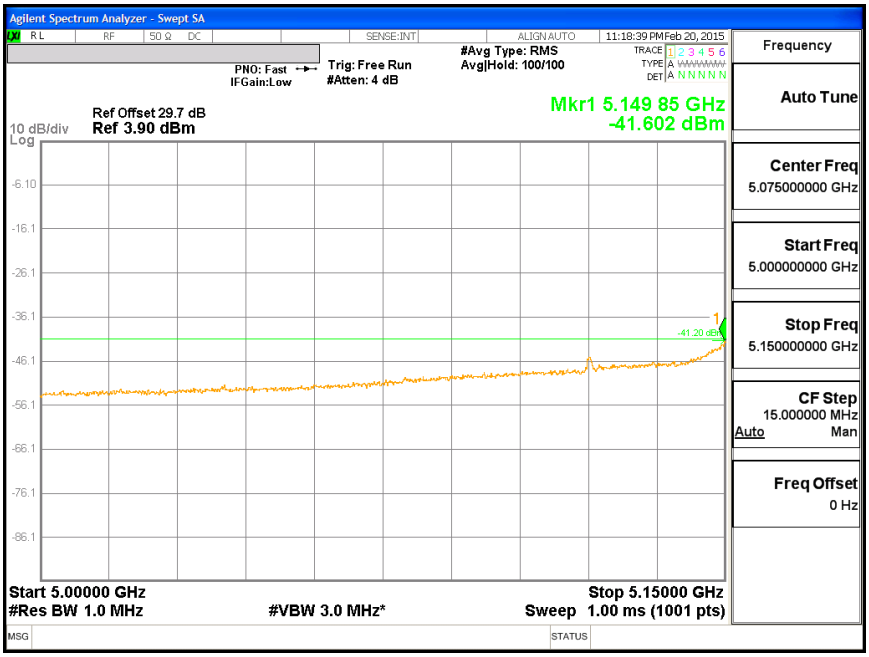
AUTHORIZED BAND EDGE Chain 1 LOW 1 AVERAGE



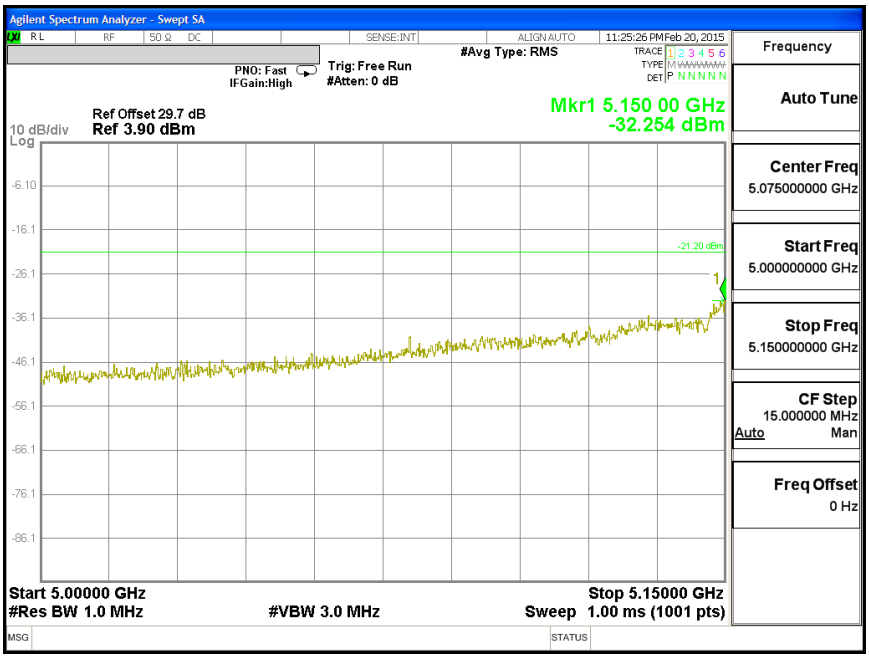
AUTHORIZED BAND EDGE Chain 1 LOW 2 PEAK



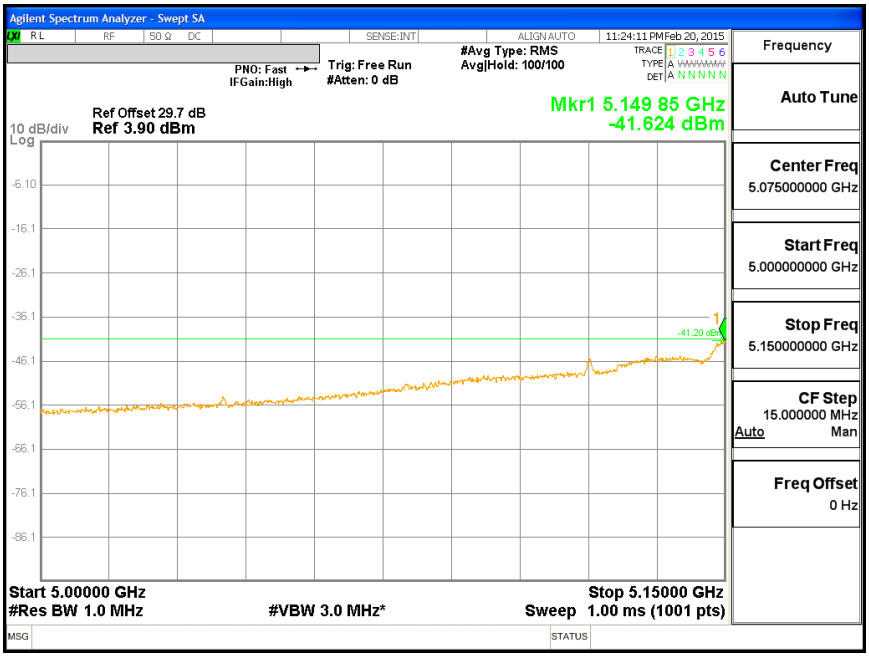
AUTHORIZED BAND EDGE Chain 1 LOW 2 AVERAGE



AUTHORIZED BAND EDGE Chain 1 LOW 3 PEAK



AUTHORIZED BAND EDGE Chain 1 LOW 3 AVERAGE



8.4. 40MHz 2TX MODE IN THE 5.2 GHz BAND (IBR-121x-38-NA)

8.4.1. **26 dB BANDWIDTH**

LIMITS

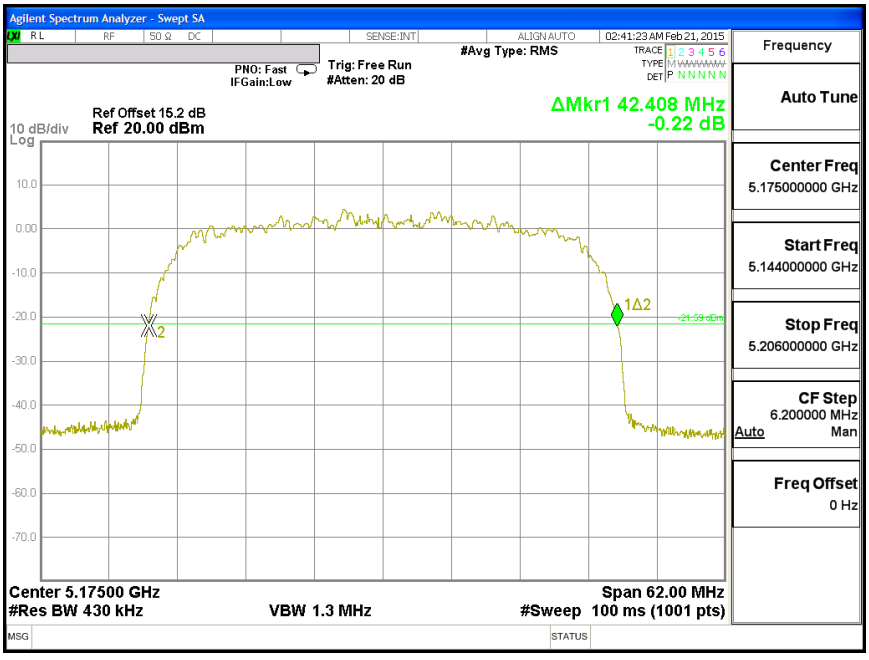
None; for reporting purposes only.

RESULTS

Channel	Frequency (MHz)	26 dB BW Chain 0 (MHz)	26 dB BW Chain 1 (MHz)
Low	5175	42.408	42.532
Straddle	5250	41.04	40.98

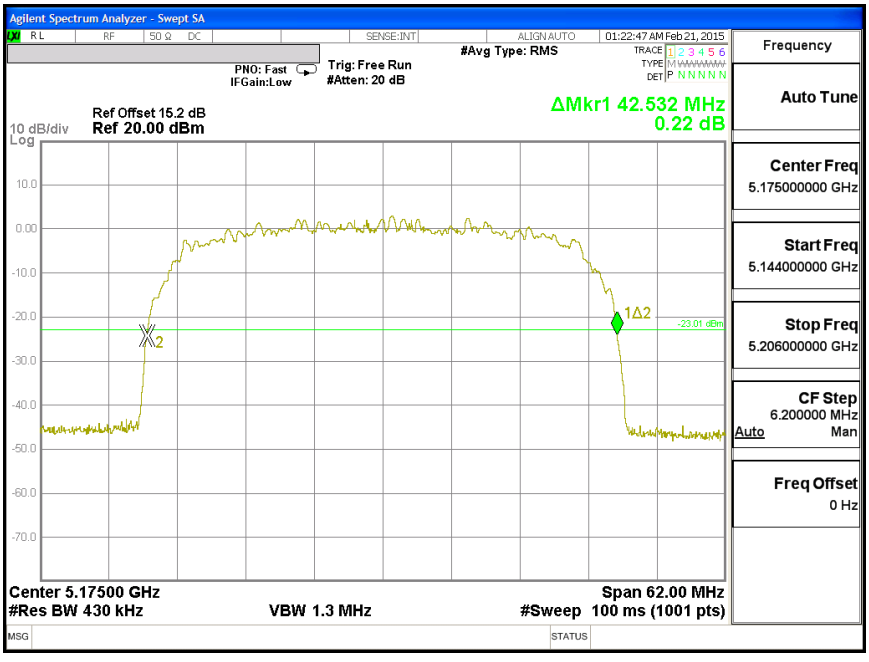
26 dB BANDWIDTH, Chain 0

BANDWIDTH Chain 0 LOW

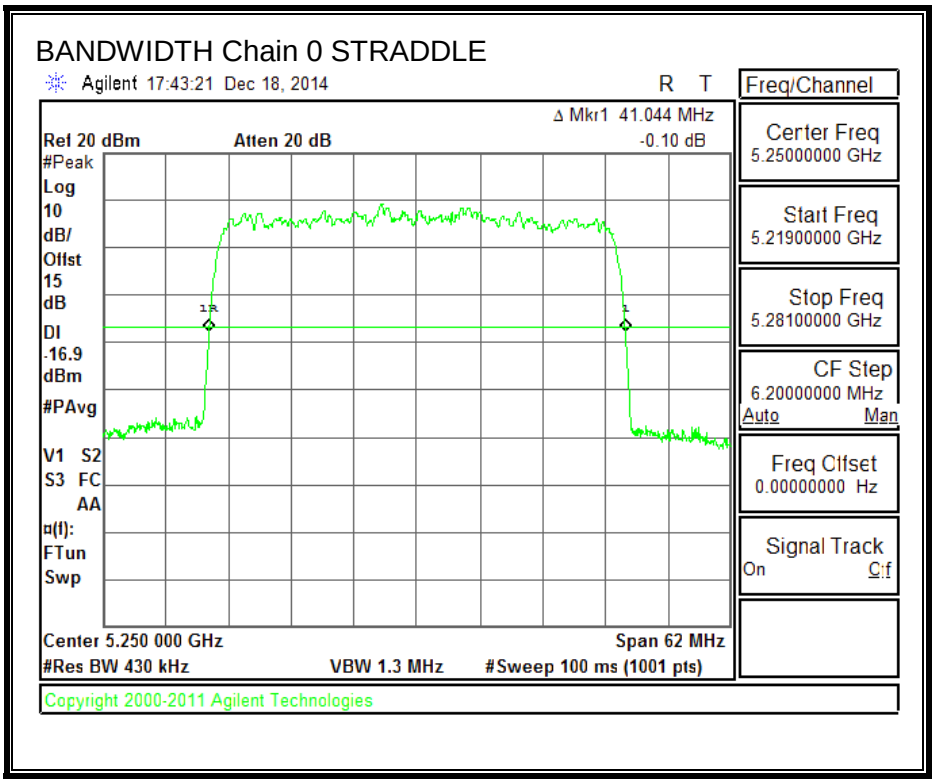


26 dB BANDWIDTH, Chain 1

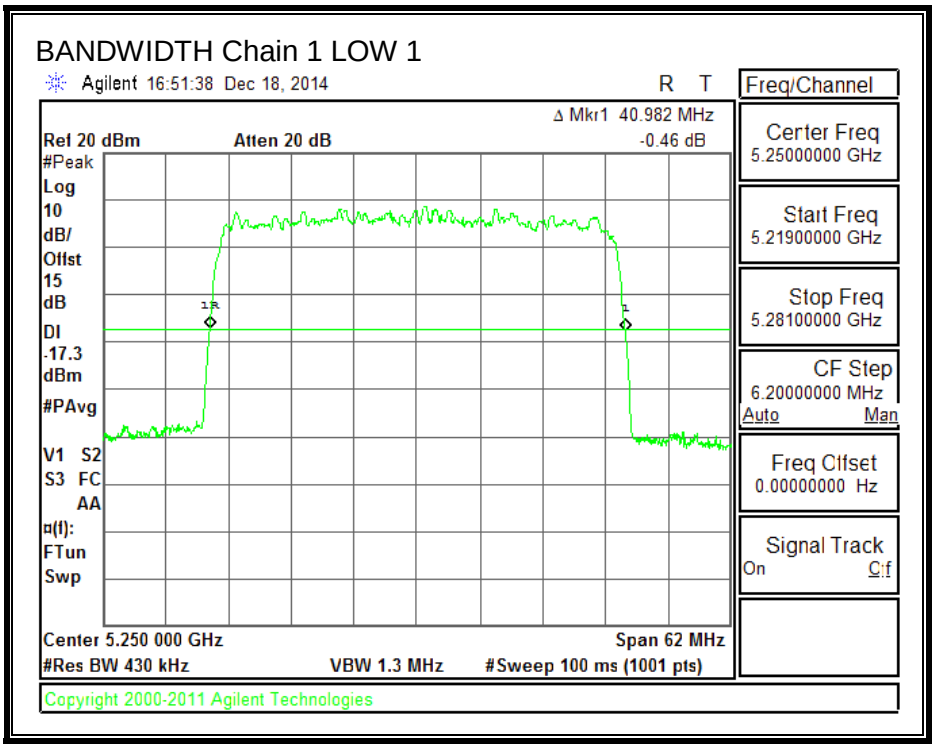
BANDWIDTH Chain 1 LOW



26 dB BANDWIDTH, Chain 0



26 dB BANDWIDTH, Chain 1



8.4.2. **OUTPUT POWER AND PSD**

LIMITS

FCC §15.407 (a) (1)

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

DIRECTIONAL ANTENNA GAIN

The TX chains are uncorrelated and the antenna gain is the same for each chain. The directional gain is equal to the antenna gain.

Chain 0 Antenna Gain (dBi)	Chain 1 Antenna Gain (dBi)	Uncorrelated Chains Directional Gain (dBi)
14.50	14.50	14.50

RESULTS

Antenna Gain and Limits

Channel	Frequency (MHz)	Directional Gain for Power (dBi)	Directional Gain for PSD (dBi)	Power Limit (dBm)	PSD Limit (dBm)
Low	5175	14.50	14.50	30.00	17.00

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

Output Power Results

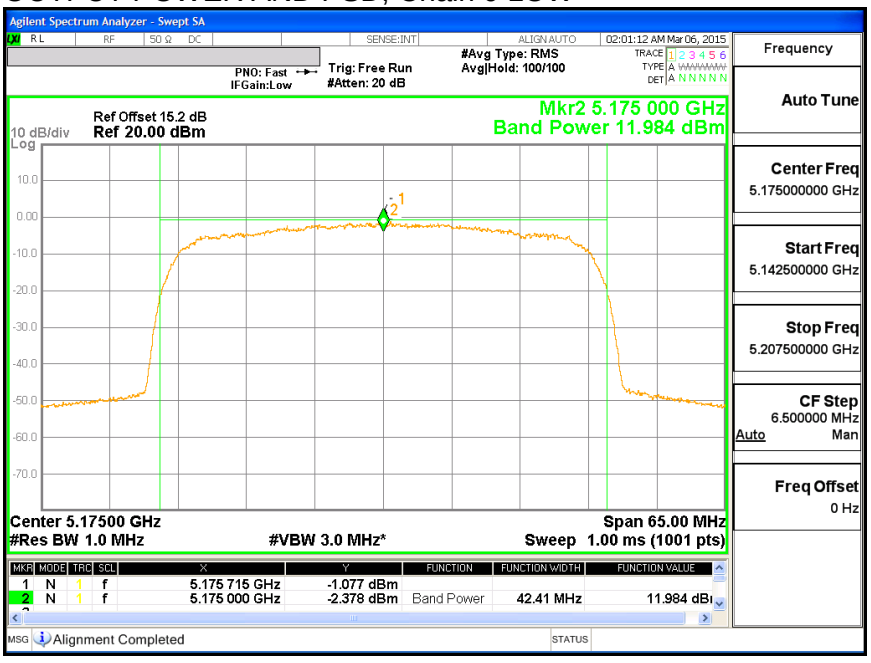
Channel	Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
Low	5175	11.98	10.35	14.25	30.00	-15.75
Straddle	5250	12.15	12.48	15.33	30.00	-14.67

PSD Results

Channel	Frequency (MHz)	Chain 0 Meas PSD (dBm)	Chain 1 Meas PSD (dBm)	Total Corr'd PSD (dBm)	PSD Limit (dBm)	PSD Margin (dB)
Low	5175	-1.08	-2.80	1.16	17.00	-15.84

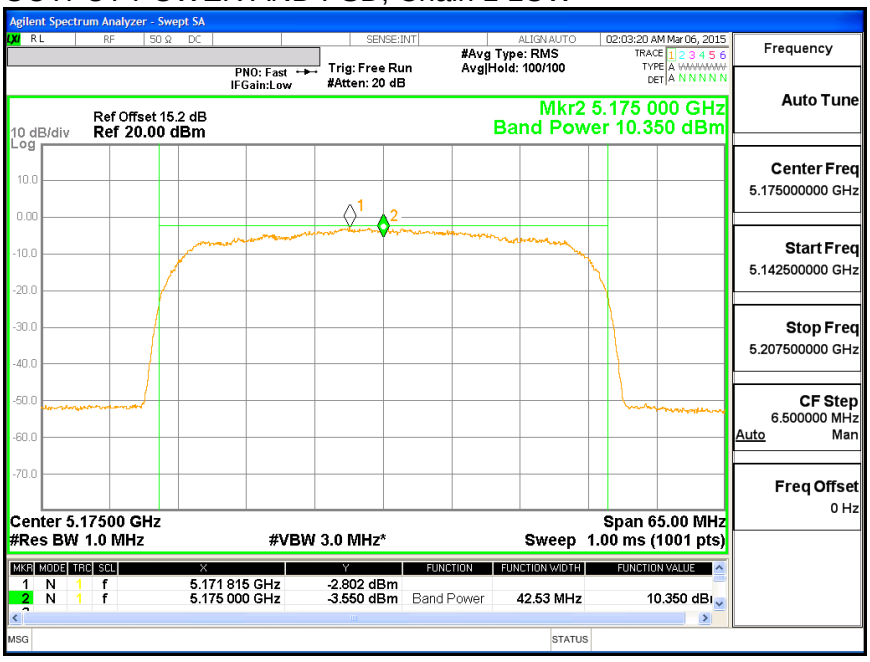
OUTPUT POWER AND PSD, Chain 0

OUTPUT POWER AND PSD, Chain 0 LOW

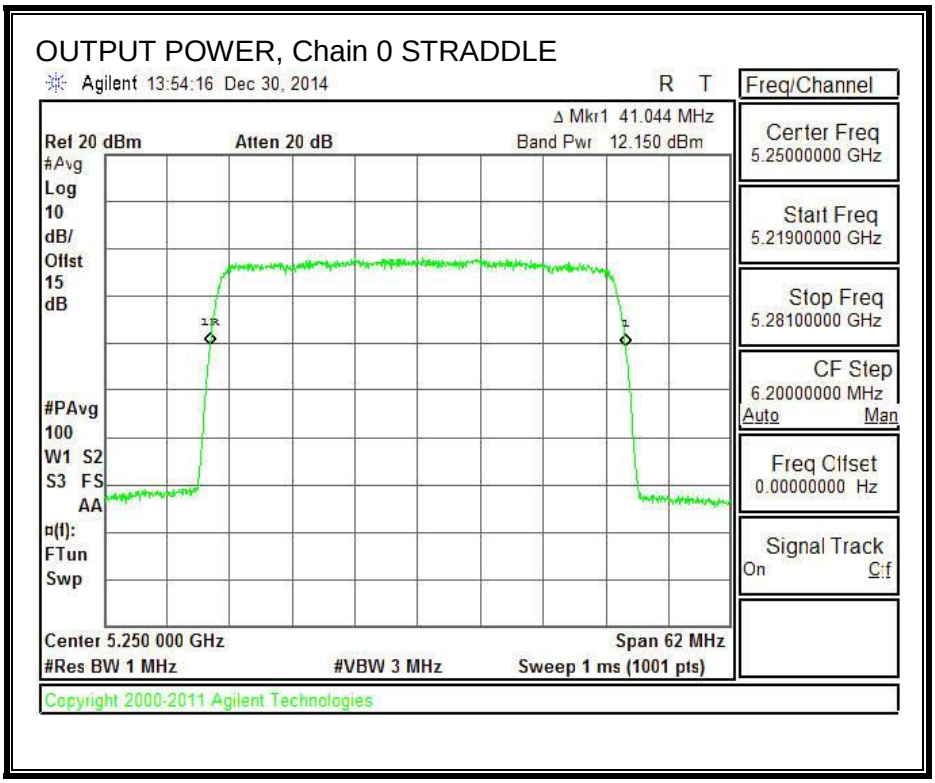


OUTPUT POWER AND PSD, Chain 1

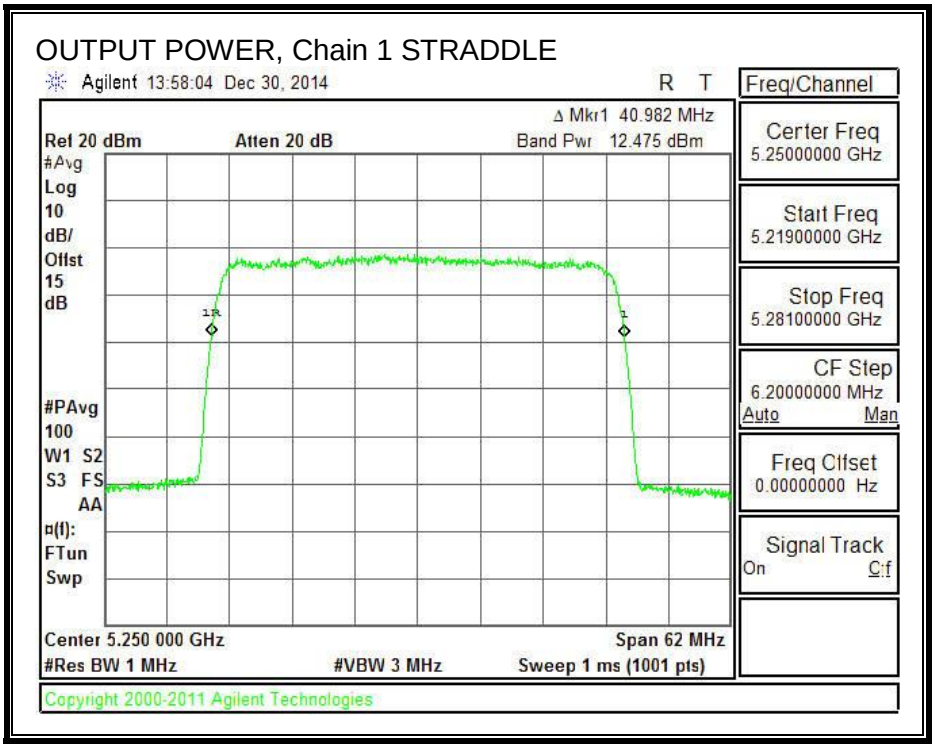
OUTPUT POWER AND PSD, Chain 1 LOW



STRADDLE CHANNEL OUTPUT POWER, Chain 0



STRADDLE CHANNEL OUTPUT POWER, Chain 1



8.4.3. **STRADDLE CHANNEL RESULTS**

UNII-1 BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directional Gain for Power (dBi)	Directional Gain for PPSD (dBi)
5250	20.49	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	PPSD Limit (dBm)
5250	30.00	17.00

Duty Cycle CF (dB)	0.00	**Included in Calculations of Corr'd Power & PPSD**

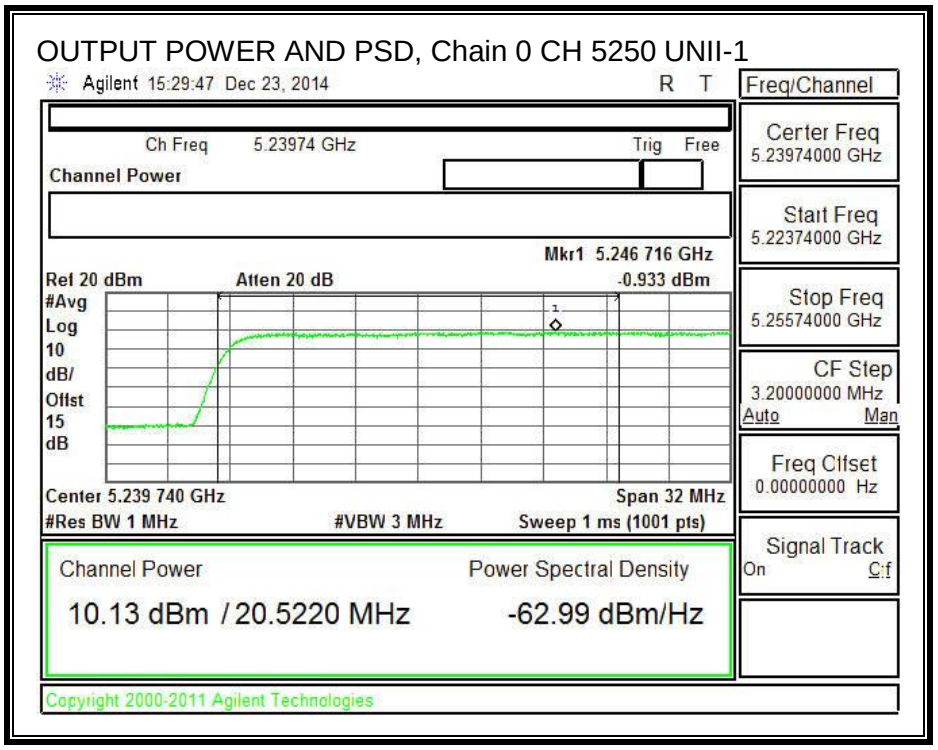
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	10.13	10.11	13.13	30.00	-16.87

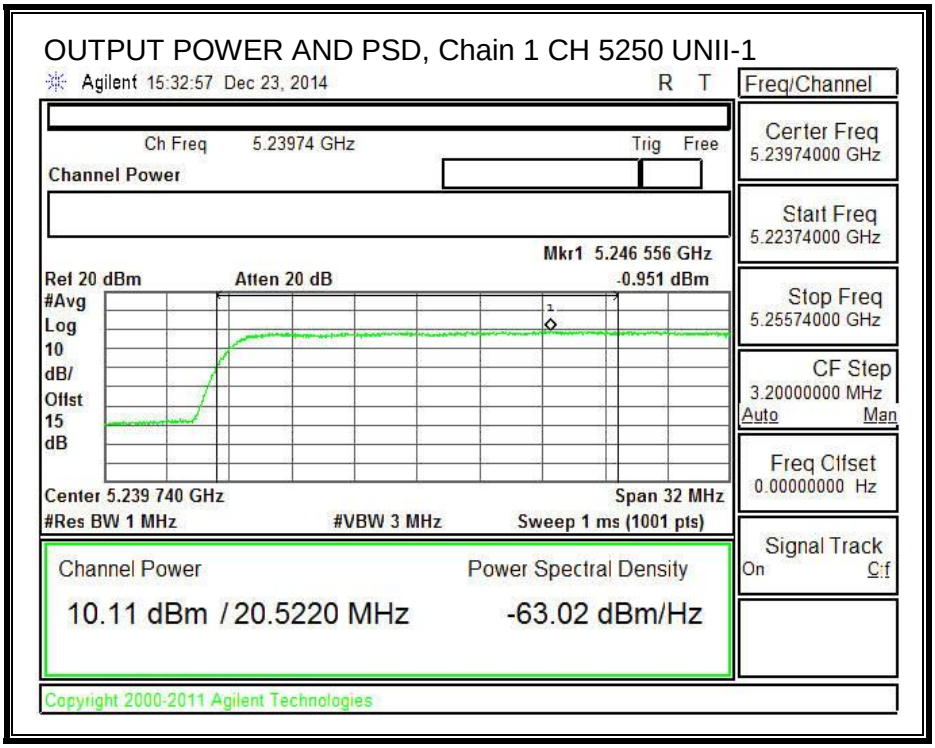
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.93	-0.95	2.07	17.00	-14.93

OUTPUT POWER AND PSD, Chain 0 CH 5250 UNII-1



OUTPUT POWER AND PSD, Chain 1 CH 5250 UNII-1



UNII-2A BAND

Bandwidth and Antenna Gain

Frequency (MHz)	Min 26 dB BW (MHz)	Directio Gain for Power (dBi)	Directio Gain for PPSD (dBi)
5250	20.49	14.50	14.50

Limits

Frequency (MHz)	FCC Power Limit (dBm)	FCC PPSD Limit (dBm)
5250	15.50	2.50

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

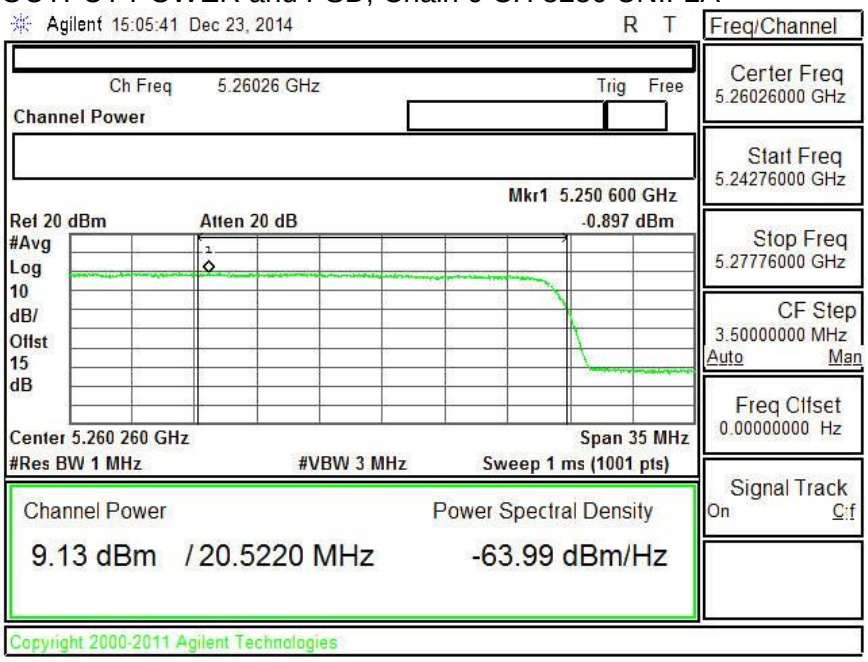
Output Power Results

Frequency (MHz)	Chain 0 Meas Power (dBm)	Chain 1 Meas Power (dBm)	Total Corr'd Power (dBm)	Power Limit (dBm)	Power Margin (dB)
5250	9.13	9.91	12.55	15.50	-2.95

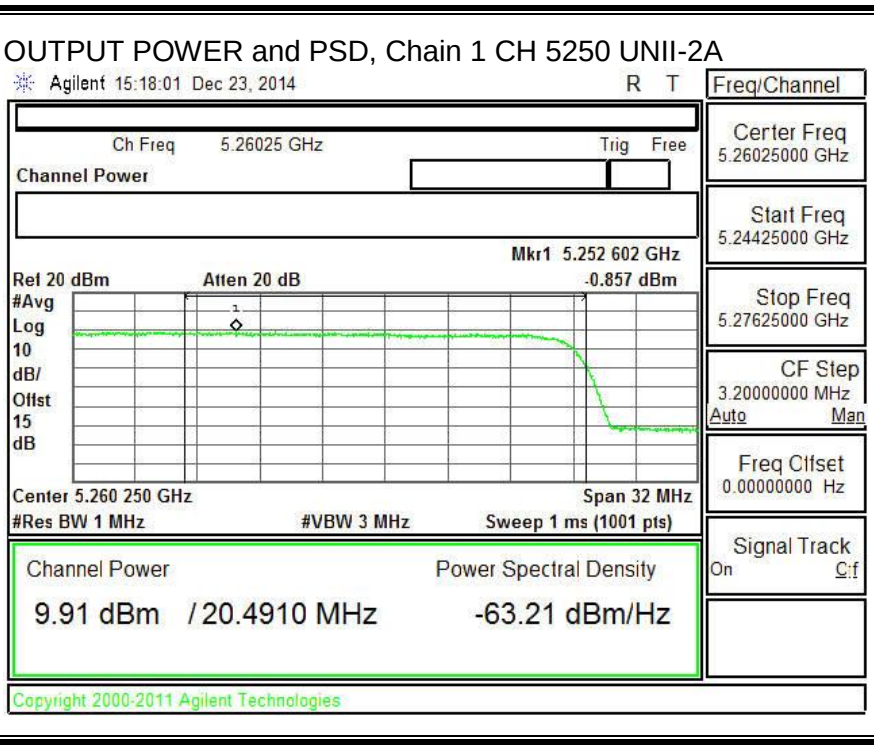
PPSD Results

Frequency (MHz)	Chain 0 Meas PPSD (dBm)	Chain 1 Meas PPSD (dBm)	Total Corr'd PPSD (dBm)	PPSD Limit (dBm)	PPSD Margin (dB)
5250	-0.90	-0.86	2.13	2.50	-0.37

OUTPUT POWER and PSD, Chain 0 CH 5250 UNII-2A



OUTPUT POWER and PSD, Chain 1 CH 5250 UNII-2A



8.4.4. **OUT-OF-BAND EMISSIONS**

LIMITS

FCC §15.205 and §15.209

PART 15, SUBPART E

Radiated LIMIT:
(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

Procedure

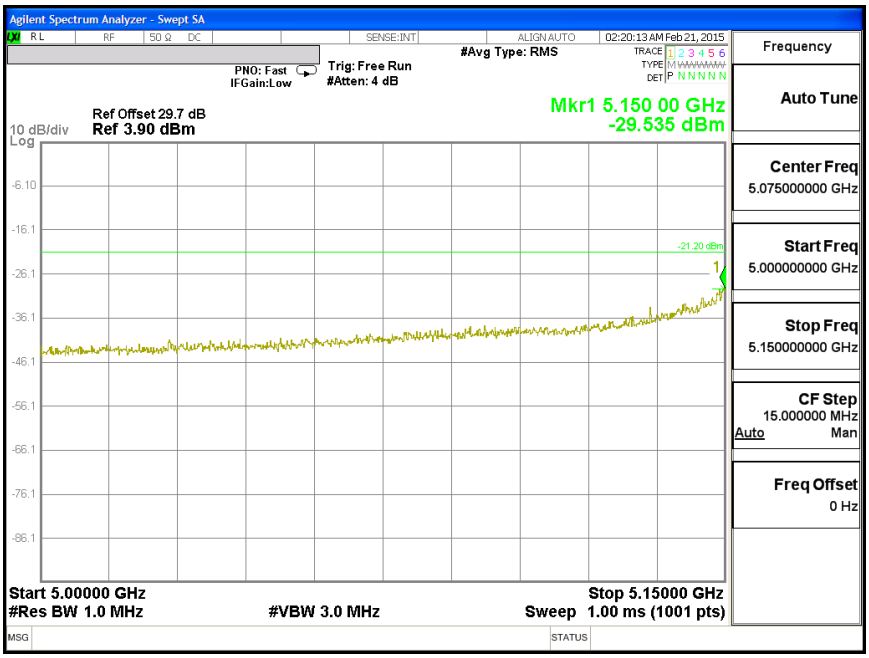
KDB 789033 D02 General UNII Test Procedures New Rules v01, Section II, G5, G6

Conducted measurements are being used to demonstrate compliance with the spurious limits in the restricted band (all other spurious emissions are measured using the radiated test method with the antennas connected). The limits are 54dBuV/m average and 74dBuV/m peak, which are equivalent to eirp of -41.2 dBm and -21.2dBm respectively. The plots include an offset to account for the EUT antenna gain and external attenuation between EUT antenna port and spectrum analyzer. As the two antenna chains feed cross polarized antennas with un- correlated signals the two chains are treated independently and the emissions do not need to be summed.

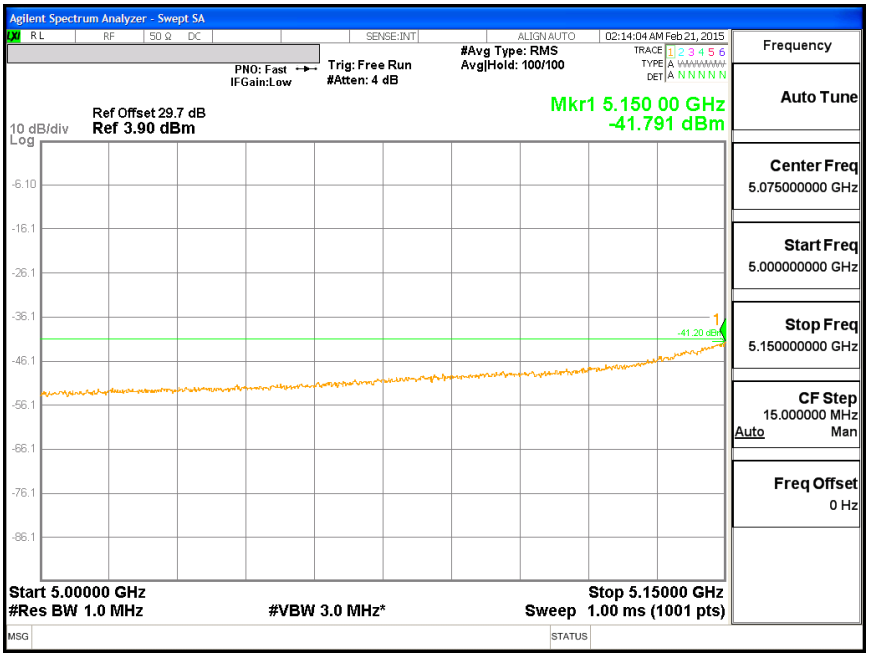
RESULTS

LOW CHANNEL BANDEDGE, Chain 0

AUTHORIZED BAND EDGE Chain 0 LOW PEAK

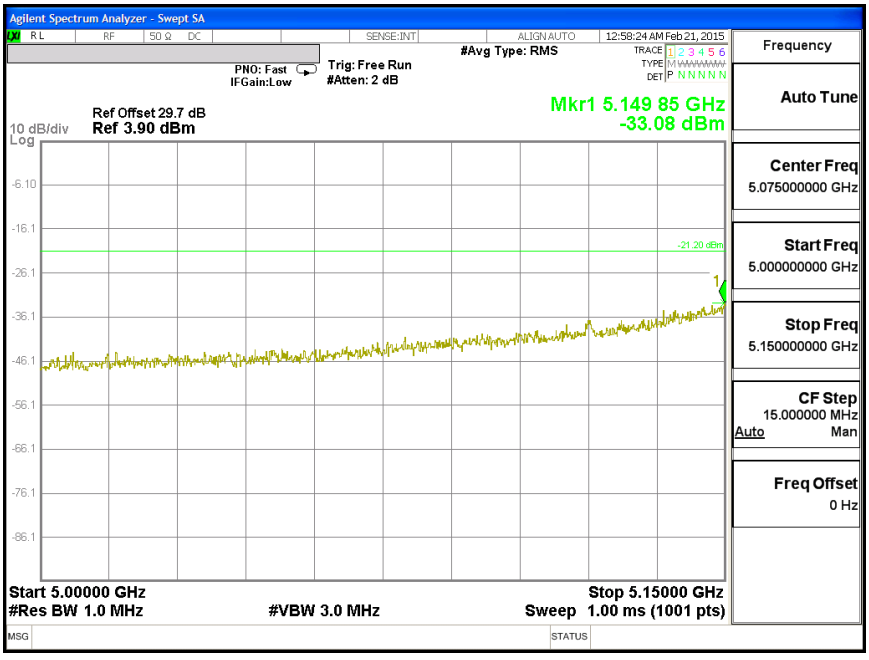


AUTHORIZED BAND EDGE Chain 0 LOW AVERAGE

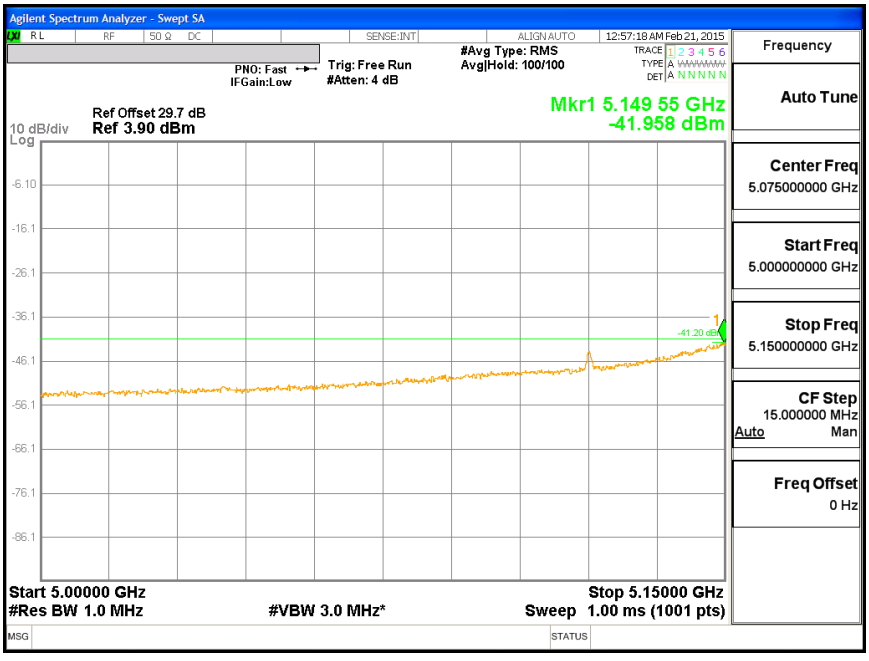


LOW CHANNEL BANDEDGE, Chain 1

AUTHORIZED BAND EDGE Chain 1 LOW PEAK



AUTHORIZED BAND EDGE Chain 1 LOW AVERAGE



9. RADIATED TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

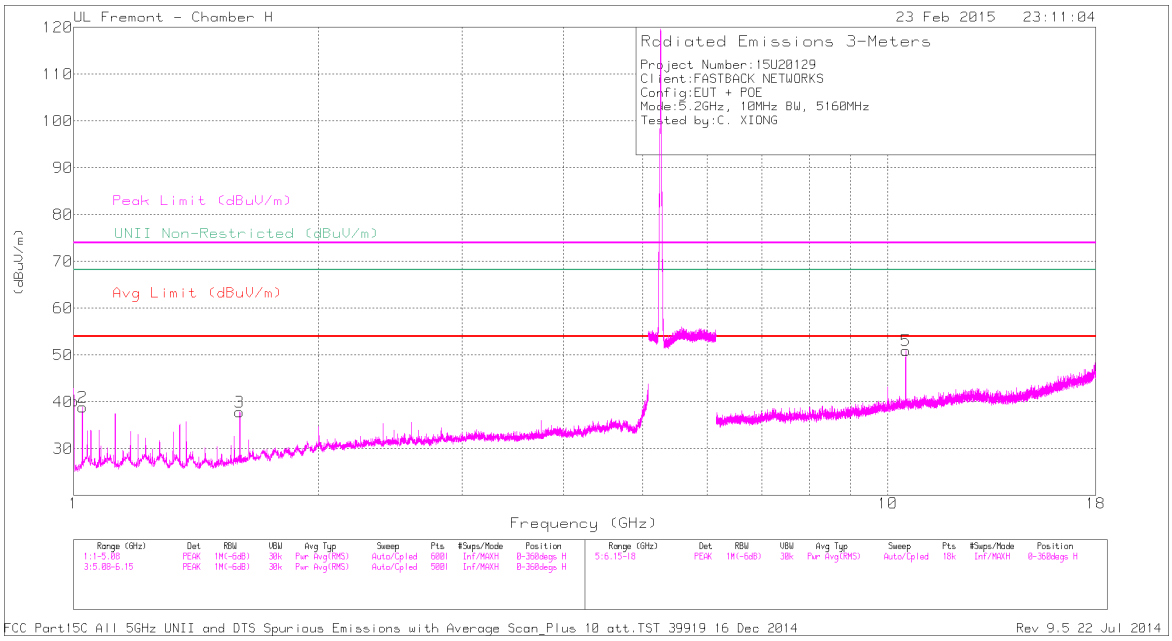
Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

9.2. TRANSMITTER ABOVE 1 GHz

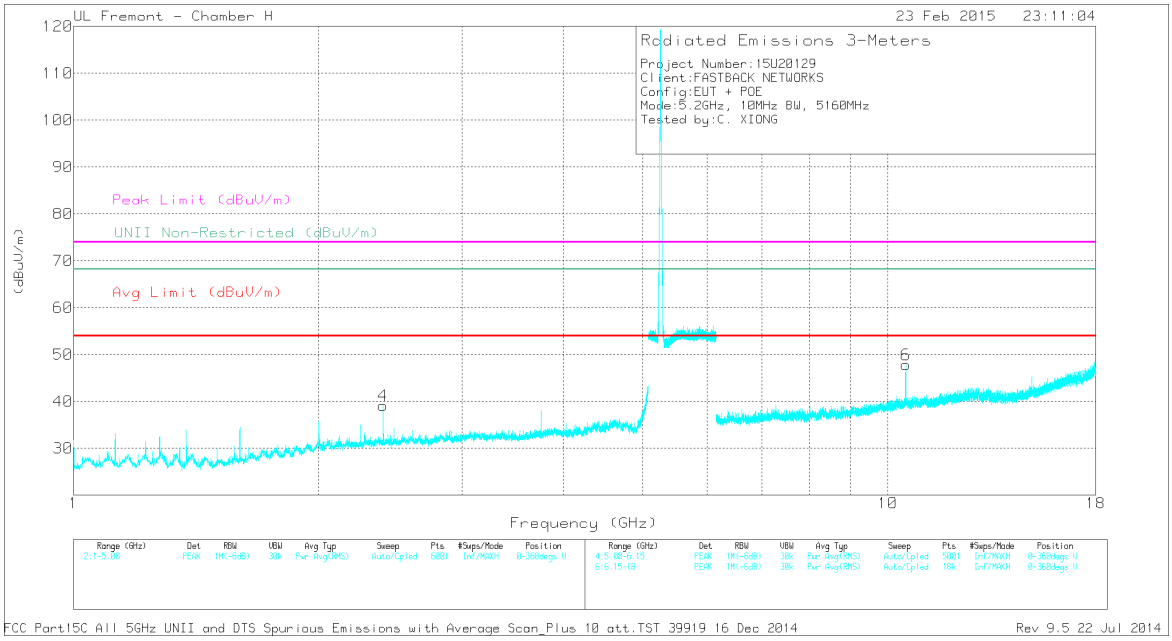
9.2.1. TX ABOVE 1 GHz 10MHz 2 TX MODE IN THE 5.2 GHz BAND

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1	53.88	PK1	27.7	-35.6	45.98	-	-	74	-28.02	-	-	327	134	H
* 1	48.01	AD1	27.7	-35.6	40.11	54	-13.89	-	-	-	-	327	134	H
* 1.025	51.28	PK1	27.8	-35.5	43.58	-	-	74	-30.42	-	-	335	113	H
* 1.025	44.41	AD1	27.8	-35.5	36.71	54	-17.29	-	-	-	-	335	113	H
* 1.6	48.57	PK1	28.5	-35	42.07	-	-	74	-31.93	-	-	36	128	H
* 1.6	42.77	AD1	28.5	-35	36.27	54	-17.73	-	-	-	-	36	128	H
2.4	46.42	PK1	32	-34	44.42	-	-	-	-	68.2	-23.78	3	213	V
10.52	47.67	PK1	37.6	-25.6	59.67	-	-	-	-	68.2	-8.53	54	100	H
10.522	44.34	PK1	37.6	-25.6	56.34	-	-	-	-	68.2	-11.86	47	100	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

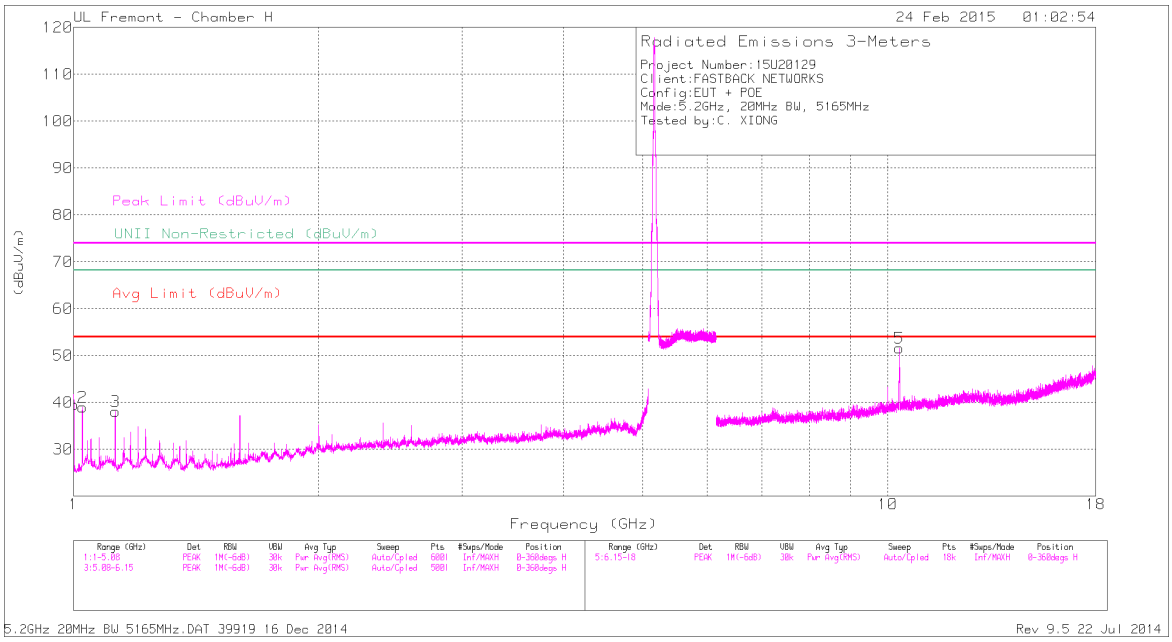
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

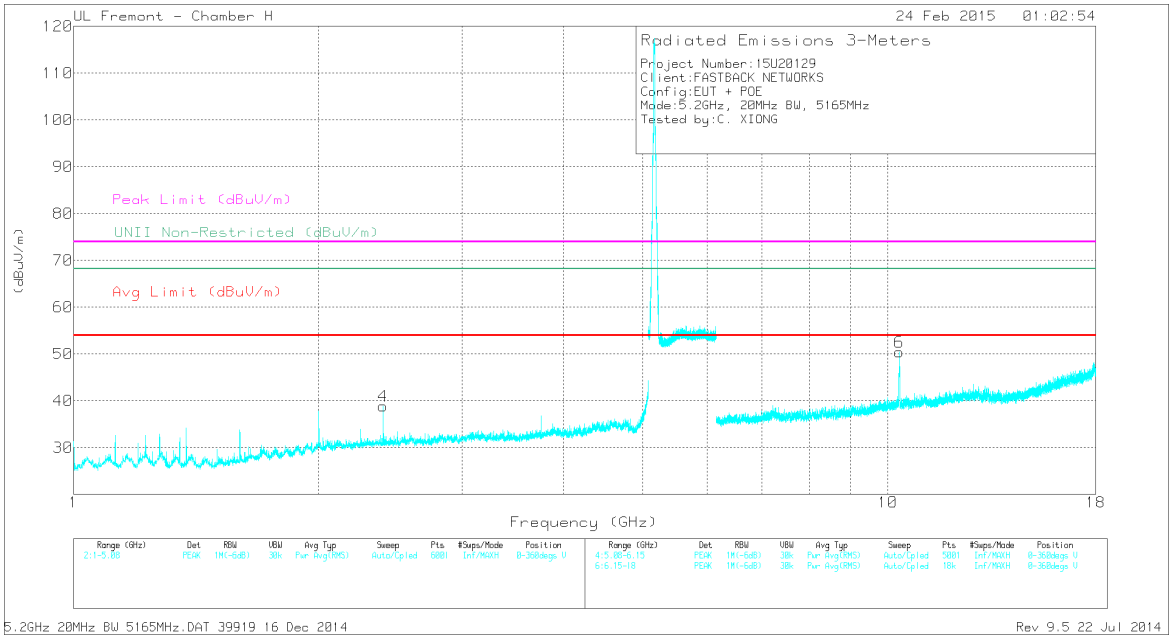
9.2.2. **TX ABOVE 1 GHz 20MHz 2 TX MODE IN THE 5.2 GHz BAND**

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1	54.32	PK1	27.7	-35.6	46.42	-	-	74	-27.58	-	-	328	133	H
* 1	48.04	AD1	27.7	-35.6	40.14	54	-13.86	-	-	-	-	328	133	H
* 1.025	50.68	PK1	27.8	-35.5	42.98	-	-	74	-31.02	-	-	332	110	H
* 1.025	44.52	AD1	27.8	-35.5	36.82	54	-17.18	-	-	-	-	332	110	H
* 1.125	48.42	PK1	28.4	-35.6	41.22	-	-	74	-32.78	-	-	41	133	H
* 1.125	42.25	AD1	28.3	-35.6	34.95	54	-19.05	-	-	-	-	41	133	H
2.4	46.87	PK1	32	-34	44.87	-	-	-	-	68.2	-23.33	356	249	V
10.328	45.23	PK1	37.5	-24.9	57.83	-	-	-	-	68.2	-10.37	41	100	V
10.33	41.18	PK1	37.5	-24.9	53.78	-	-	-	-	68.2	-14.42	346	126	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

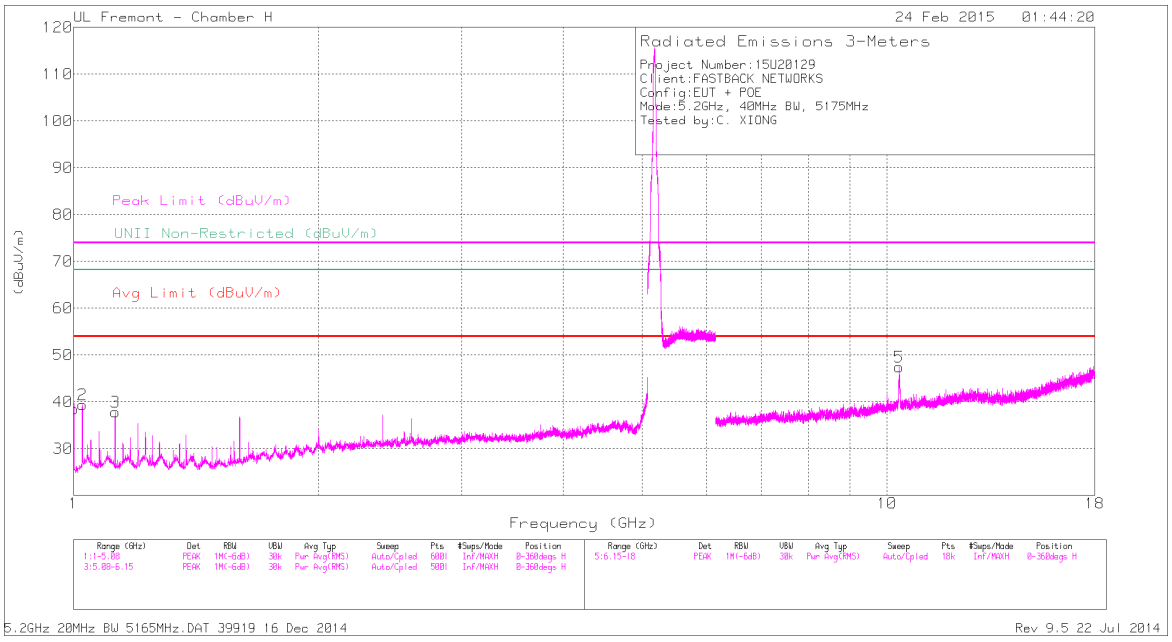
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

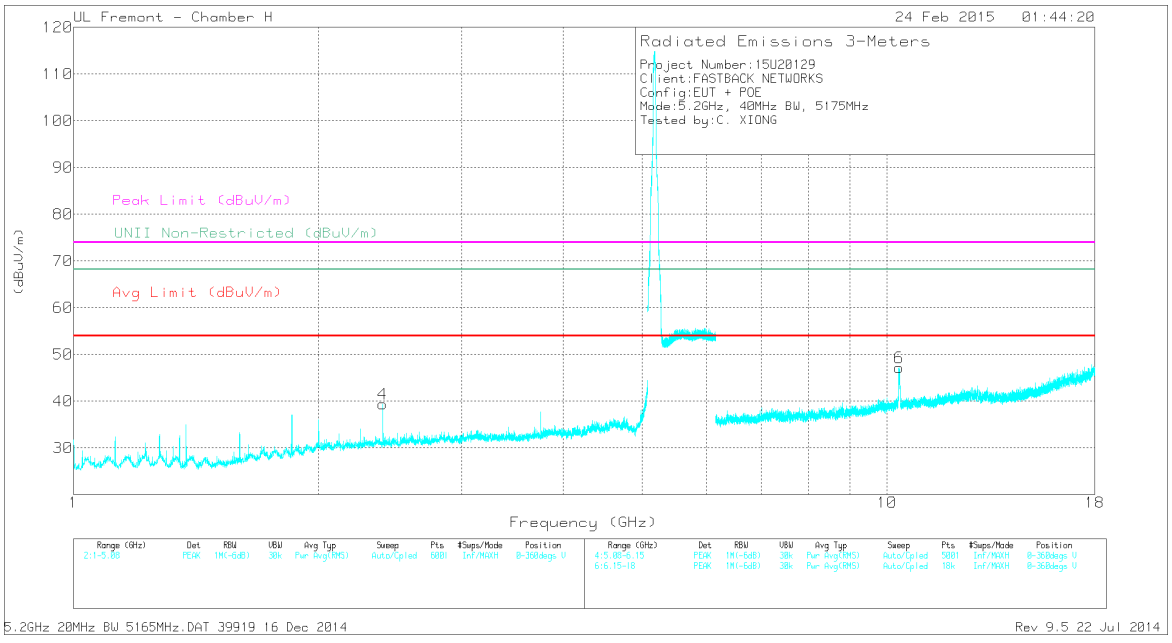
9.2.3. **TX ABOVE 1 GHz 40MHz 2 TX MODE IN THE 5.2 GHz BAND**

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT



LOW CHANNEL VERTICAL PLOT



DATA

Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 1	53.6	PK1	27.7	-35.6	45.7	-	-	74	-28.3	-	-	331	128	H
* 1	48	AD1	27.7	-35.6	40.1	54	-13.9	-	-	-	-	331	128	H
* 1.025	52.2	PK1	27.8	-35.5	44.5	-	-	74	-29.5	-	-	328	115	H
* 1.025	45.68	AD1	27.8	-35.5	37.98	54	-16.02	-	-	-	-	328	115	H
* 1.125	50.47	PK1	28.3	-35.6	43.17	-	-	74	-30.83	-	-	35	106	H
* 1.125	44.35	AD1	28.3	-35.6	37.05	54	-16.95	-	-	-	-	35	106	H
2.4	46.83	PK1	32	-34	44.83	-	-	-	-	68.2	-23.37	359	206	V
10.337	41.57	PK1	37.5	-25.2	53.87	-	-	-	-	68.2	-14.33	35	100	V
10.35	42.86	PK1	37.5	-25.7	54.66	-	-	-	-	68.2	-13.54	349	118	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

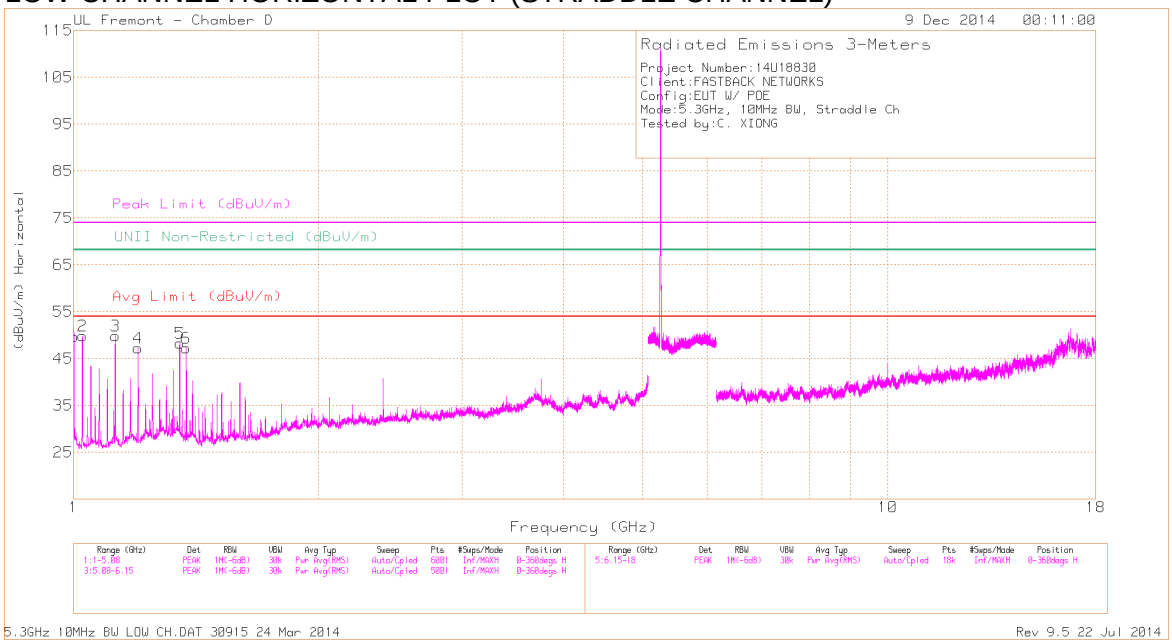
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

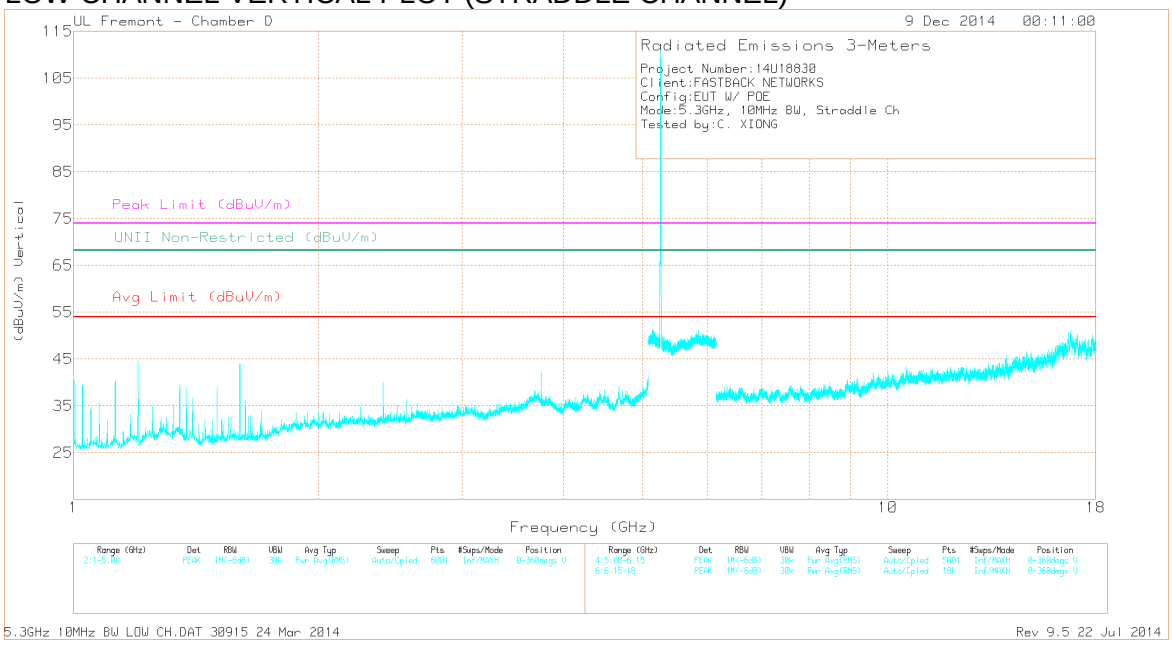
9.2.4. TX ABOVE 1 GHz 10MHz 2 TX MODE IN THE 5.2 GHz BAND STRADDLE CHANNEL

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT (STRADDLE CHANNEL)



LOW CHANNEL VERTICAL PLOT (STRADDLE CHANNEL)



DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	60.06	PK1	27.6	-32.6	55.06	-	-	74	-18.94	-	-	351	122	H
1	* 1	56.42	AD1	27.6	-32.6	51.42	54	-2.58	-	-	-	-	351	122	H
2	* 1.025	56.03	PK1	27.6	-32.4	51.23	-	-	74	-22.77	-	-	342	111	H
2	* 1.025	52.35	AD1	27.6	-32.4	47.55	54	-6.45	-	-	-	-	342	111	H
3	* 1.125	53.88	PK1	27.9	-32.5	49.28	-	-	74	-24.72	-	-	76	111	H
3	* 1.125	50.63	AD1	27.9	-32.5	46.03	54	-7.97	-	-	-	-	76	111	H
4	* 1.2	54.27	PK1	29	-32.5	50.77	-	-	74	-23.23	-	-	100	286	H
4	* 1.2	51.19	AD1	29	-32.5	47.69	54	-6.31	-	-	-	-	100	286	H
5	* 1.35	52.32	PK1	29.6	-31.7	50.22	-	-	74	-23.78	-	-	68	104	H
5	* 1.35	46.52	AD1	29.6	-31.7	44.42	54	-9.58	-	-	-	-	68	104	H
6	* 1.375	51.53	PK1	29.4	-31.9	49.03	-	-	74	-24.97	-	-	72	104	H
6	* 1.375	47.96	AD1	29.4	-31.9	45.46	54	-8.54	-	-	-	-	72	104	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

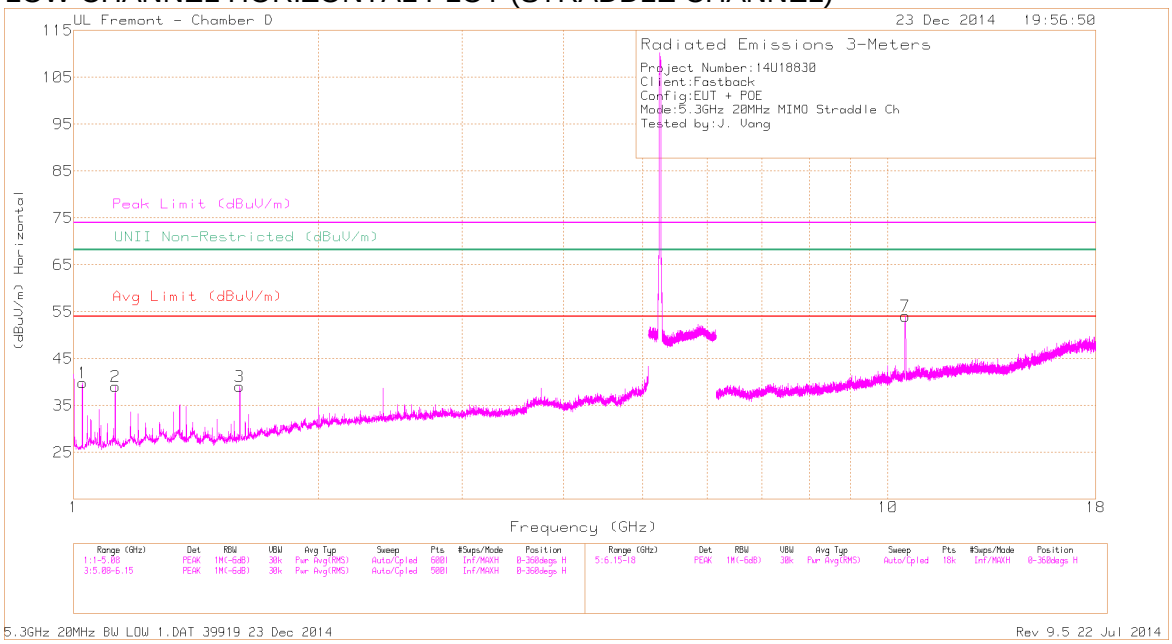
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

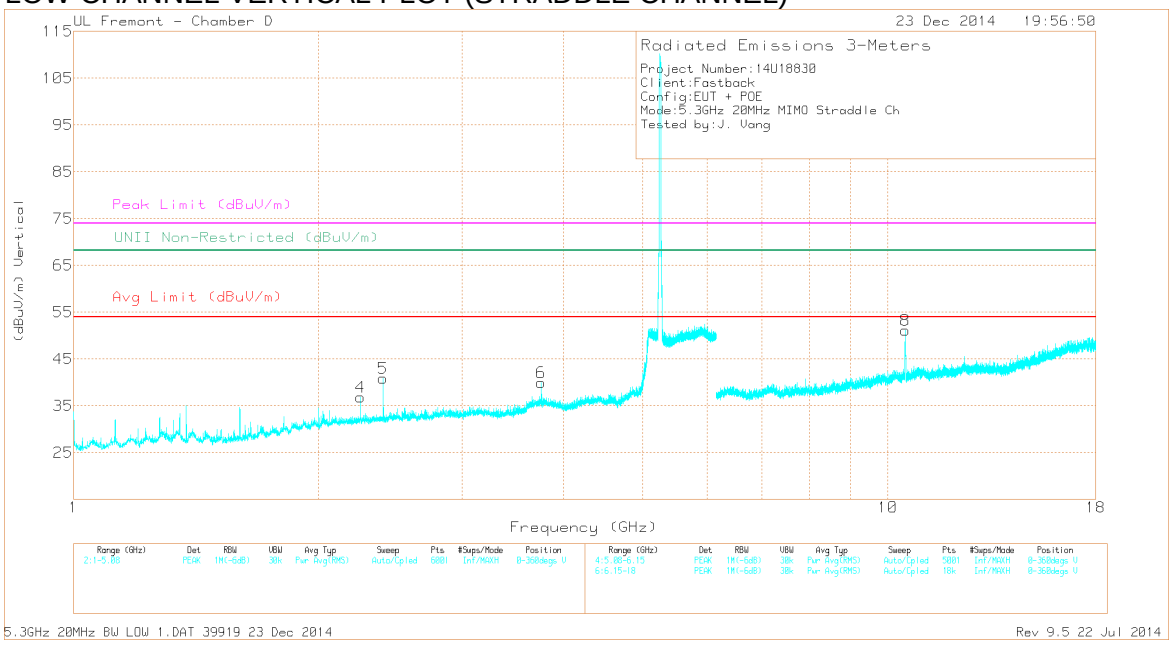
9.2.5. **TX ABOVE 1 GHz 20MHz 2 TX MODE IN THE 5.2 GHz BAND STRADDLE CHANNEL**

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT (STRADDLE CHANNEL)



LOW CHANNEL VERTICAL PLOT (STRADDLE CHANNEL)



DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.025	49.54	PK1	27	-32.1	44.44	-	-	74	-29.56	-	-	346	119	H
1	* 1.025	44.56	AD1	27	-32.1	39.46	54	-14.54	-	-	-	-	346	119	H
2	* 1.125	48.55	PK1	27.3	-31.8	44.05	-	-	74	-29.95	-	-	61	105	H
2	* 1.125	42.67	AD1	27.3	-31.8	38.17	54	-15.83	-	-	-	-	61	105	H
3	* 1.6	47.16	PK1	28.2	-31.6	43.76	-	-	74	-30.24	-	-	59	122	H
3	* 1.6	41.24	AD1	28.2	-31.6	37.84	54	-16.16	-	-	-	-	59	122	H
4	* 2.25	42.43	PK1	31.8	-30.7	43.53	-	-	74	-30.47	-	-	347	208	V
4	* 2.25	32.93	AD1	31.8	-30.7	34.03	54	-19.97	-	-	-	-	347	208	V
6	* 3.75	41.09	PK1	33.3	-28.7	45.69	-	-	74	-28.31	-	-	27	190	V
6	* 3.75	32.12	AD1	33.3	-28.7	36.72	54	-17.28	-	-	-	-	27	190	V
5	2.4	44.5	PK1	32.1	-30.4	46.2	-	-	-	-	68.2	-22	52	112	V
7	10.5	34.8	PK1	37.6	-21.5	50.9	-	-	-	-	68.2	-17.3	41	112	H
8	10.5	36.9	PK1	37.6	-21.5	53	-	-	-	-	68.2	-15.2	38	158	V

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

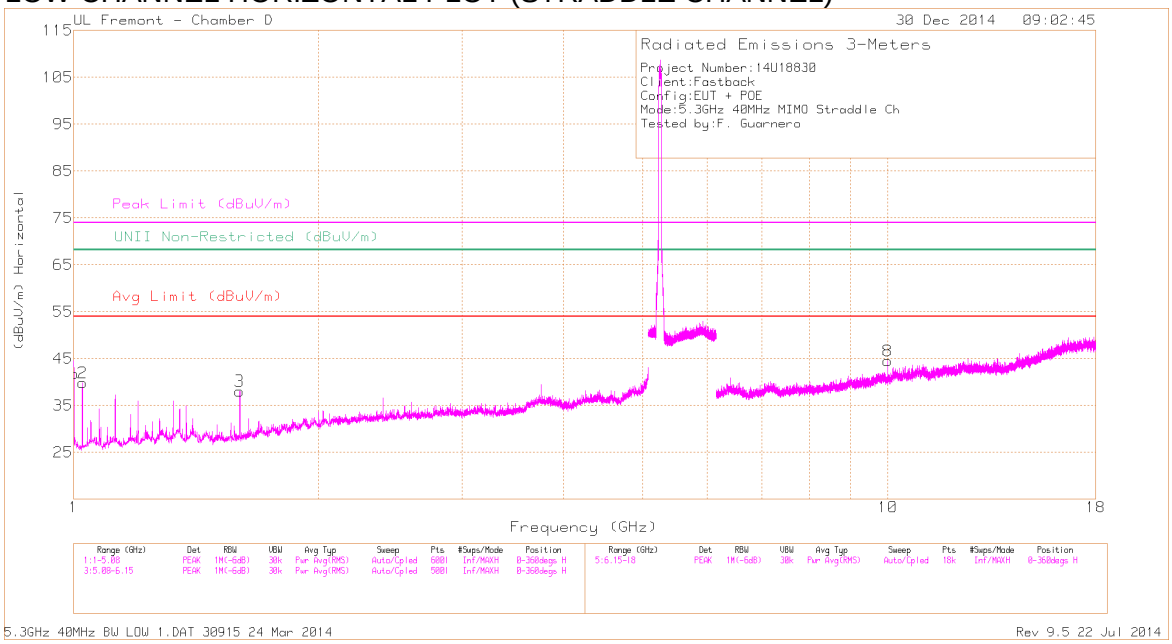
PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

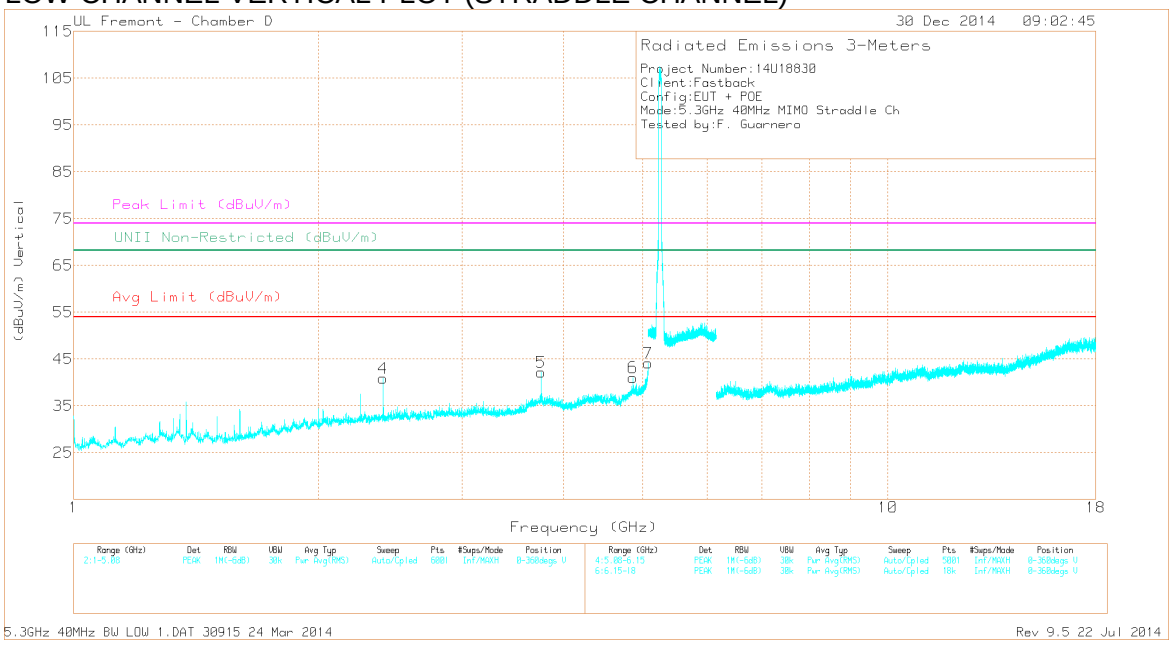
9.2.6. **TX ABOVE 1 GHz 40MHz 2 TX MODE IN THE 5.2 GHz BAND STRADDLE CHANNEL**

HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL HORIZONTAL PLOT (STRADDLE CHANNEL)



LOW CHANNEL VERTICAL PLOT (STRADDLE CHANNEL)



DATA

Radiated Emissions

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T344 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	UNII Non-Restricted (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1	51.34	PK1	27.1	-32.3	46.14	-	-	74	-27.86	-	-	353	113	H
1	* 1	45.14	AD1	27.1	-32.3	39.94	54	-14.06	-	-	-	-	353	113	H
2	* 1.025	48.68	PK1	27	-32.1	43.58	-	-	74	-30.42	-	-	350	114	H
2	* 1.025	43.12	AD1	27	-32.1	38.02	54	-15.98	-	-	-	-	350	114	H
3	* 1.6	46.57	PK1	28.2	-31.6	43.17	-	-	74	-30.83	-	-	54	115	H
3	* 1.6	41.69	AD1	28.2	-31.6	38.29	54	-15.71	-	-	-	-	54	115	H
5	* 3.75	41.59	PK1	33.3	-28.6	46.29	-	-	74	-27.71	-	-	31	197	V
5	* 3.75	33.42	AD1	33.3	-28.7	38.02	54	-15.98	-	-	-	-	31	197	V
6	* 4.866	36.76	PK1	34.2	-25.7	45.26	-	-	74	-28.74	-	-	27	197	V
6	* 4.864	25.48	AD1	34.2	-25.7	33.98	54	-20.02	-	-	-	-	27	197	V
7	* 5.074	41.87	PK1	34.3	-24.9	51.27	-	-	74	-22.73	-	-	31	103	V
7	* 5.078	30.22	AD1	34.3	-24.5	40.02	54	-13.98	-	-	-	-	31	103	V
4	2.4	45.32	PK1	32.1	-30.4	47.02	-	-	-	-	68.2	-21.18	15	240	V
4	2.4	39.59	AD1	32.1	-30.4	41.29	-	-	-	-	-	-	15	240	V
8	10	36.64	PK1	37.1	-22.1	51.64	-	-	-	-	68.2	-16.56	210	103	H

* - indicates frequency in CFR15.205/IC7.2.2 Restricted Band

PK1 - KDB789033 Method: Peak

AD1 - KDB789033 Method: AD Primary Power Average

10. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

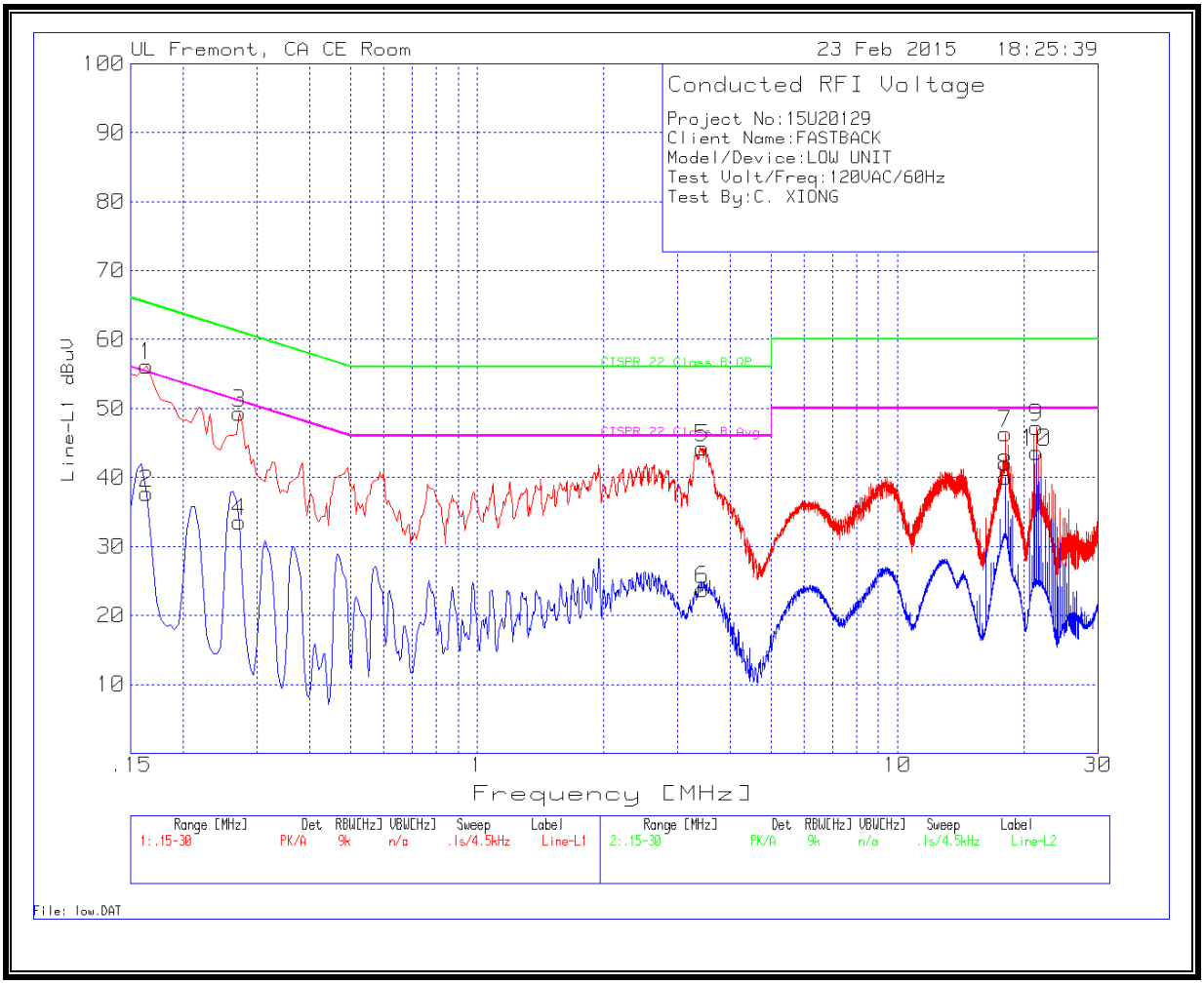
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

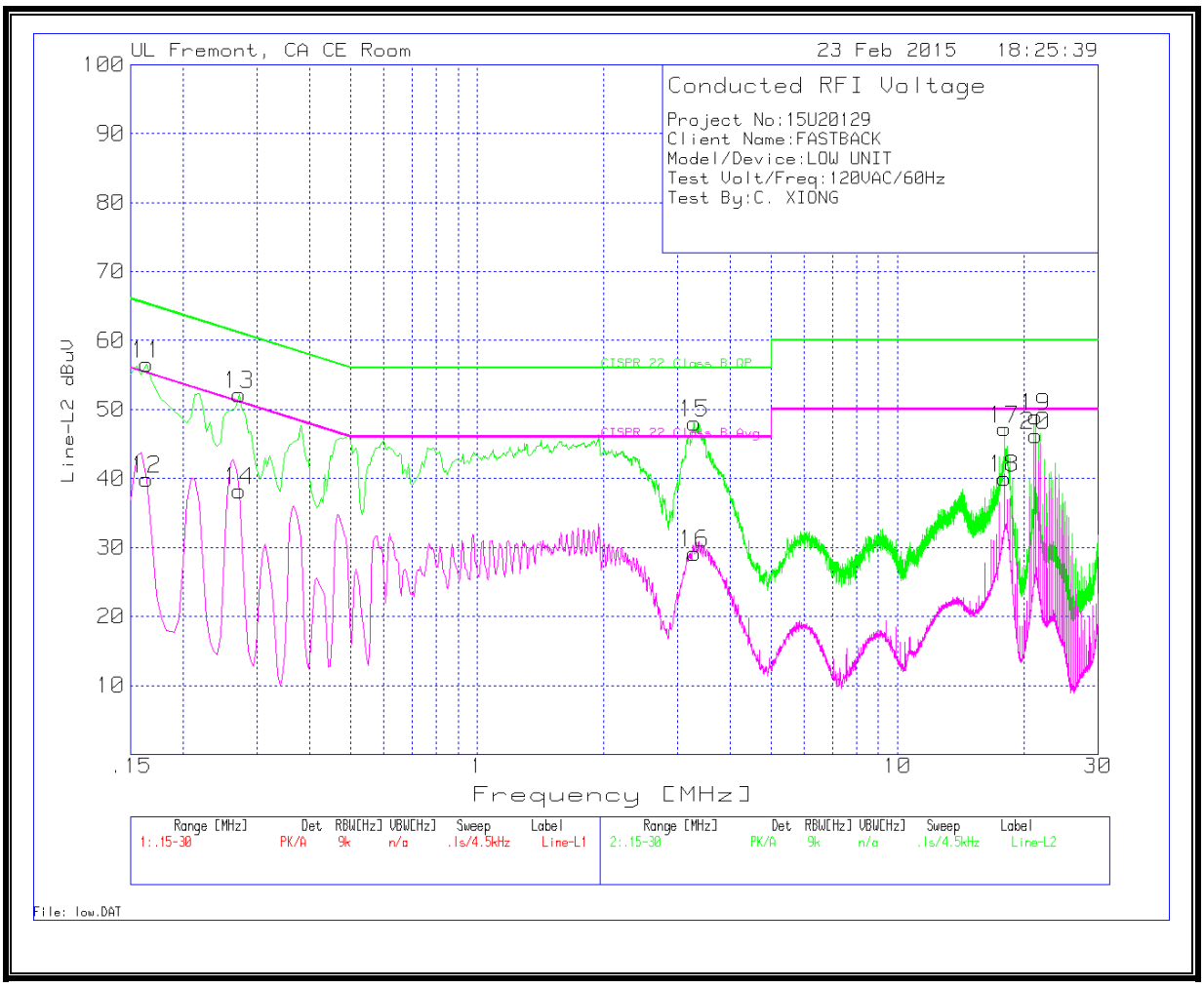
5.2GHz BAND

WORST CASE RESULTS

LINE 1 RESULTS



LINE 2 RESULTS



DATA

Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
1	.1635	54.96	PK	1.2	0	56.16	65.3	-9.14	-	-
2	.1635	36.53	Av	1.2	0	37.73	-	-	55.3	-17.57
3	.2715	48.77	PK	.6	0	49.37	61.1	-11.73	-	-
4	.2715	33.03	Av	.6	0	33.63	-	-	51.1	-17.47
5	3.4305	43.96	PK	.2	.1	44.26	56	-11.74	-	-
6	3.4305	23.44	Av	.2	.1	23.74	-	-	46	-22.26
7	18.033	45.91	PK	.3	.2	46.41	60	-13.59	-	-
8	18.033	39.57	Av	.3	.2	40.07	-	-	50	-9.93
9	21.4215	46.79	PK	.3	.2	47.29	60	-12.71	-	-
10	21.4215	43.14	Av	.3	.2	43.64	-	-	50	-6.36

Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dBuV	CISPR 22 Class B QP	Margin to Limit (dB)	CISPR 22 Class B Avg	Margin to Limit (dB)
11	.1635	55.29	PK	1.3	0	56.59	65.3	-8.71	-	-
12	.1635	38.57	Av	1.3	0	39.87	-	-	55.3	-15.43
13	.2715	51.46	PK	.7	0	52.16	61.1	-8.94	-	-
14	.2715	37.53	Av	.7	0	38.23	-	-	51.1	-12.87
15	3.282	47.78	PK	.2	.1	48.08	56	-7.92	-	-
16	3.282	28.85	Av	.2	.1	29.15	-	-	46	-16.85
17	17.9745	46.71	PK	.3	.2	47.21	60	-12.79	-	-
18	17.9745	39.51	Av	.3	.2	40.01	-	-	50	-9.99
19	21.3585	48.44	PK	.3	.2	48.94	60	-11.06	-	-
20	21.3585	45.74	Av	.3	.2	46.24	-	-	50	-3.76

PK - Peak detector
Av - average detection