



FCC RADIO TEST REPORT

FCC ID:LNQSBWD700A

Product : ScreenBeam Enterprise Wireless Display Receiver

Trade Name : Actiontec

Model Name : SBWD700A

Serial Model : N/A

Report No. : NTEK-2014NT09281643F1

Prepared for

Actiontec Electronics, Inc.

760 North Mary Ave., Sunnyvale, CA 94085 USA

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name Actiontec Electronics, Inc.

Address 760 North Mary Ave., Sunnyvale, CA 94085 USA

Manufacture's Name... Actiontec Electronics, Inc.

Address 760 North Mary Ave., Sunnyvale, CA 94085 USA

Product description

Product name ScreenBeam Enterprise Wireless Display Receiver

Model and/or type reference SBWD700A

Serial Model N/A

Standards FCC Part15.407: 01 Oct. 2013

Test procedure ANSI C63.4-2003 and KDB 789033 D01 v01r04

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Date of Test

Date (s) of performance of tests 28 Sep. 2014 ~16 Oct. 2014

Date of Issue 16 Oct. 2014

Test Result..... **Pass**

Testing Engineer : 
(Kyle Xu)

Technical Manager : 
(Brown Lu)

Authorized Signatory : 
(Bill Yao)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
FCC §15.207	AC Power Line Conducted Emissions	PASS	
FCC §15.209(a), 15.407(b)	Spurious Radiated Emissions	PASS	
FCC §15.407(a)	26 dB and 99% Emission Bandwidth	PASS	
FCC §407(a)(1)	Peak Output Power Measurement	PASS	
FCC §2.1051, §15.407(b)	Band Edges	PASS	
FCC §15.407(a)(1)	Power Spectral Density	PASS	
FCC §15.407(a)(6)	Peak Excursion Ratio	PASS	
IC RSS-210 §2.3	Receiver Spurious Radiated Emissions	PASS	
FCC §2.1051, §15.407(b)	Spurious Emissions at Antenna Terminals	PASS	
FCC §15.203	Antenna Requirement	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registration No.:238937; IC Registration No.:9270A-1

CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 % .

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	ScreenBeam Enterprise Wireless Display Receiver
Trade Name	Actiontec
Model Name	SBWD700A
Product Description	The EUT is a ScreenBeam Enterprise Wireless Display Receiver
	Operation Frequency: 802.11a/n(20):5180 MHz ~ 5240 MHz 802.11n(40): 5190 MHz ~ 5230 MHz
	Modulation Type: OFDM (BPSK / QPSK / 16QAM / 64QAM)
	Bit Rate of Transmitter 802.11a:54/48/36/24/18/12/9/6Mbps 802.11n(20MHz):150/144.44/130/117/115.56/104/86.67/78/52/6.5Mbps 802.11n(40MHz):300/270/240/180/150/120/108/90/54 Mbps
	Number Of Channel 802.11a/n20MHz:7CH 802.11n40MHz:5CH
	Max.Output Power(Conducted): 11.60 dBm
	Antenna Designation: Please see Note 3.
	Antenna Gain (dBi) Please see Note 3.
	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
	Channel List Please refer to the Note 2.
Ratings	DC 5.0V,2.0A
Adapter	Mode: WA-10P05FU Input: 100-240V~, 50/60Hz, 0.3A MAX Output: 5.0V--, 2.0A
Battery	N/A
Connecting I/O Port(s)	Please refer to the User's Manual

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

5GHz

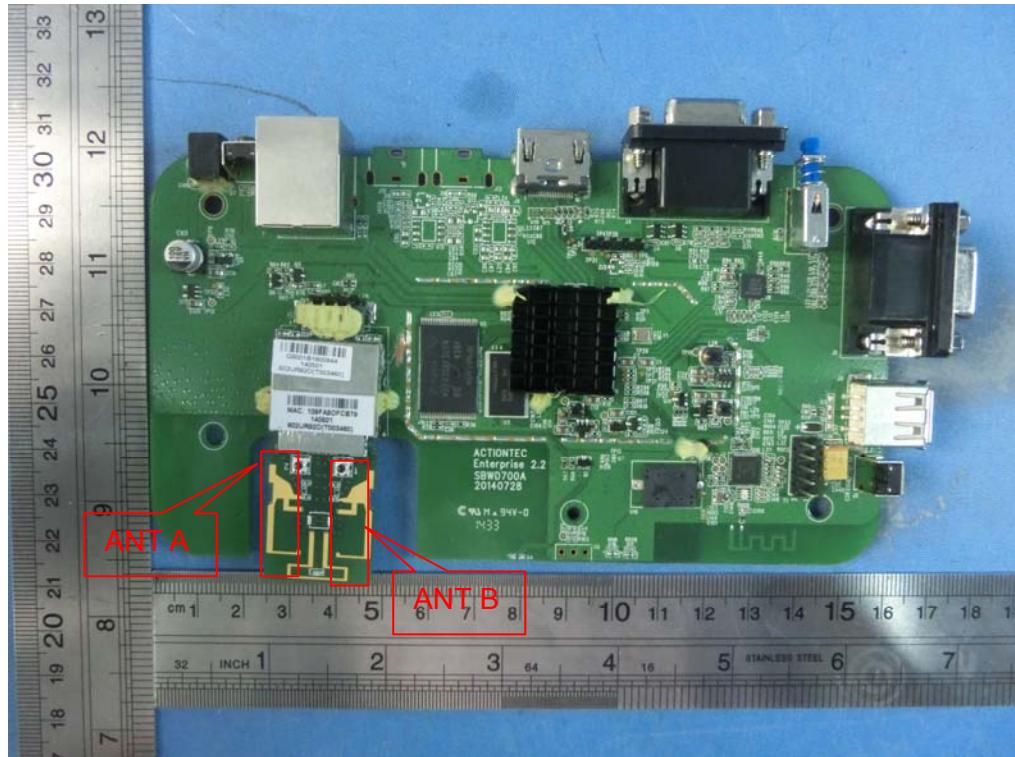
802.11a/n(20)Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	38	5190	40	5200	42	5210
44	5220	46	5230	48	5240	-	-

802.11n (BW40MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	40	5200	42	5210	44	5220
46	5230	-	-	-	-	-	-

3.

Table for Filed Antenna

Brand	Model Name	Antenna Type	Gain (dBi)	NOTE
N/A	N/A	PCB antenna	2.4G:3.6	Wifi Antenna
N/A	N/A	PCB antenna	5G:3.2	Wifi Antenna



The Control software(tool_WIFI.exe) can control antenna A B ,

For 2.4GHz mode, antenna A B are transmitting,two antennas simultaneously transmit.

And the data is recorded for radiated emission and band edge.

For 5GHz mode,antenna A B are transmitting Two antennas simultaneously transmit.

And the data is recorded for radiated emission, and band edge.

For MIMO mode , Directional gain=GANT +10log(N)dbi =6.61dbi in 2.4GHz

Directional gain=GANT +10log(N)dbi =6.21dbi in 5GHz

802.11a/b/g/n 2.4GHz & 5GHz has MIMO mode.

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11a /n CH36/ CH40/ CH 48
Mode 2	802.11n38/ CH 46
Mode 3	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 3	Link Mode

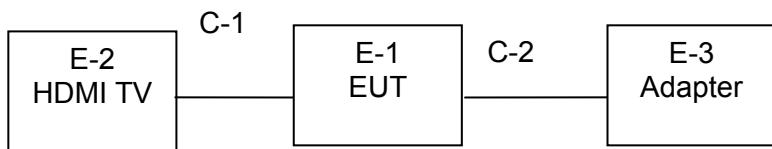
For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11a /n CH36/ CH40/ CH 48
Mode 2	802.11n38/ CH 46
Mode 3	Link Mode

Note:

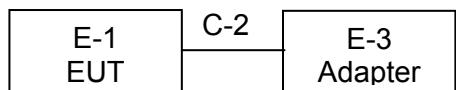
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	ScreenBeam Enterprise Wireless Display Receiver	Actiontec	SBWD700A	N/A	EUT
E-2	TV	SONY	KDL-24EX520	N/A	
E-3	Adapter	Actiontec	WA-10P05FU	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	100cm	
C-2	NO	NO	80cm	

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY4510840	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2014.06.07	2015.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.07	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2014.06.07	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2013.12.22	2014.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.07	2015.06.06	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2014.07.06	2015.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2014.06.07	2015.06.06	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.07	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.07	2015.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2014.06.07	2015.06.06	1 year

1	Attenuation	MCE	24-10-34	BN9258	2014.06.07	2015.06.06	1 year
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3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

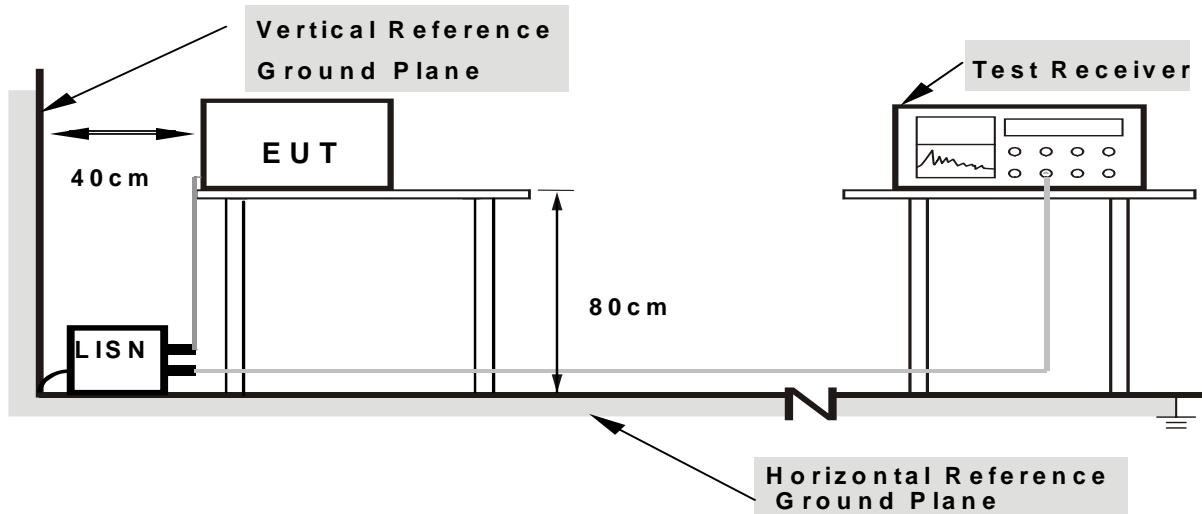
3.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

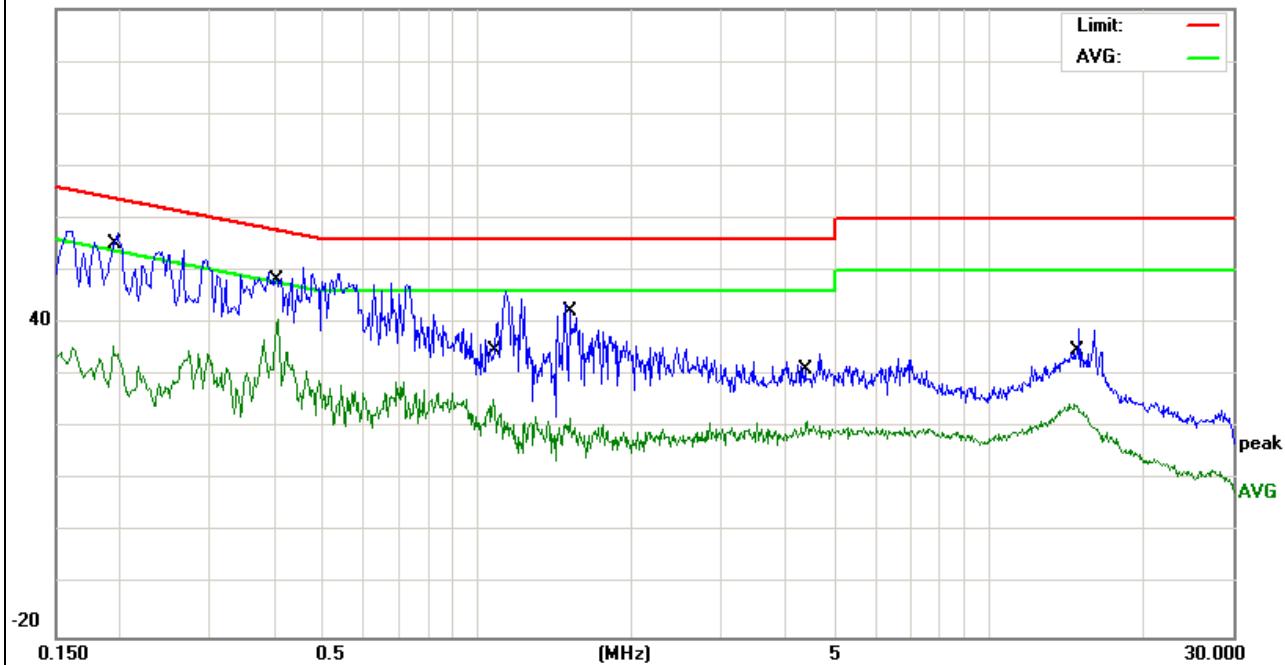
3.1.6 TEST RESULTS

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name. :	SBWD700A
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 5V From adapter AC120V/60Hz	Test Mode :	Mode 3

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V)	Limits (dB μ V)	Margin (dB)	Remark
0.1940	45.61	9.51	55.12	63.86	-8.74	QP
0.1940	26.24	9.51	35.75	53.86	-18.11	AVG
0.4061	38.58	9.50	48.08	57.73	-9.65	QP
0.4061	31.18	9.50	40.68	47.73	-7.05	AVG
1.0740	23.77	9.53	33.30	56.00	-22.70	QP
1.0740	15.86	9.53	25.39	46.00	-20.61	AVG
1.5180	32.56	9.54	42.10	56.00	-13.90	QP
1.5180	12.32	9.54	21.86	46.00	-24.14	AVG
4.4218	19.65	9.60	29.25	56.00	-26.75	QP
4.4218	11.62	9.60	21.22	46.00	-24.78	AVG
14.7096	24.59	9.83	34.42	60.00	-25.58	QP
14.7096	14.78	9.83	24.61	50.00	-25.39	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

100.0 dB μ V

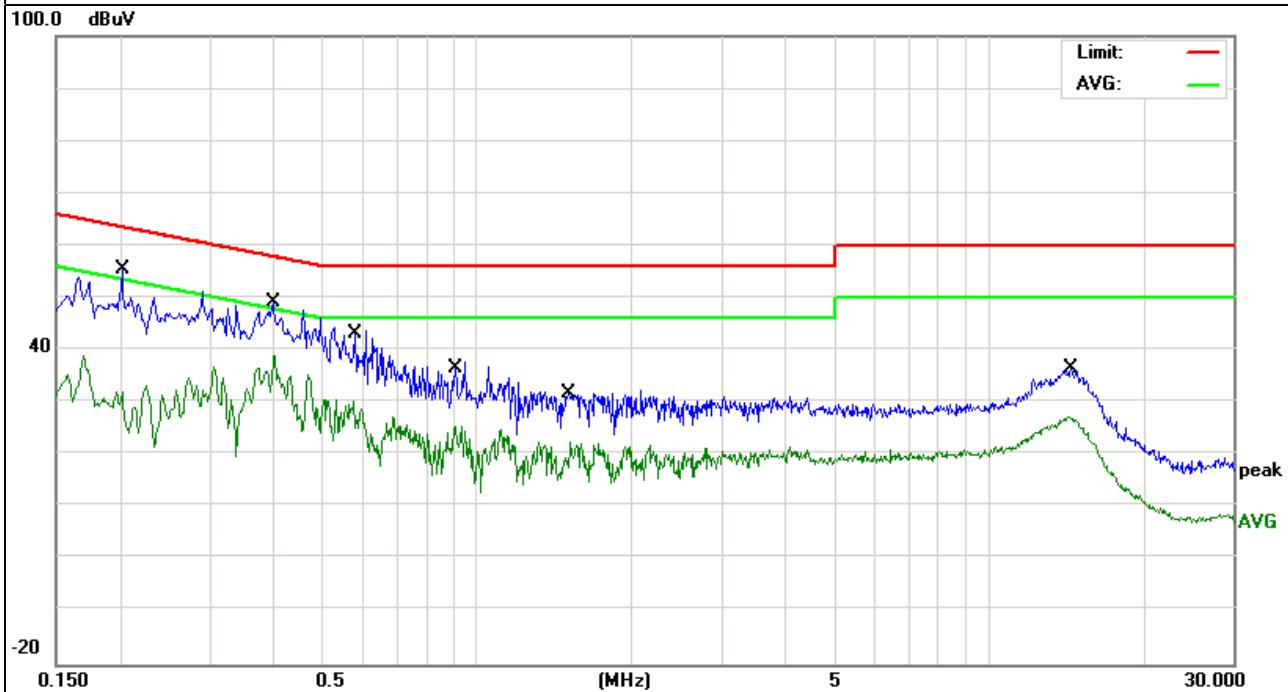
EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name. :	SBWD700A
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 5V From adapter AC120V/60Hz	Test Mode :	Mode 3

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V)	Limits (dB μ V)	Margin (dB)	Remark
0.2020	45.86	9.49	55.35	63.52	-8.17	QP
0.2020	22.68	9.49	32.17	53.52	-21.35	AVG
0.3996	38.39	9.50	47.89	57.86	-9.97	QP
0.3996	29.48	9.50	38.98	47.86	-8.88	AVG
0.5735	29.81	9.51	39.32	56.00	-16.68	QP
0.5735	20.69	9.51	30.20	46.00	-15.80	AVG
0.9060	26.93	9.53	36.46	56.00	-19.54	QP
0.9060	16.04	9.53	25.57	46.00	-20.43	AVG
1.5260	21.69	9.54	31.23	56.00	-24.77	QP
1.5260	12.93	9.54	22.47	46.00	-23.53	AVG
14.4298	25.91	9.83	35.74	60.00	-24.26	QP
14.4298	17.50	9.83	27.33	50.00	-22.67	AVG

Remark:

1. All readings are Quasi-Peak and Average values.

2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

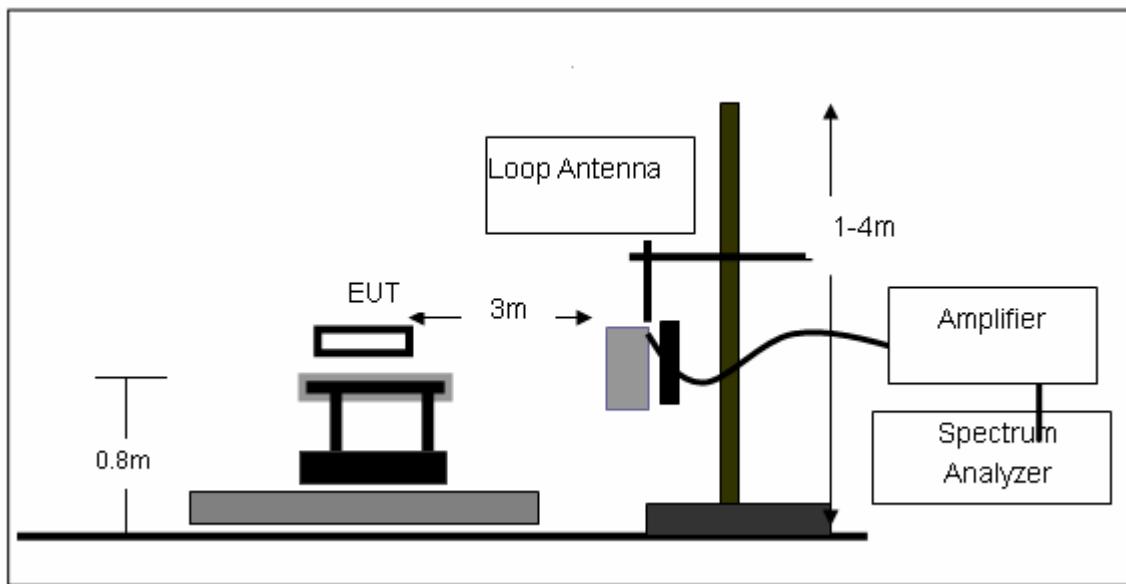
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

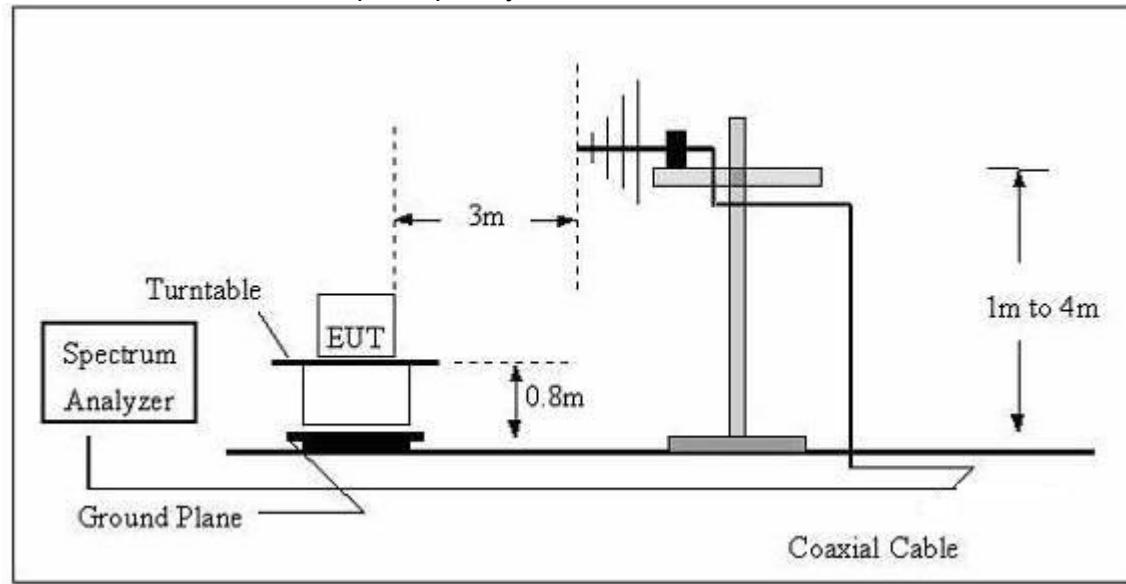
No deviation

3.2.4 TEST SETUP

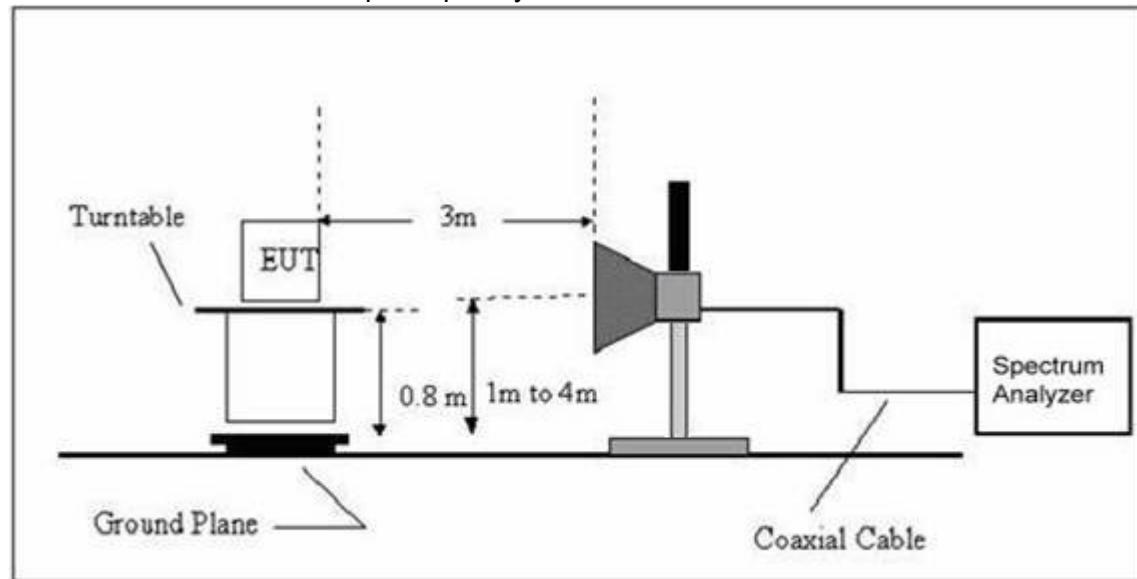
(A) Radiated Emission Test-Up Frequency Below 30MHz



(B) Radiated Emission Test-Up Frequency 30MHz~1GHz



(C) Radiated Emission Test-Up Frequency Above 1GHz

**3.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	ScreenBeam Enterprise Wireless Display Receiver	Model Name. :	SBWD700A
Temperature:	20 °C	Relative Humidity:	48%
Pressure:	1010 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);

Limit line = specific limits(dBuV) + distance extrapolation factor.

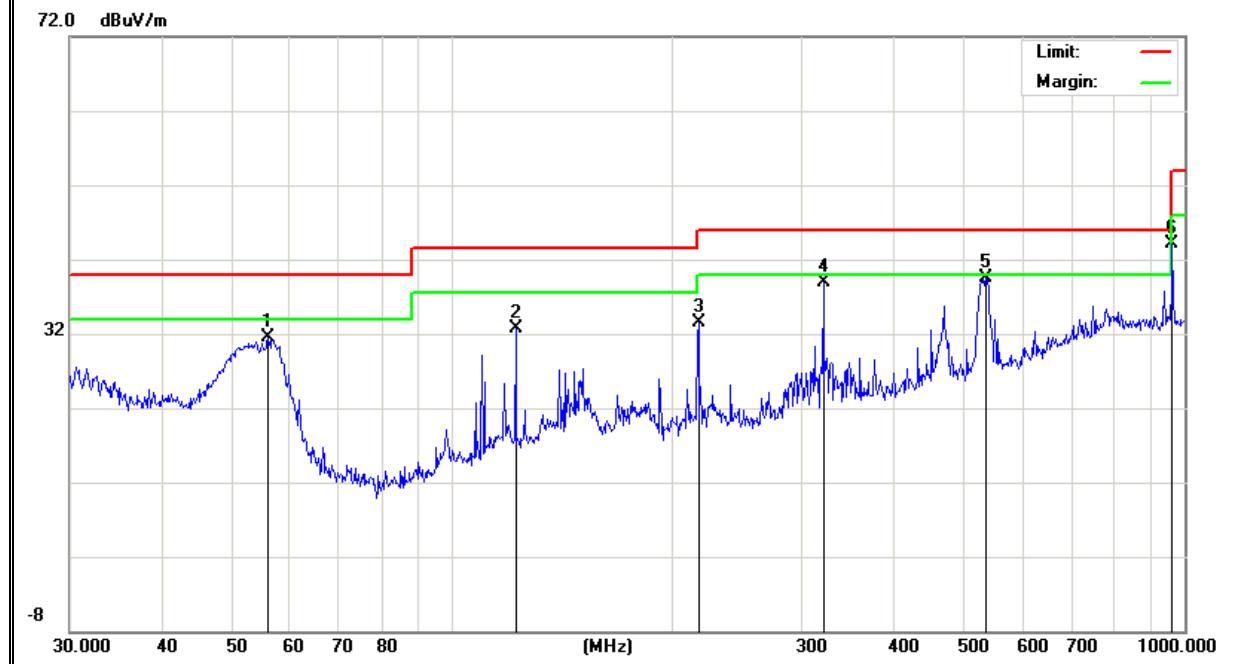
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX (5.0G)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	56.0007	22.44	8.97	31.41	40.00	-8.59	QP
V	121.9753	20.63	12.06	32.69	43.50	-10.81	QP
V	216.7828	21.56	11.91	33.47	46.00	-12.53	QP
V	321.0605	23.95	15.03	38.98	46.00	-7.02	QP
V	535.7073	18.53	21.04	39.57	46.00	-6.43	QP
V	962.1621	16.65	27.38	44.03	54.00	-9.97	QP

Remark:

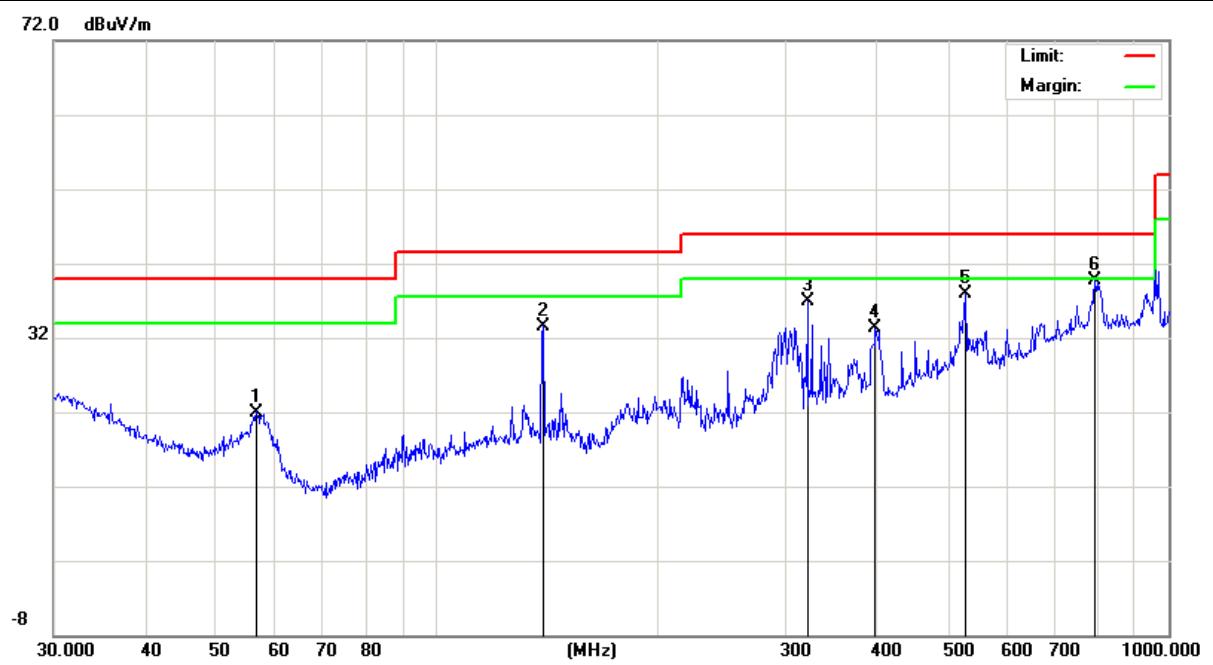
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	56.7916	13.25	8.75	22.00	40.00	-18.00	QP
H	139.8505	22.18	11.42	33.60	43.50	-9.90	QP
H	321.0605	21.90	15.03	36.93	46.00	-9.07	QP
H	397.6333	15.01	18.21	33.22	46.00	-12.78	QP
H	528.2458	17.12	20.88	38.00	46.00	-8.00	QP
H	793.3958	12.54	27.24	39.78	46.00	-6.22	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX (5.0G)		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G							
Vertical	10360.000	37.98	13.09	51.07	74	-22.93	Pk
Vertical	15540.000	34.04	15.16	49.2	74	-24.8	Pk
Horizontal	10360.000	36.36	13.09	49.45	74	-24.55	Pk
Horizontal	15540.000	32.78	15.16	47.94	74	-26.06	Pk
middle Channel (5200 MHz)-Above 1G							
Vertical	10400.000	36.25	13.11	49.36	74	-24.64	Pk
Vertical	15600.000	34.89	15.19	50.08	74	-23.92	Pk
Horizontal	10400.000	34.21	13.11	47.32	74	-26.68	Pk
Horizontal	15600.000	33.13	15.19	48.32	74	-25.68	Pk
High Channel (5240 MHz)-Above 1G							
Vertical	10480.000	37.89	13.19	51.08	74	-22.92	Pk
Vertical	15720.00	33.57	15.25	48.82	74	-25.18	Pk
Horizontal	10480.000	36.13	13.19	49.32	74	-24.68	Pk
Horizontal	15720.00	32.67	15.34	48.01	74	-25.99	Pk

Note: "802.11a(5G)" mode is the worst mode. When PK value is lower than the Average value limit, average didn't record.

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to IC RSS-210 §A9.2:

5150-5250MHz the maximum e.i.r.p. shall not exceed 200 mW or $10 + 10 \log_{10} B$, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

4.1.1 TEST PROCEDURE

- (i) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- (ii) Set RBW = 1 MHz.
- (iii) Set VBW ≥ 3 MHz.
- (iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, so that narrowband signals are not lost between frequency bins.)
- (v) Sweep time = auto.
- (vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- (vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
- (viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- (ix) Compute power by integrating the spectrum across the 26 dB EBW of the signal using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges. If the spectrum analyzer does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW of the spectrum.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

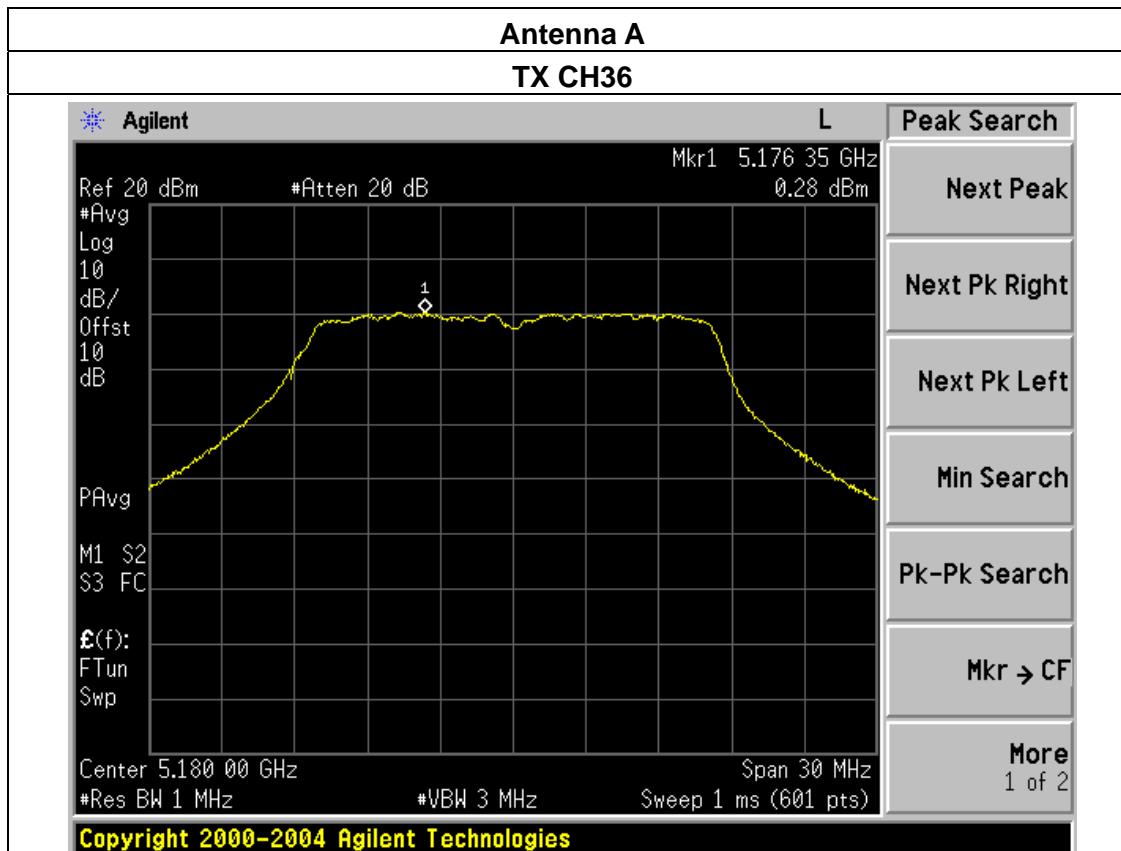
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

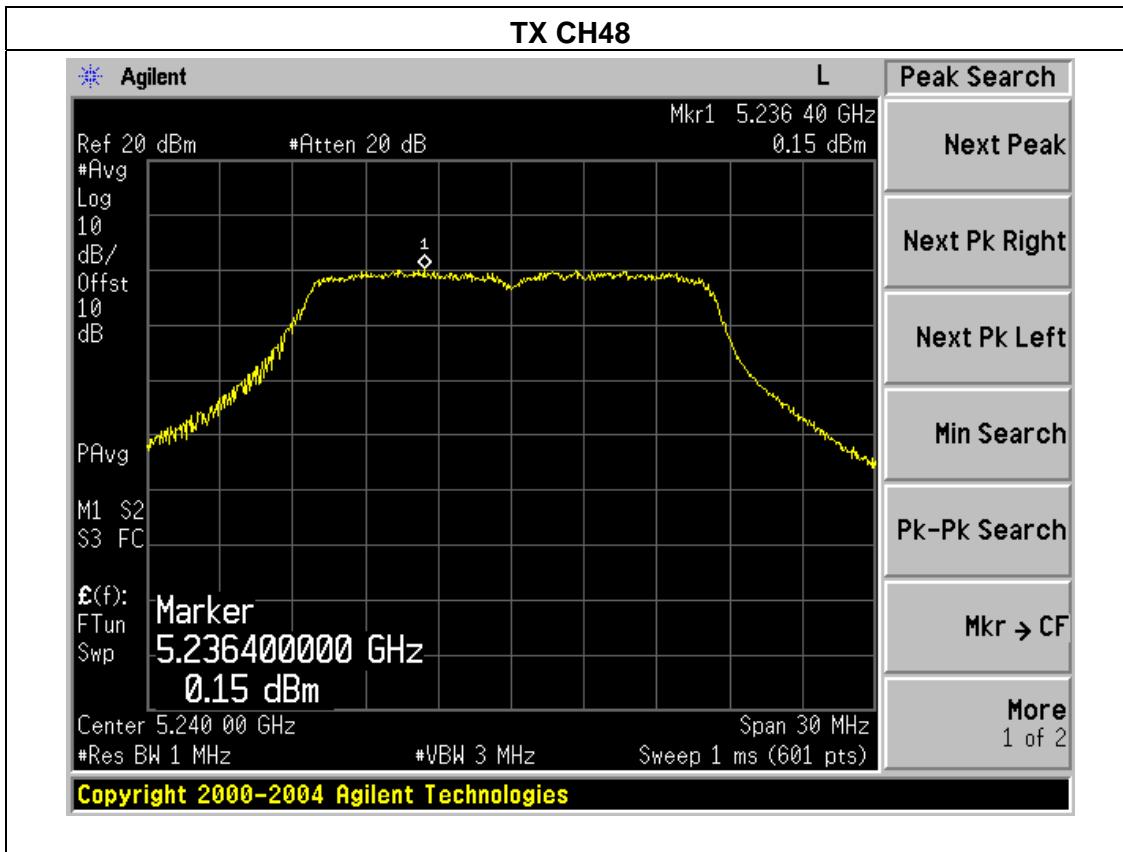
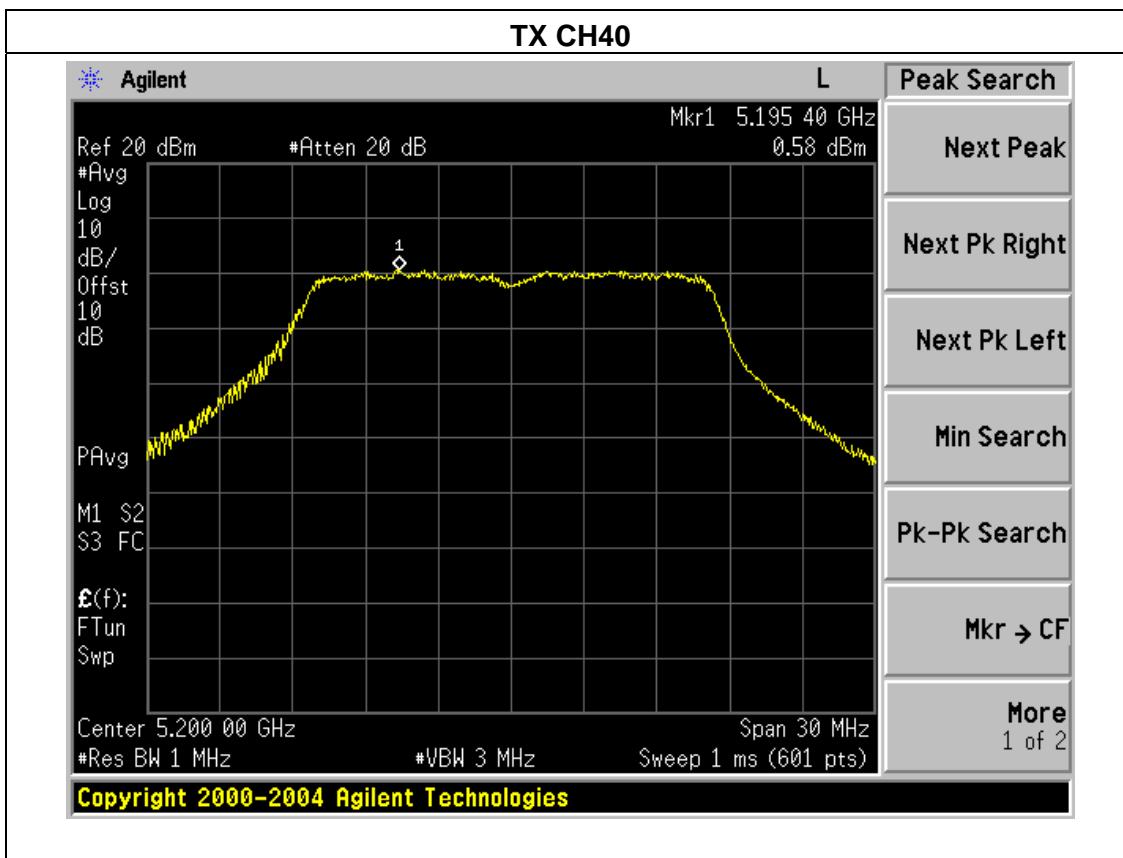
4.1.5 TEST RESULTS

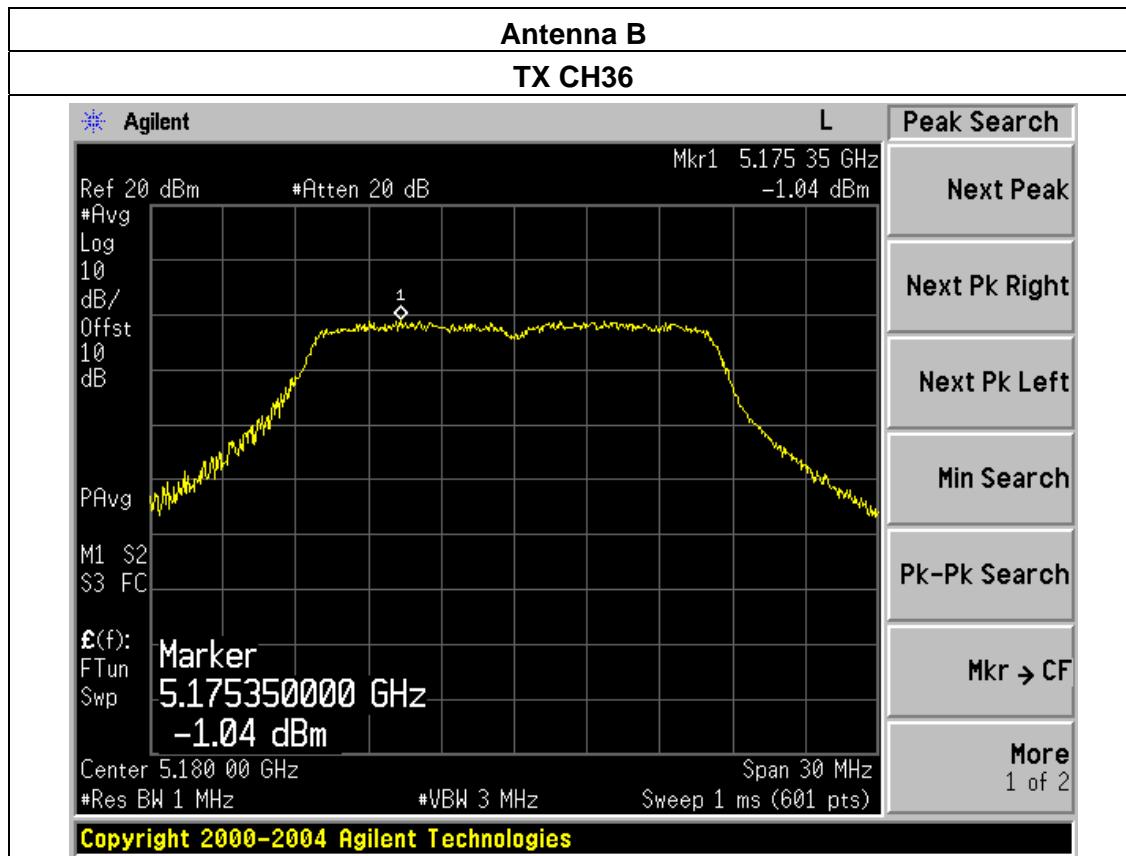
EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX a Mode /CH36, CH40, CH48		

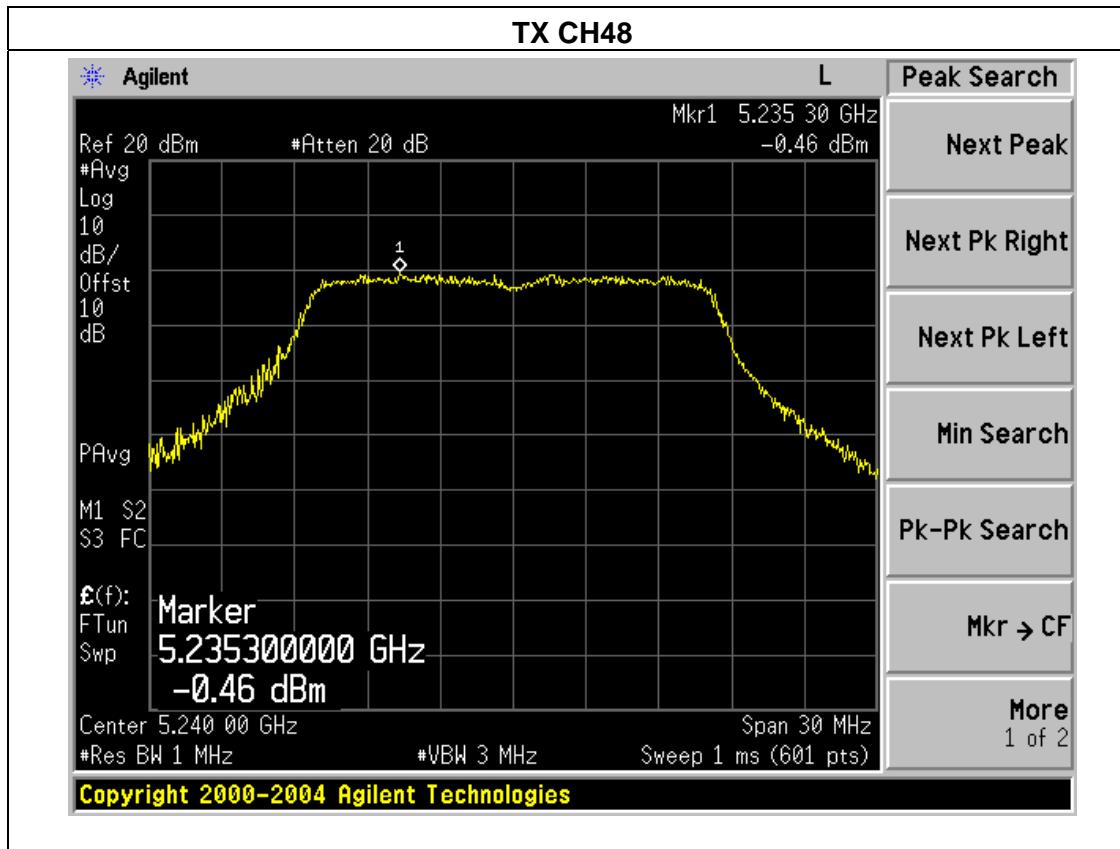
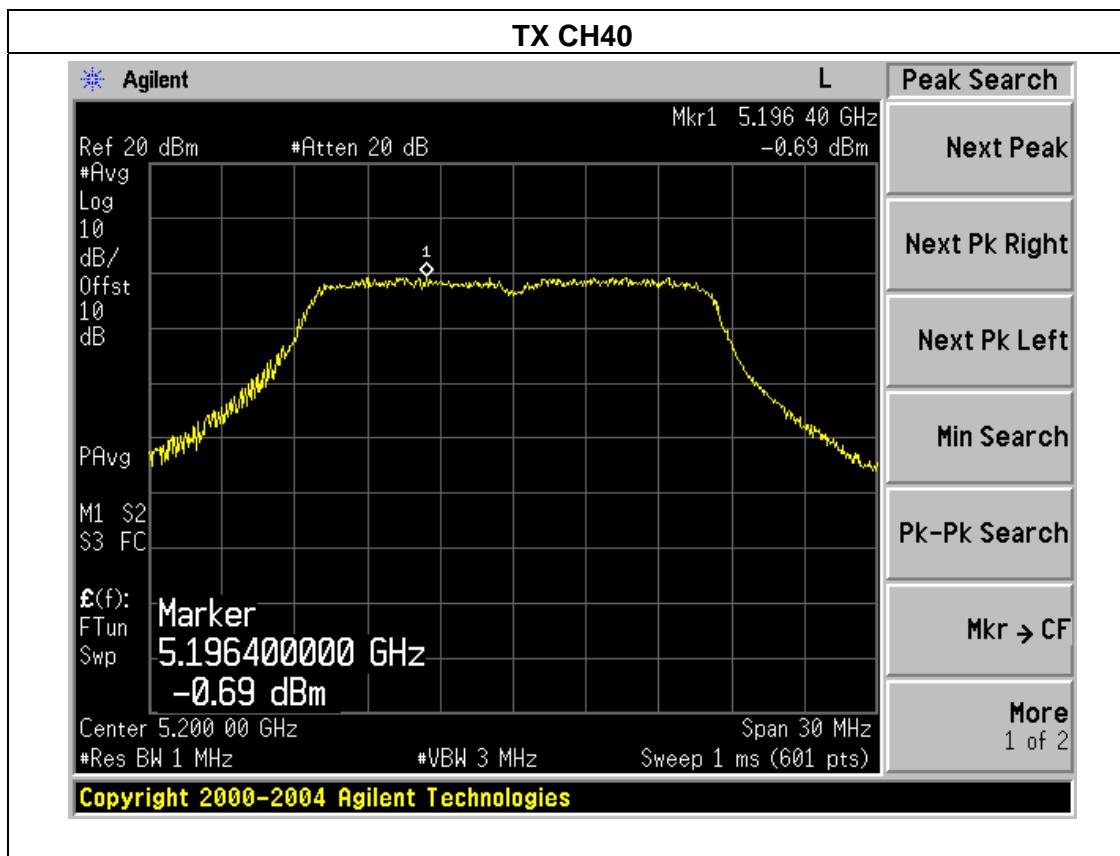
Frequency	Power Density A (dBm)	Power Density B (dBm)	total power density (dBm)	Limit (dBm)	Result
5180 MHz	0.28	-1.04	2.68	3.79	PASS
5200 MHz	0.58	-0.69	2.83	3.79	PASS
5240 MHz	0.15	-0.46	2.87	3.79	PASS

The antenna gain of 5 GHz is 6.21 dBi; therefore, the power spectral density limit is reduced by 0.21 dB.





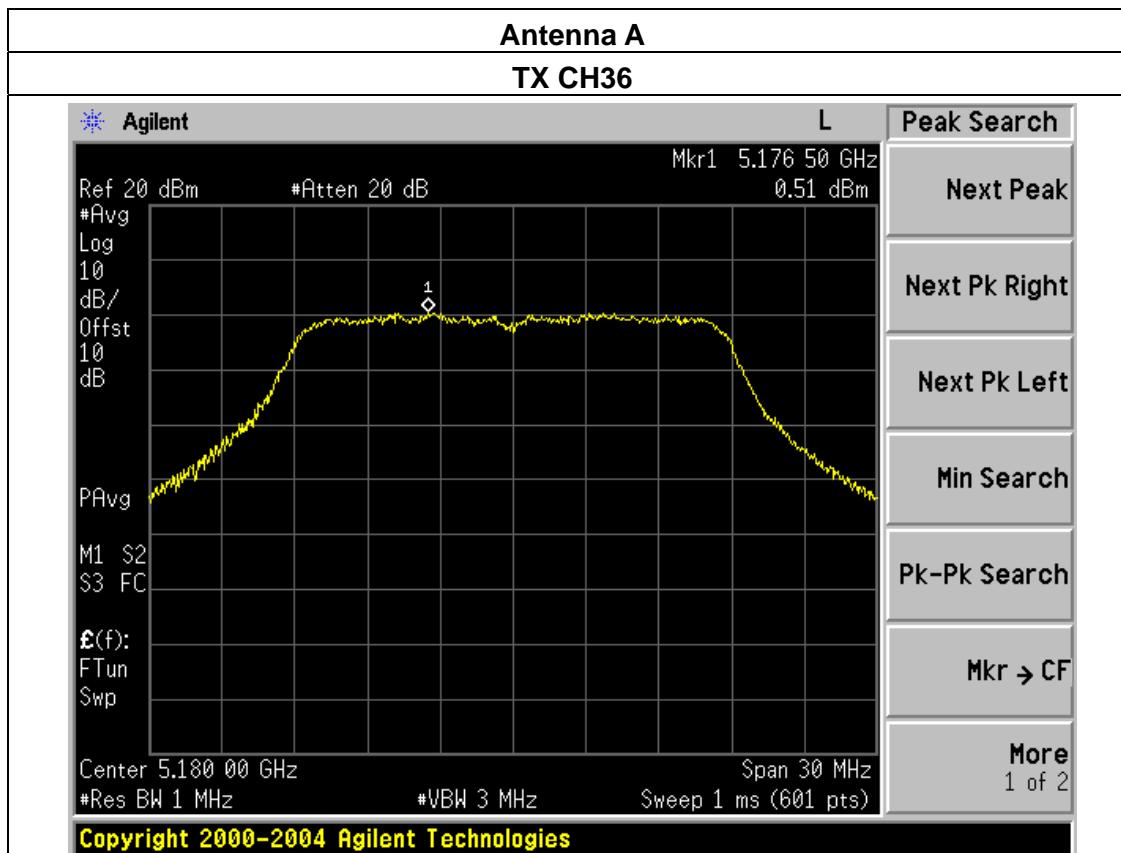


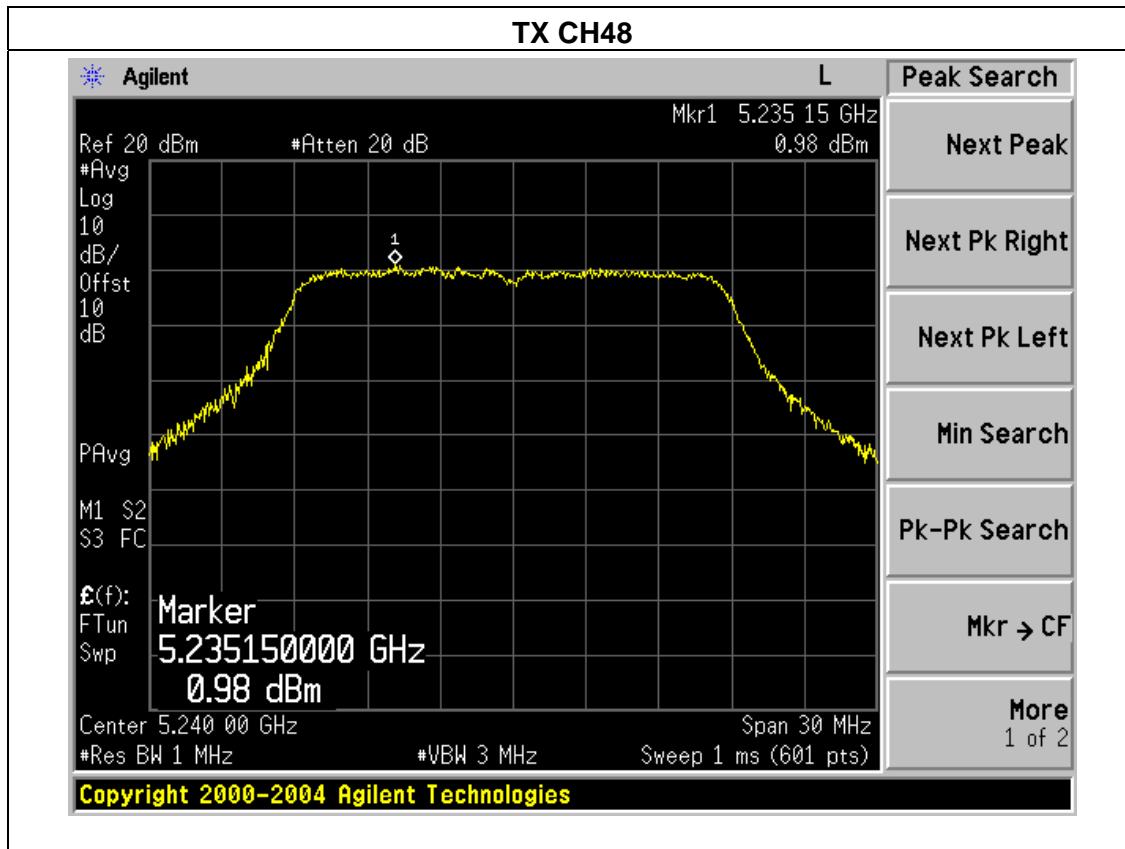
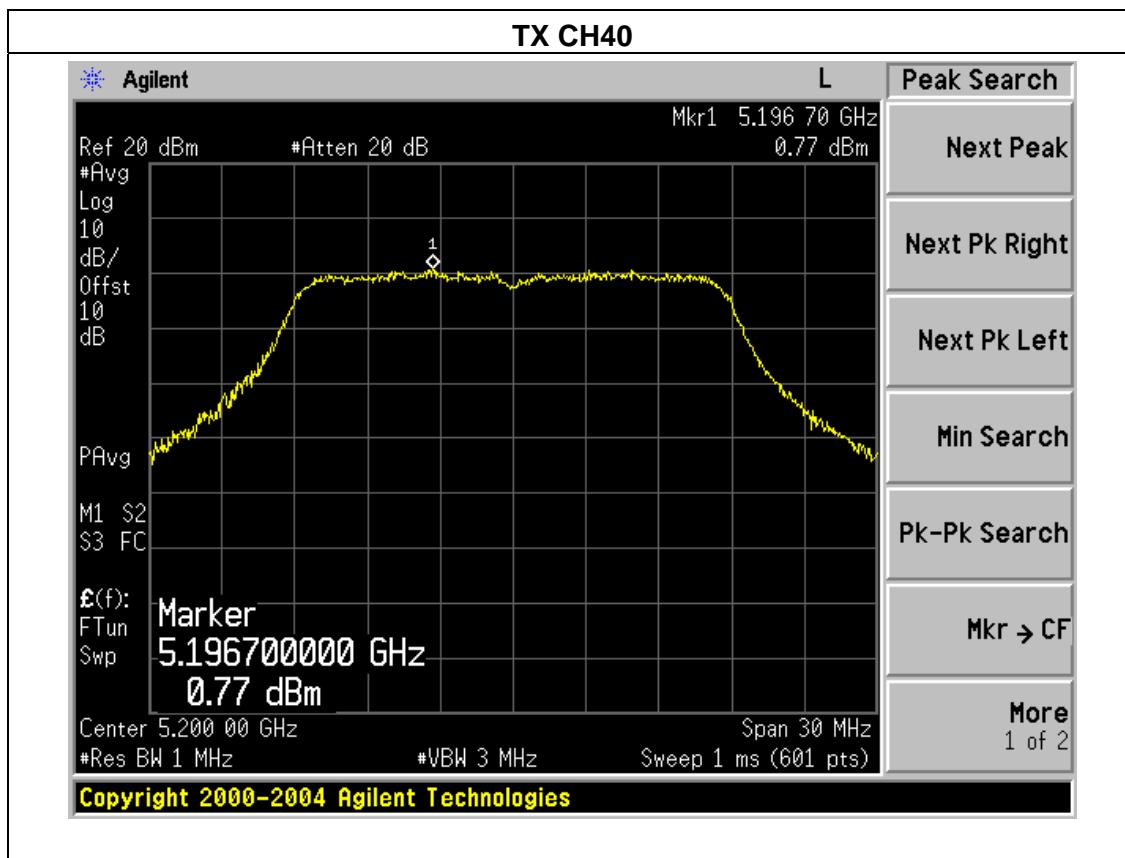


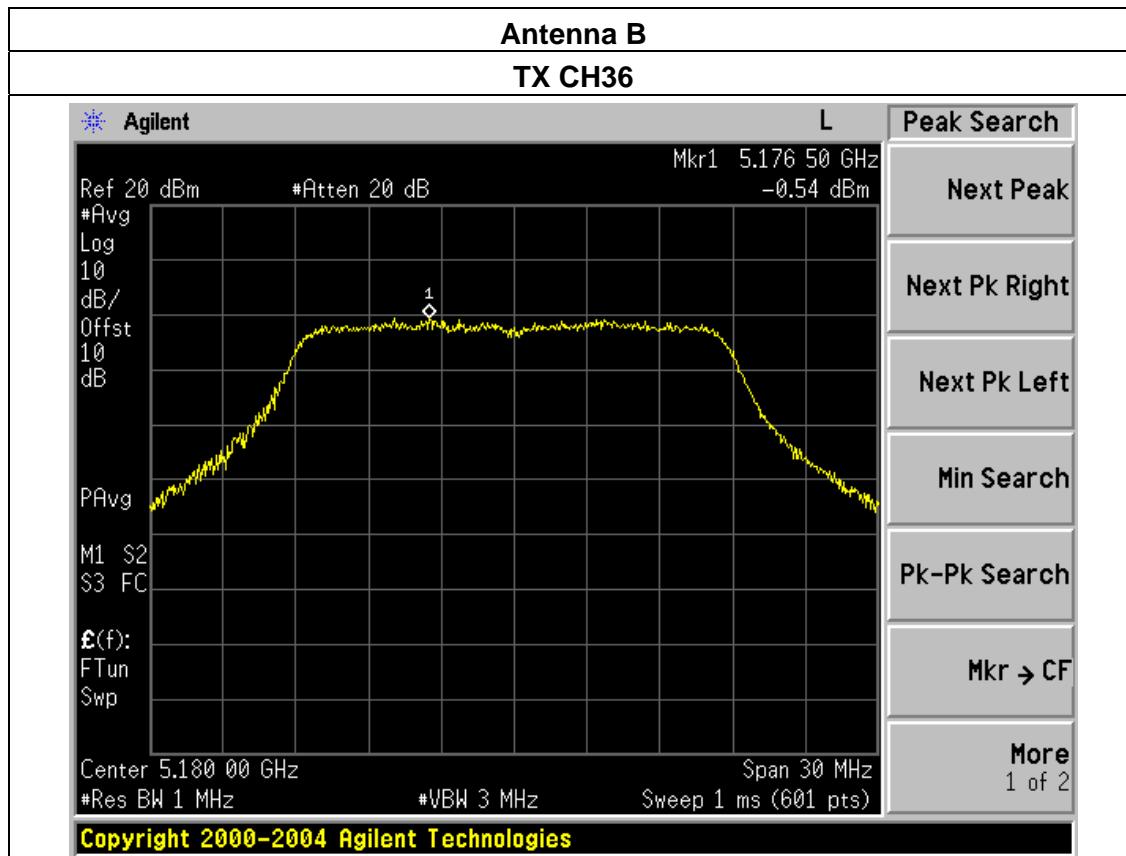
EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX n(20) Mode(5G) /CH36, CH40, CH48		

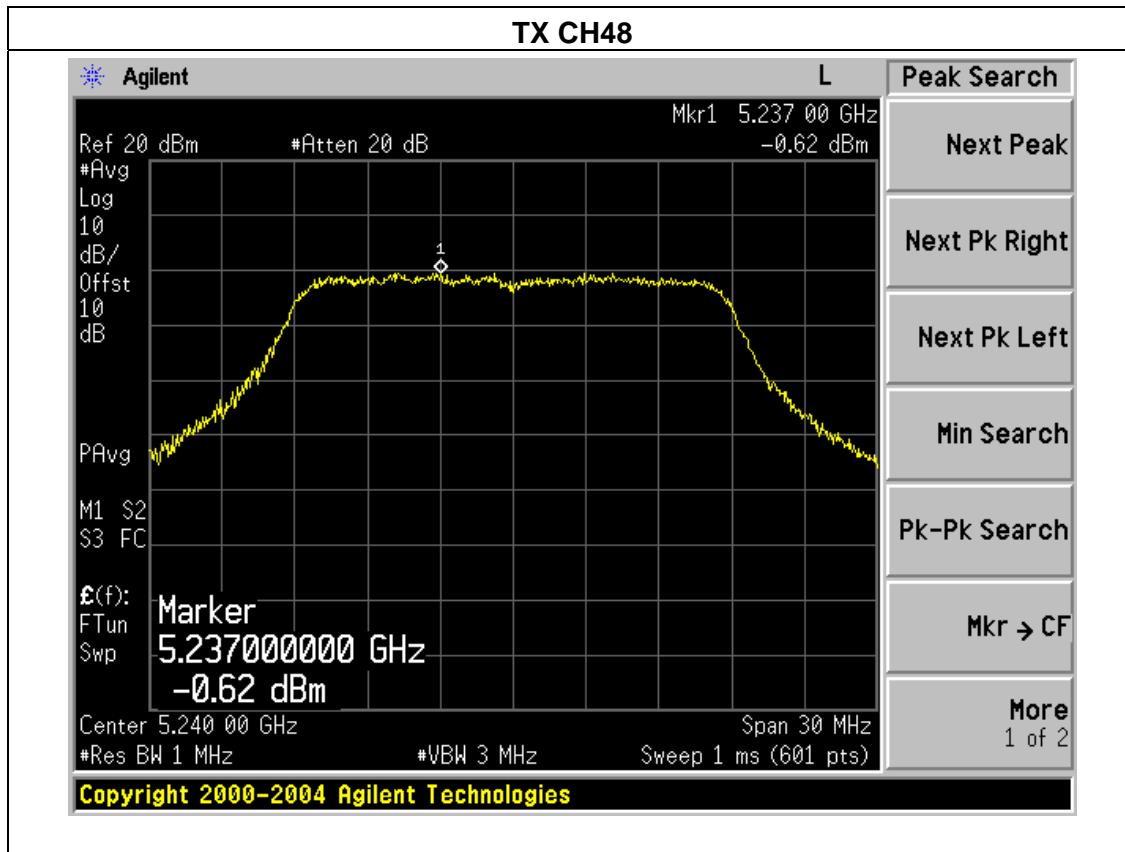
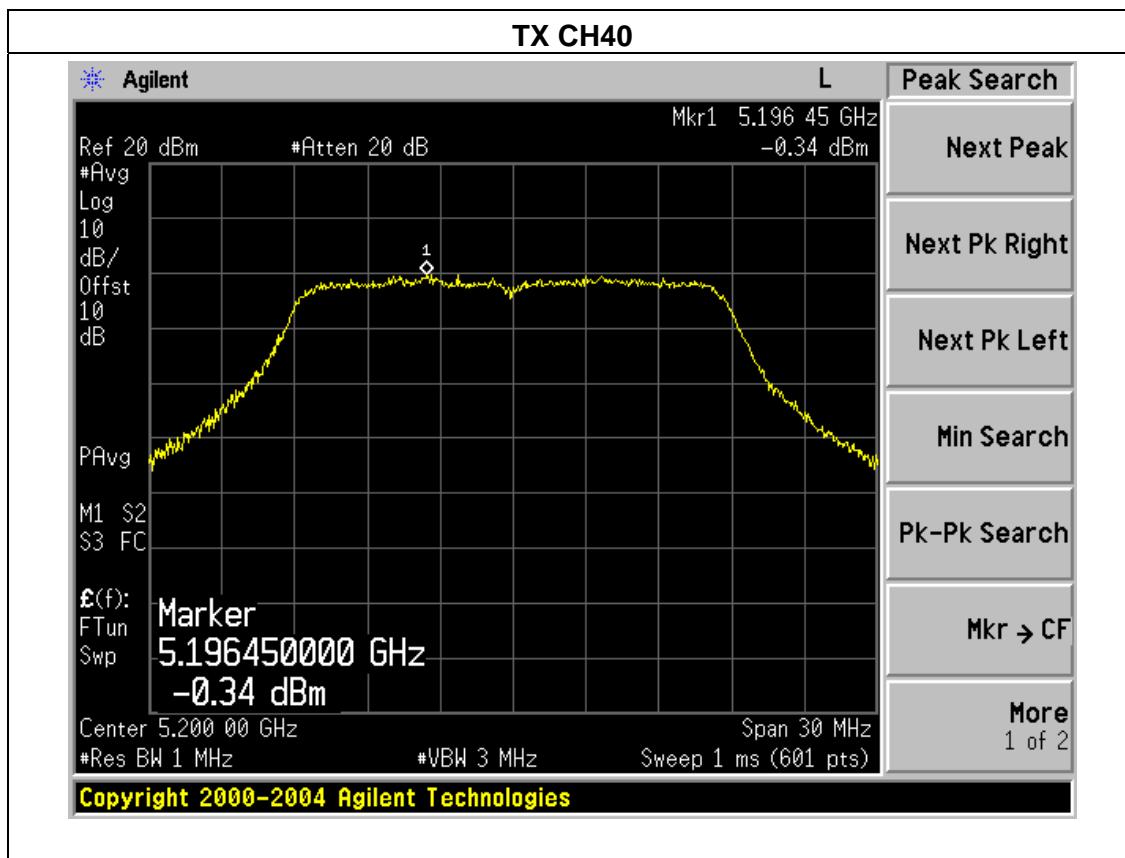
Frequency	Power Density A (dBm)	Power Density B (dBm)	total power density (dBm)	Limit (dBm)	Result
5180 MHz	0.51	-0.54	3.03	3.79	PASS
5200 MHz	0.77	-0.34	3.12	3.79	PASS
5240 MHz	0.98	-0.62	3.26	3.79	PASS

The antenna gain of 5 GHz is 6.21 dBi; therefore, the power spectral density limit is reduced by 0.21 dB





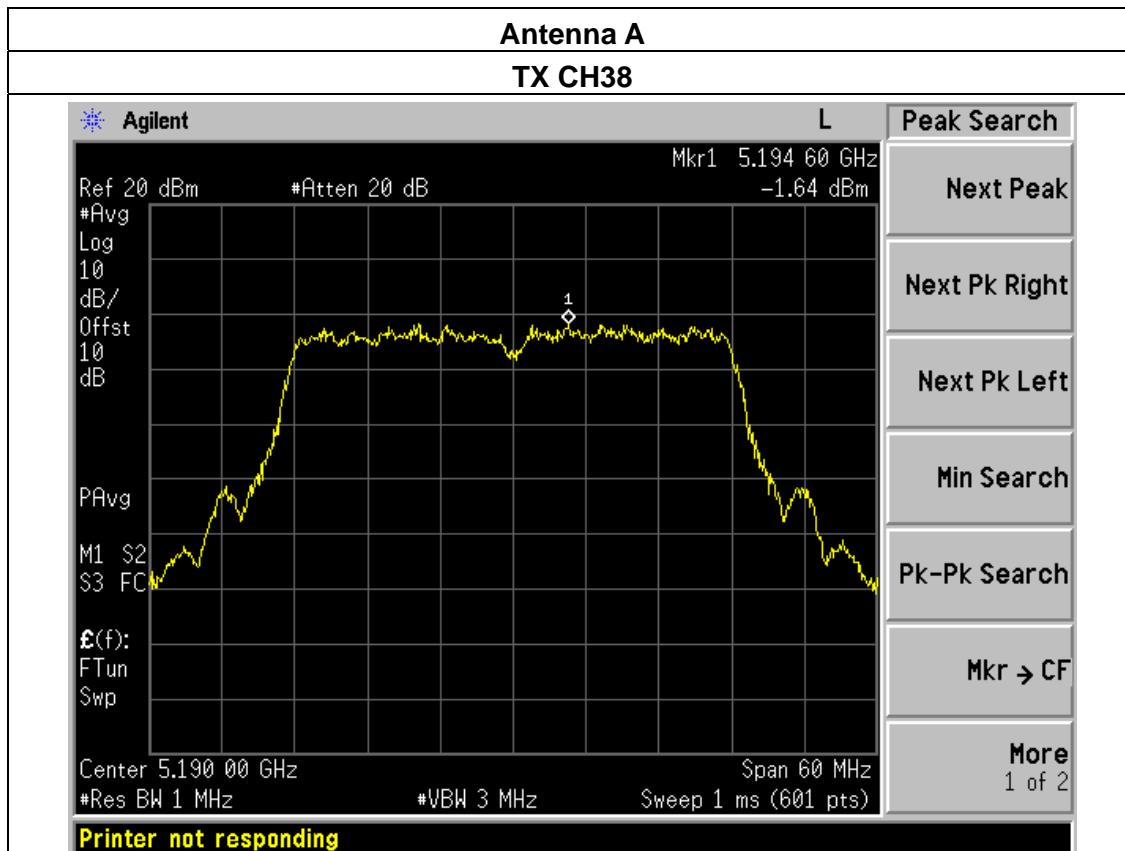


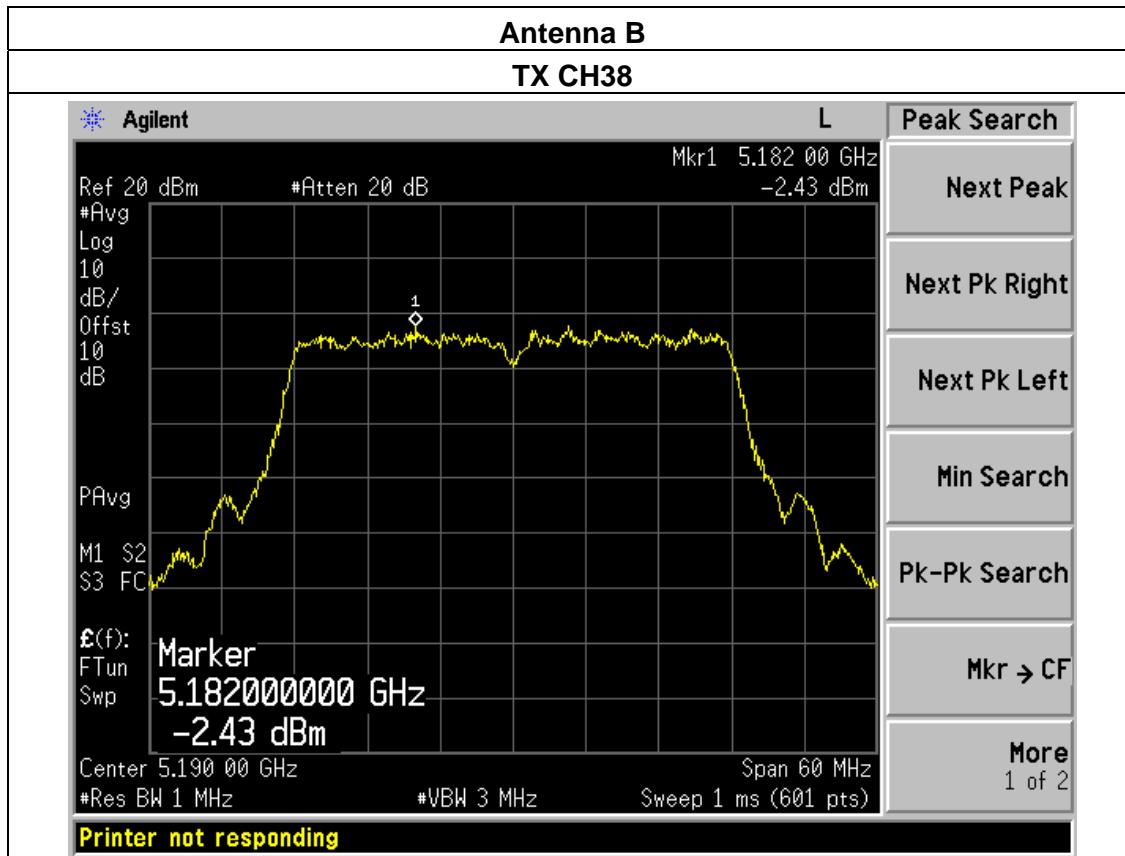
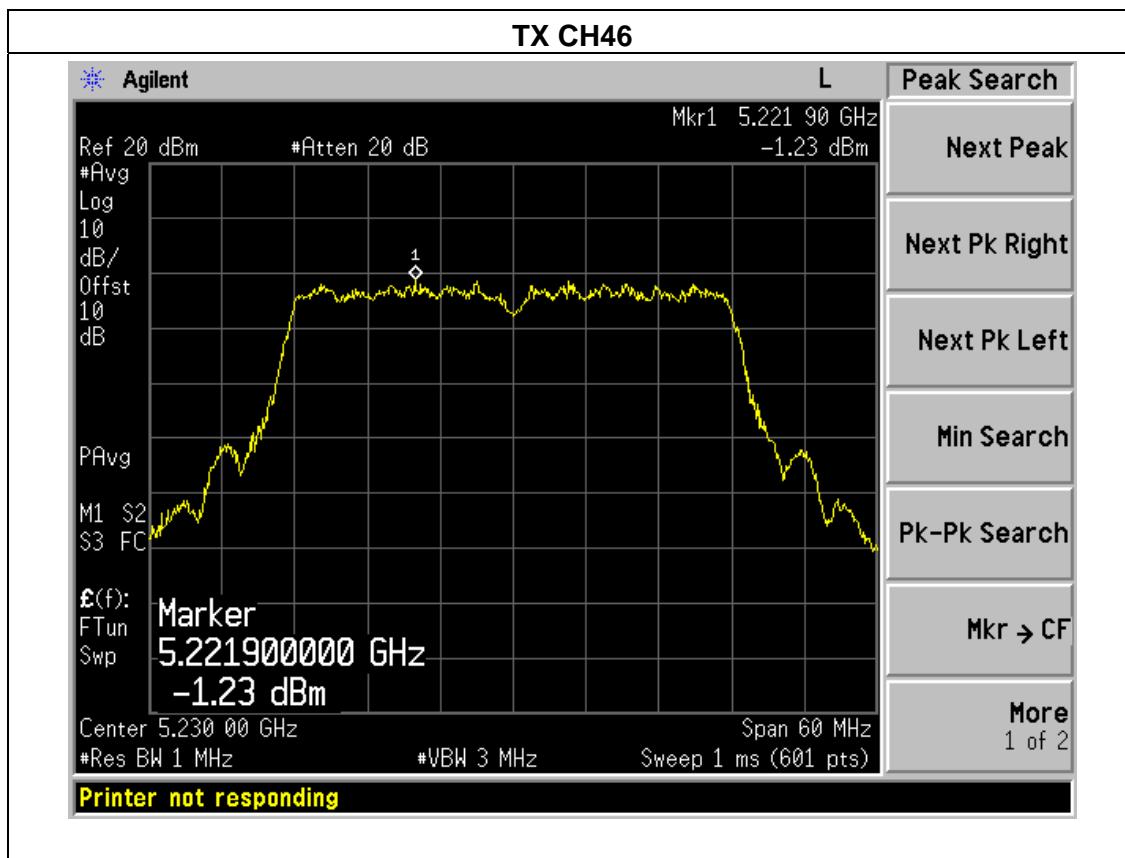


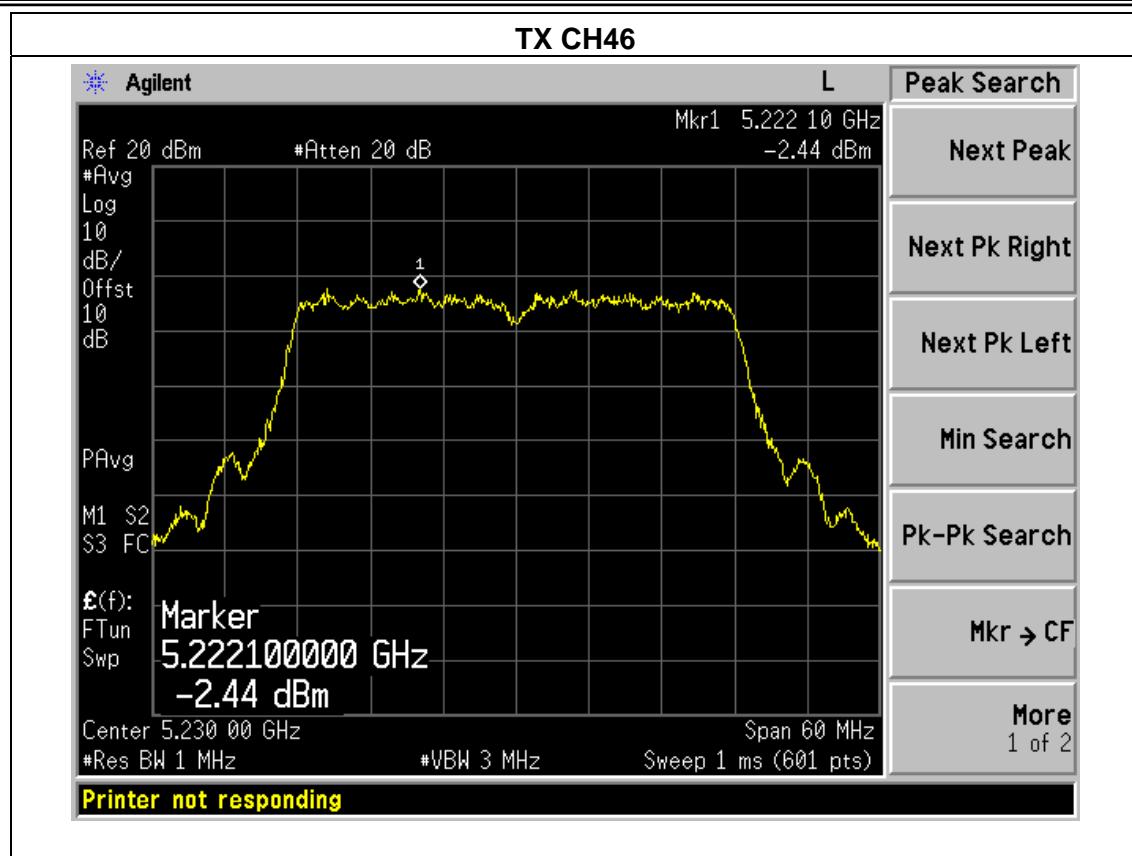
EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX n40 Mode(5G) /CH38, CH46		

Frequency	Power Density A (dBm)	Power Density B (dBm)	total power density (dBm)	Limit (dBm)	Result
5190 MHz	-1.64	-2.43	0.99	3.79	PASS
5230 MHz	-1.23	-2.44	0.99	3.79	PASS

The antenna gain of 5 GHz is 6.21 dBi; therefore, the power spectral density limit is reduced by 0.21 dB







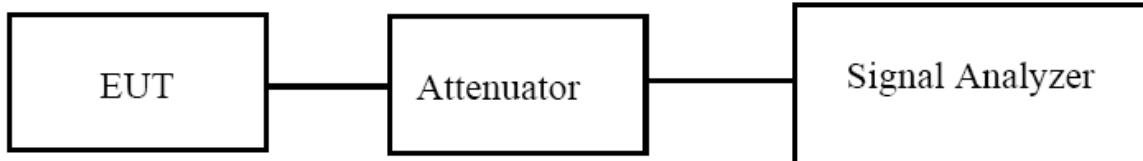
5. 26 DB & 99% EMISSION BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.407) , Subpart E			
Section	Test Item	Limit	Result
15.407(a)	Bandwidth	>= 500KHz (26dB bandwidth)	PASS

5.1.1 TEST PROCEDURE

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.



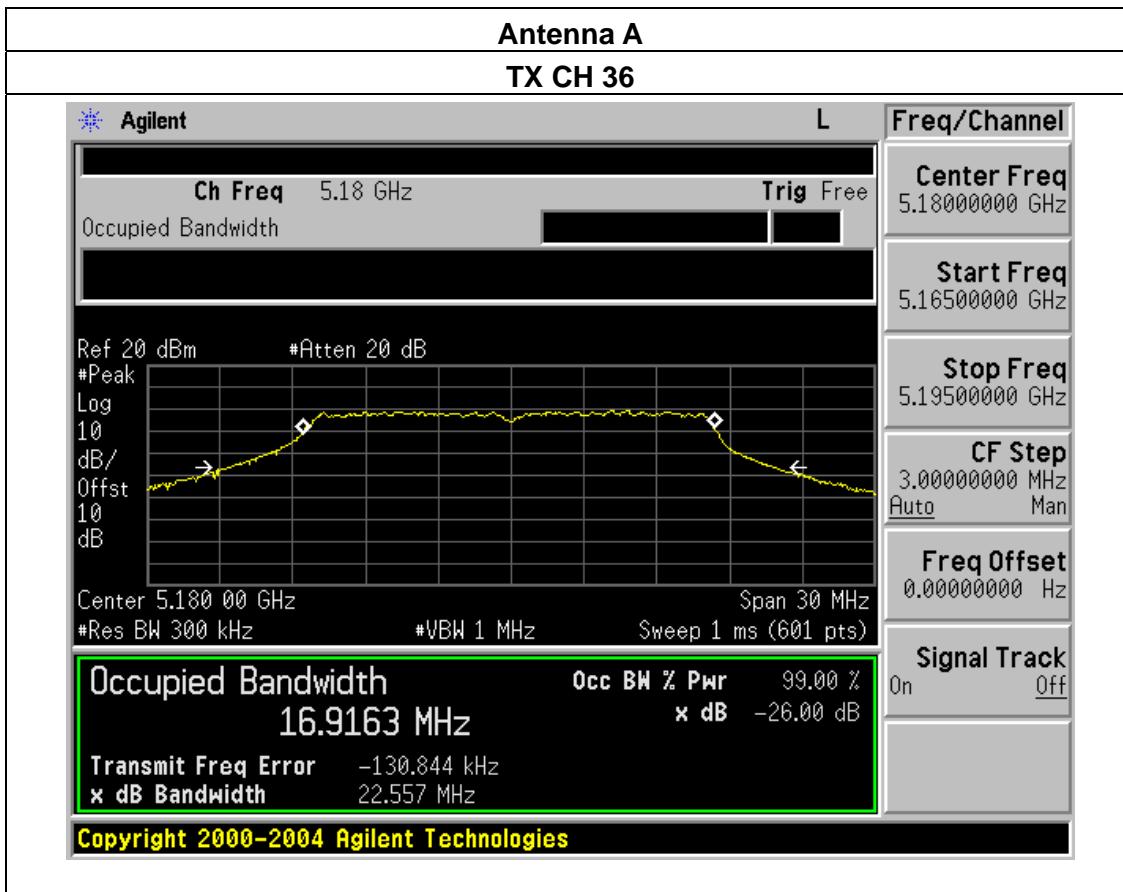
5.1.2 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

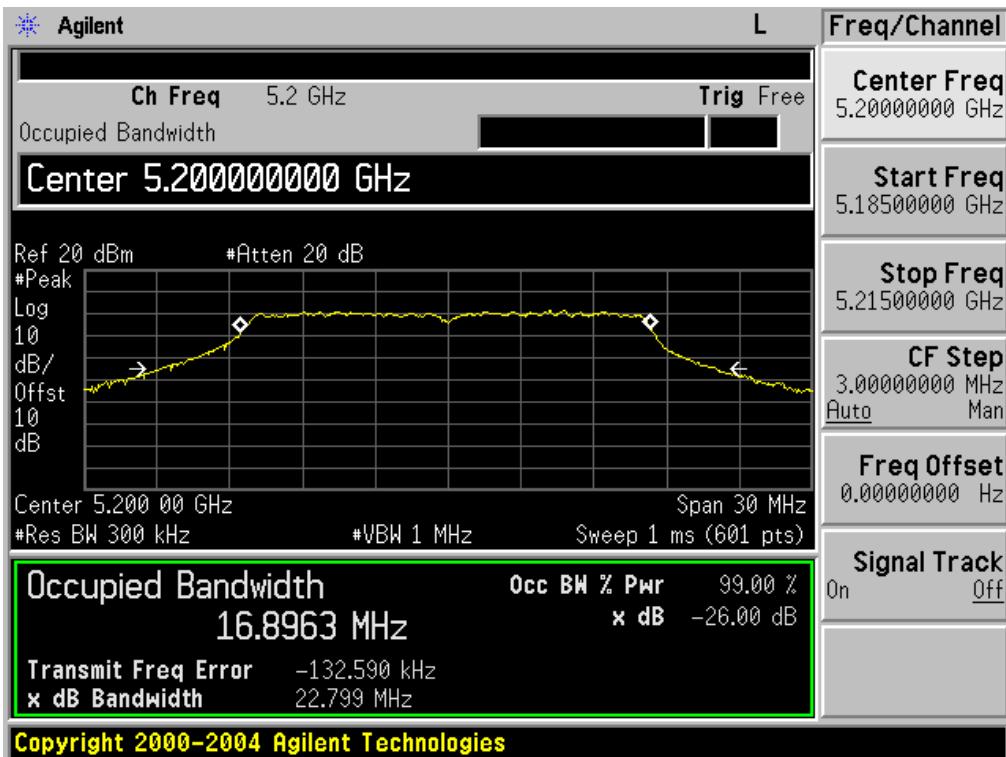
5.1.3 TEST RESULTS

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX a Mode /CH36, CH40, CH48		

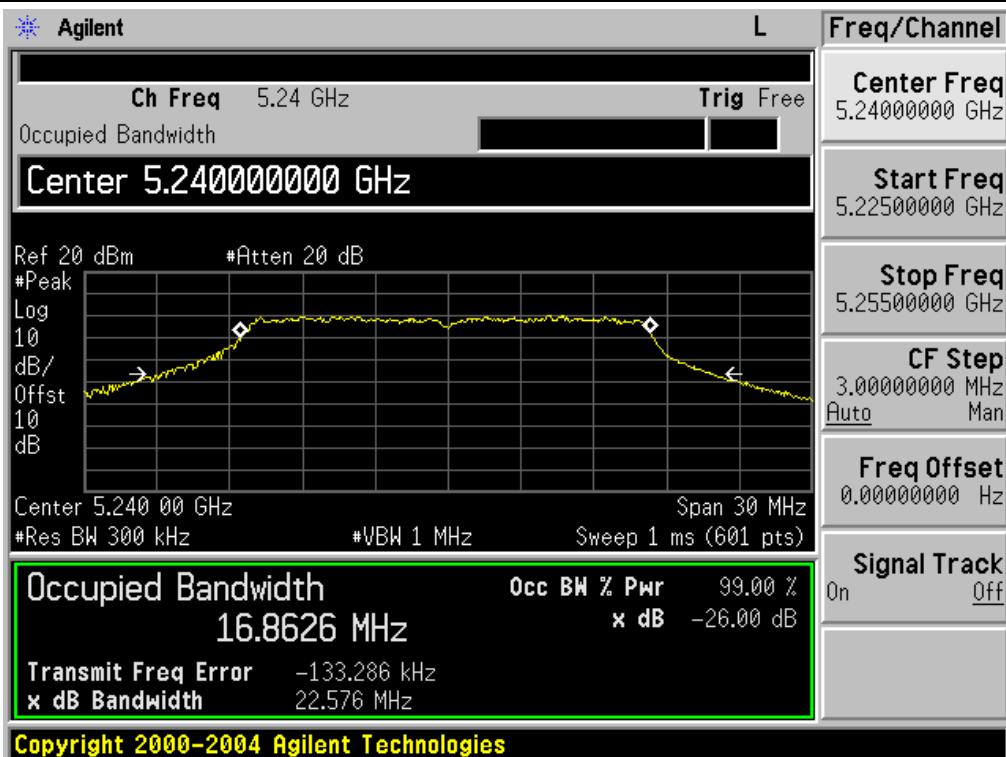
Channel	Frequency (MHz)	99% bandwidth (MHz)ANT A	99% bandwidth (MHz)ANT B	26dB bandwidth (MHz)ANT A	26dB bandwidth (MHz)ANT B	Limit (kHz)	Result
802.11a mode							
Low	5180	16.916	16.806	22.557	22.405	500	Pass
Middle	5200	16.896	16.843	22.799	22.219	500	Pass
High	5240	16.863	16.883	22.576	22.309	500	Pass

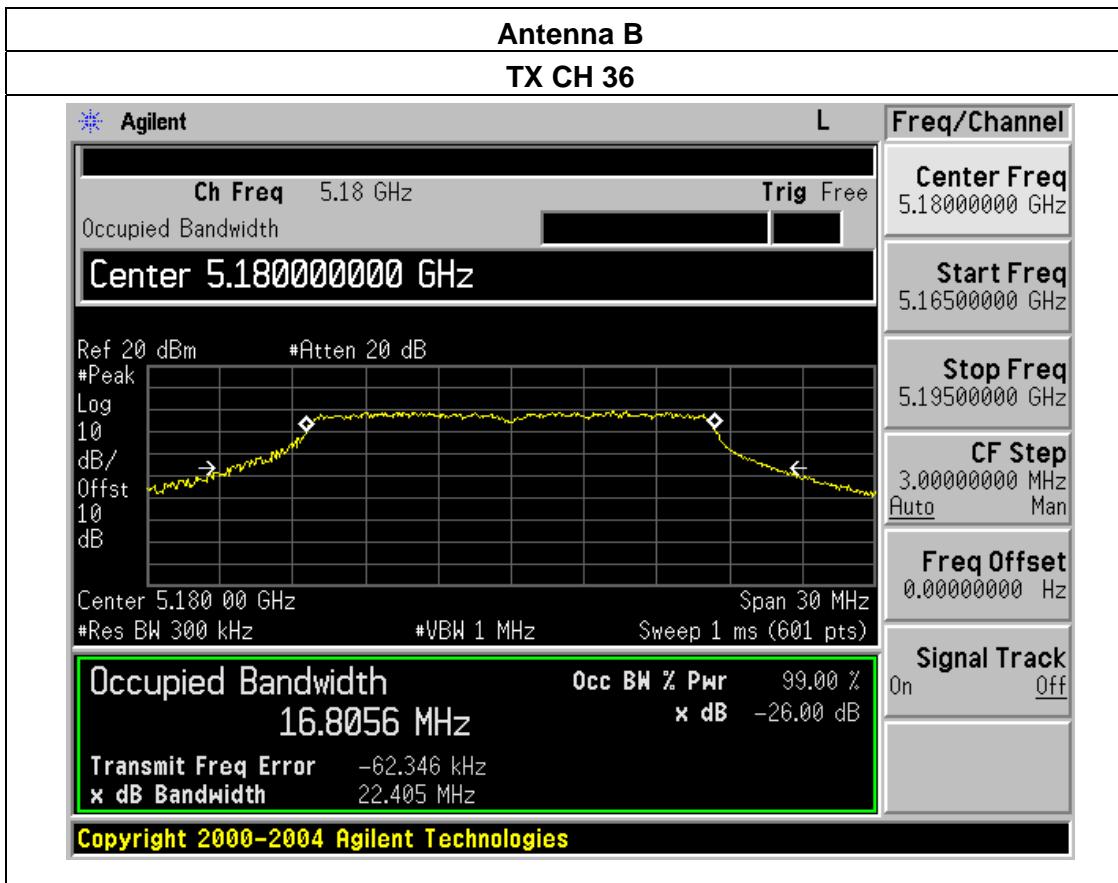


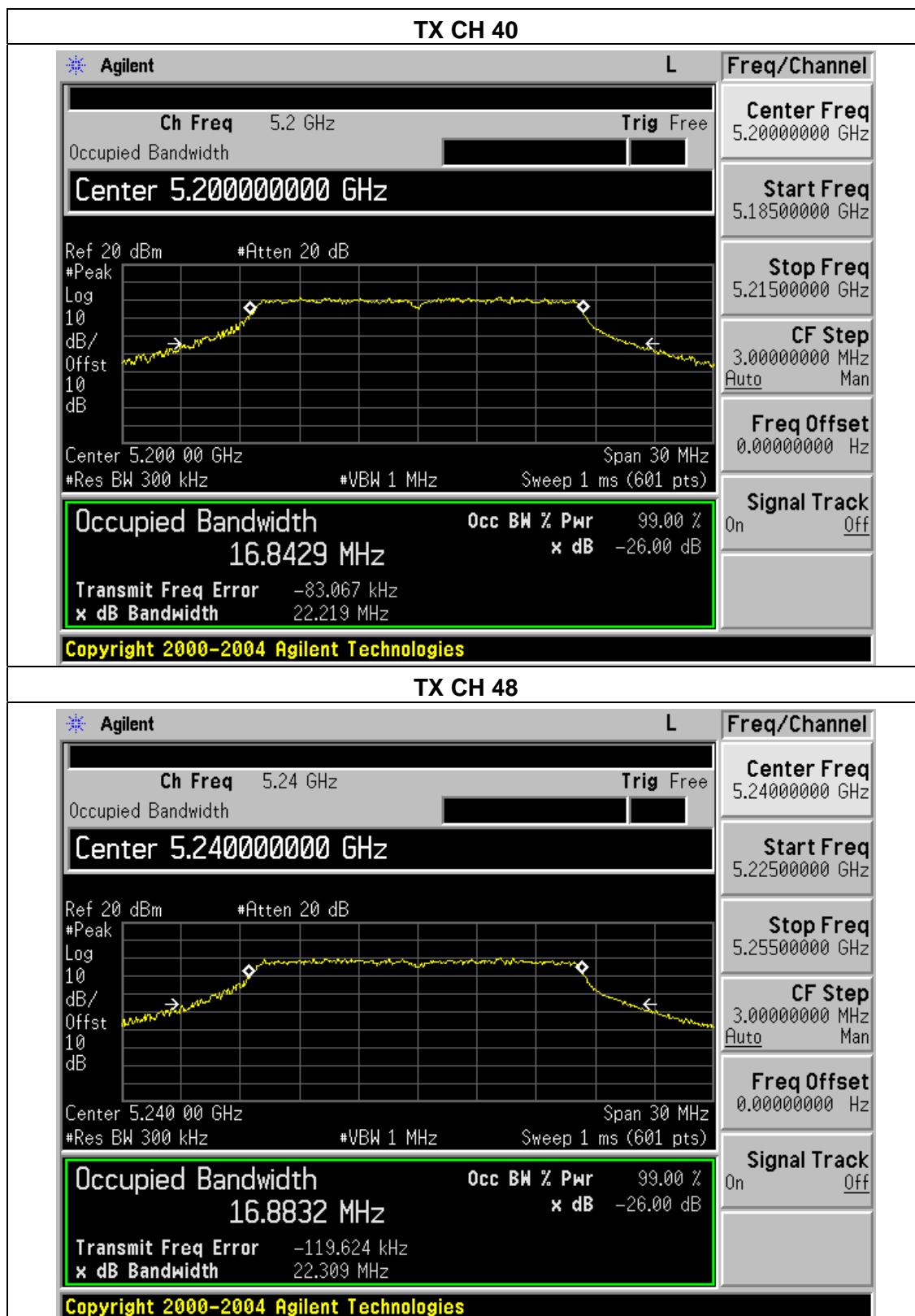
TX CH 40



TX CH 48

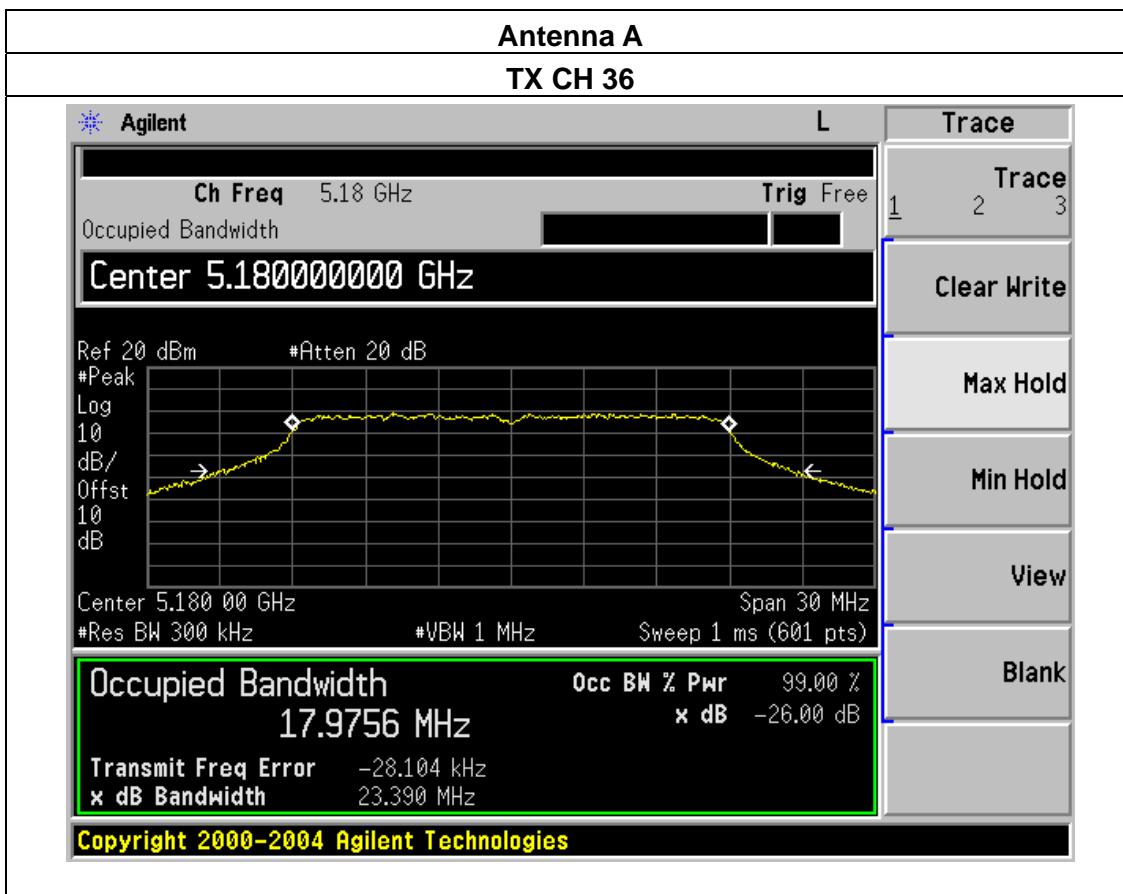




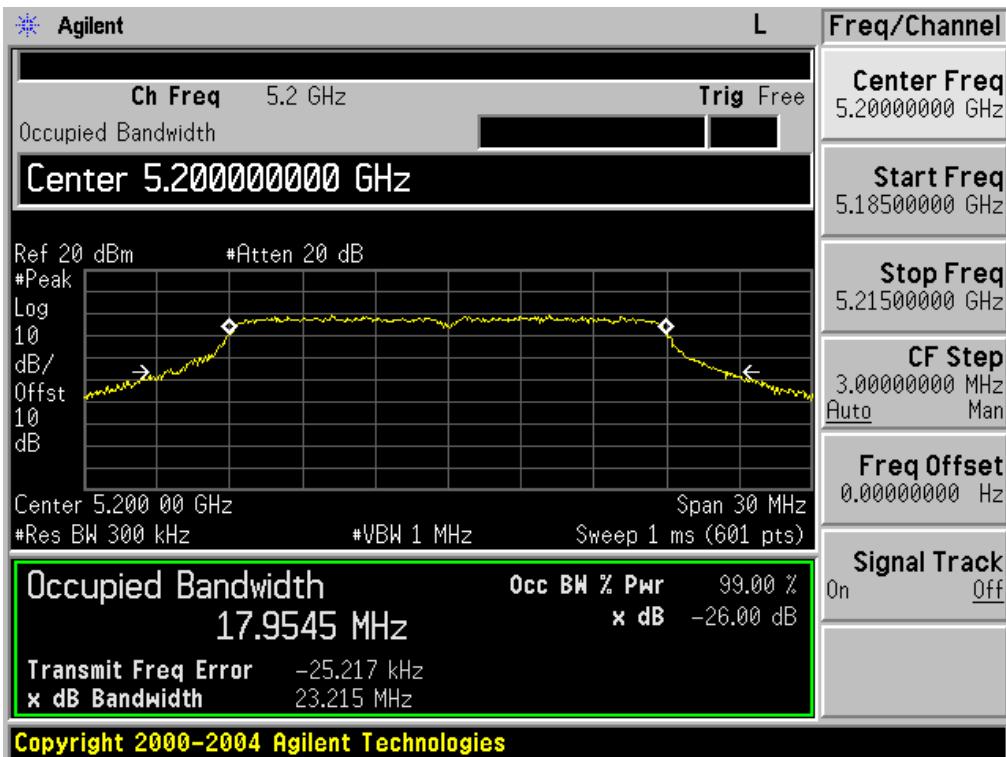


EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX n(20) Mode(5G) /CH36, CH40, CH48		

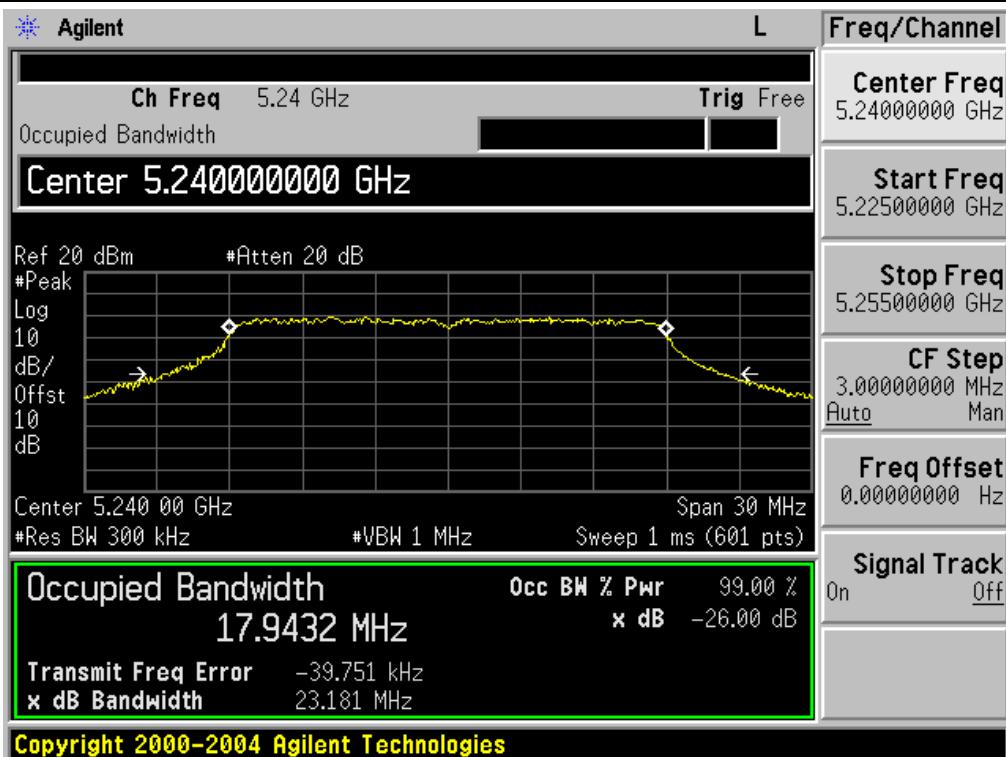
Channel	Frequency (MHz)	99% bandwidth (MHz) ANT A	99% bandwidth (MHz) ANT B	26dB bandwidth (MHz) ANT A	26dB bandwidth (MHz) ANT B	Limit (kHz)	Result
802.11N20 mode							
Low	5180	17.976	17.943	23.390	23.077	500	Pass
Middle	5200	17.955	17.950	23.215	23.073	500	Pass
High	5240	17.943	17.964	23.181	23.073	500	Pass

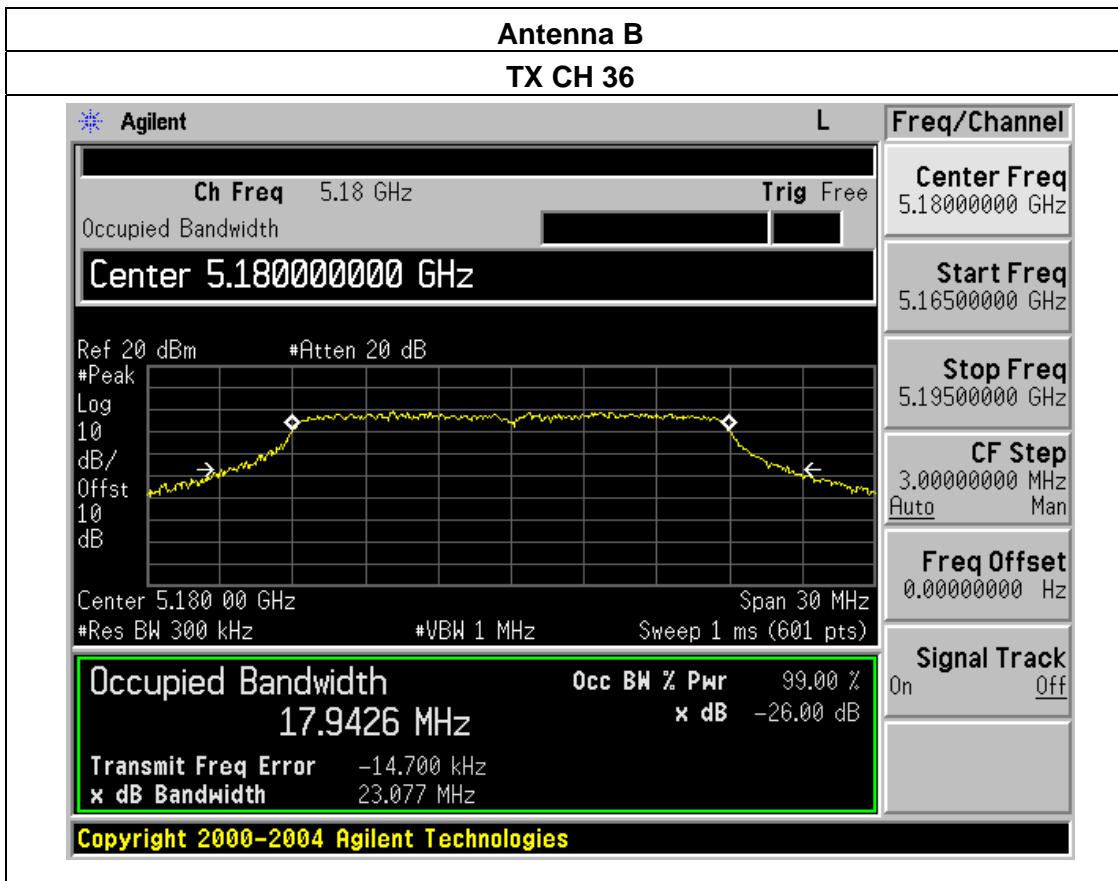


TX CH 40

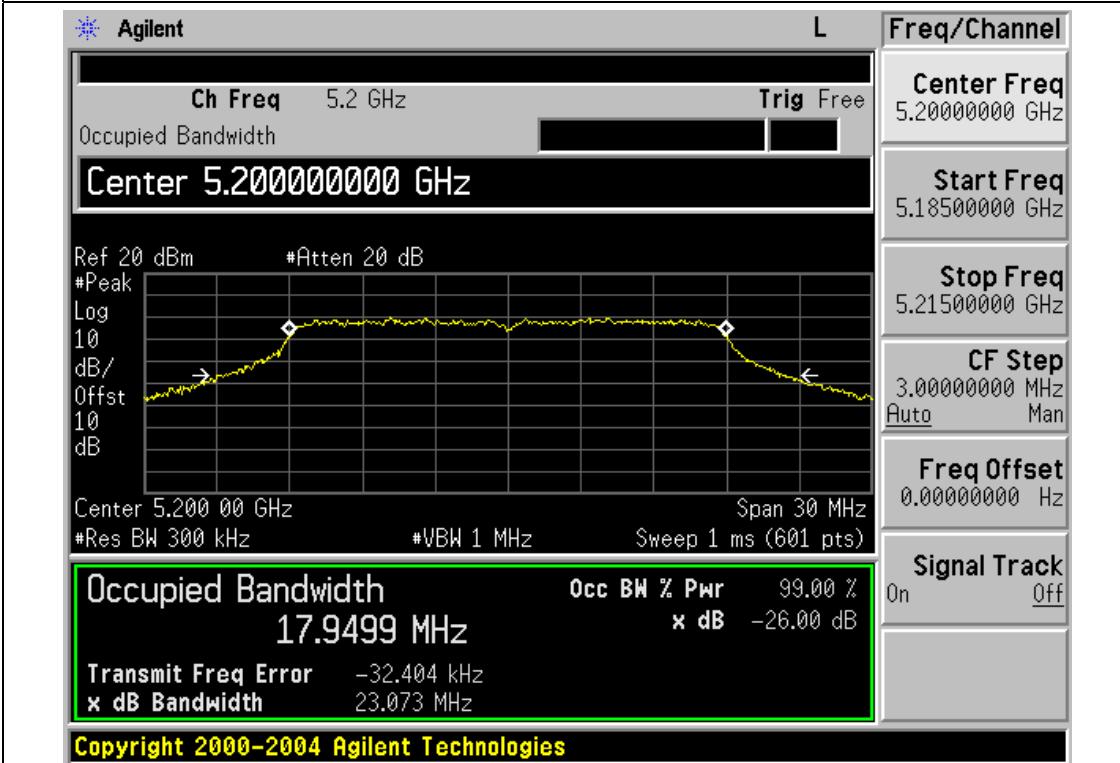


TX CH 48

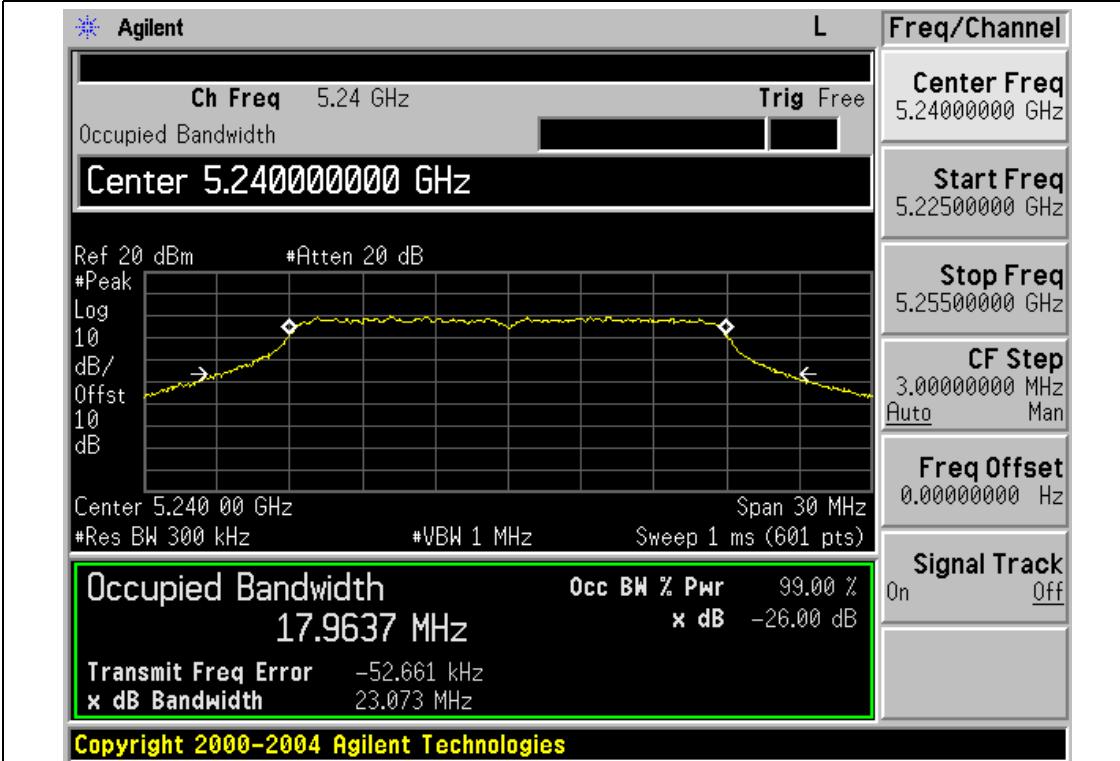




TX CH 40

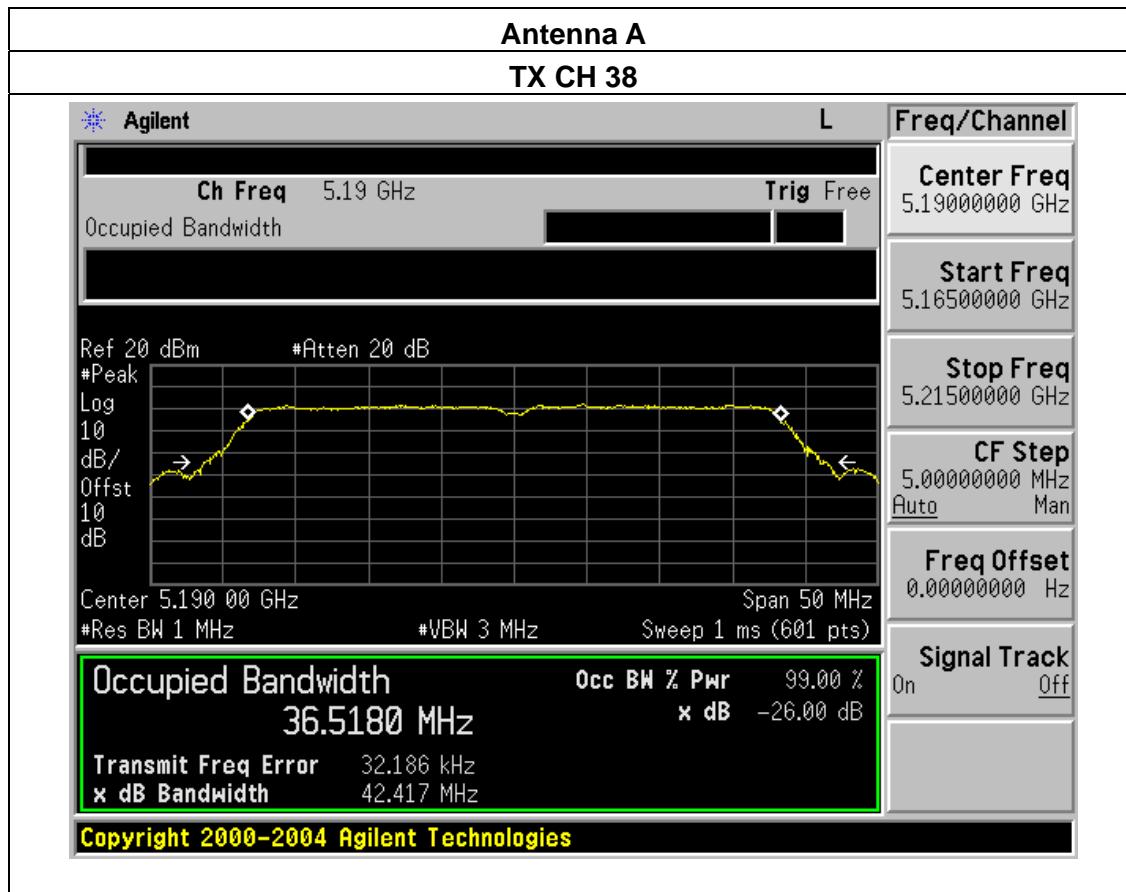


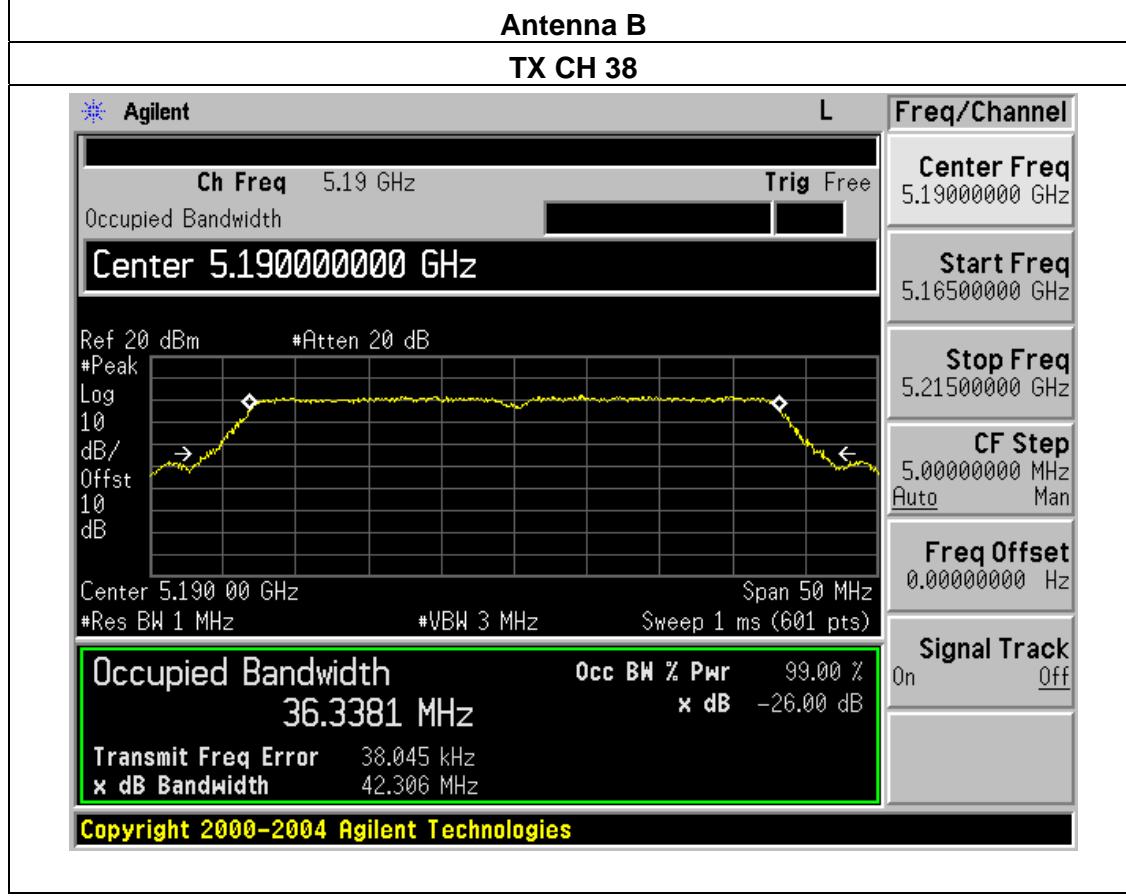
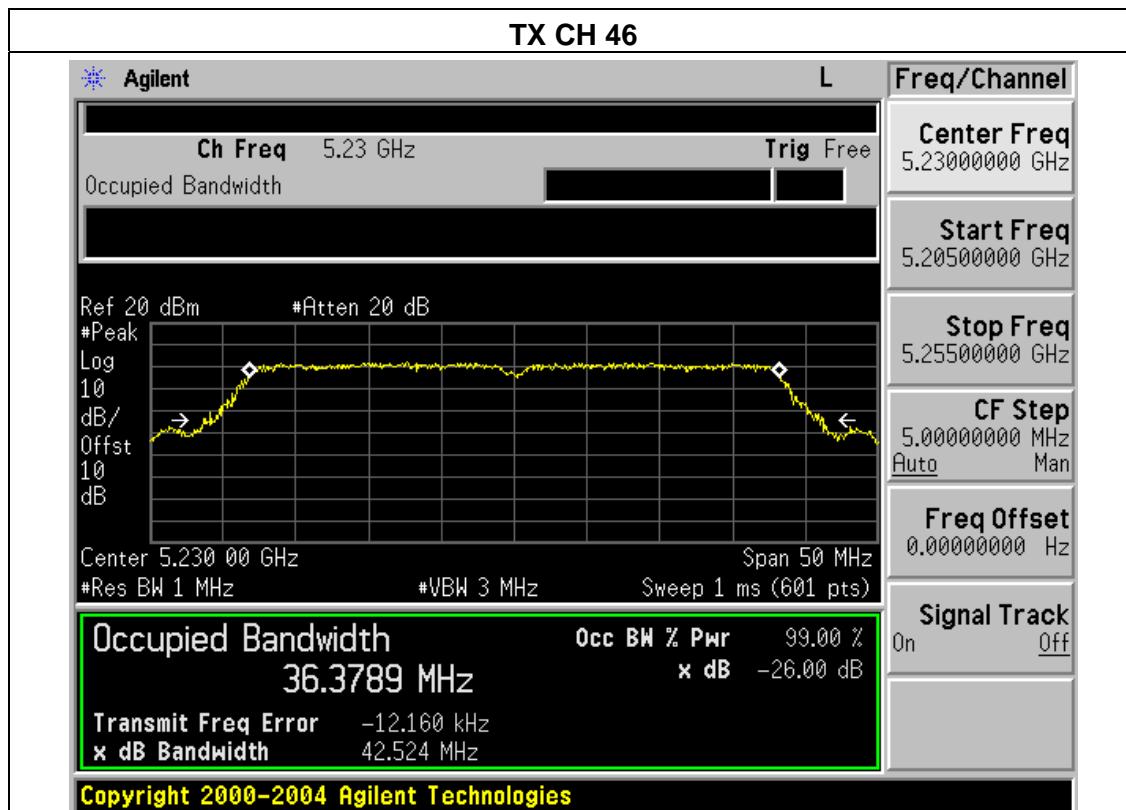
TX CH 48

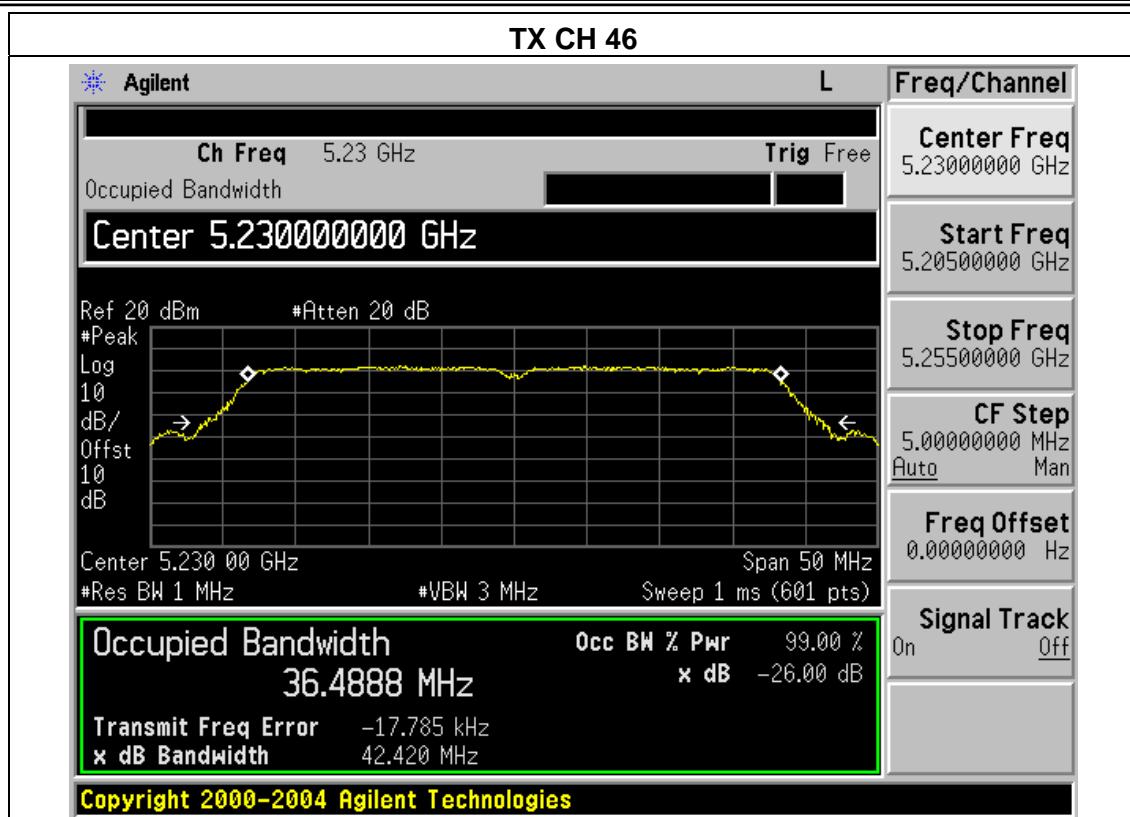


EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX n40 Mode(5G) /CH38, CH46		

Channel	Frequency (MHz)	99% bandwidth (MHz) ANT A	99% bandwidth (MHz) ANT B	26dB bandwidth (MHz) ANT A	26dB bandwidth (MHz) ANT B	Limit (kHz)	Result
802.11N40 mode							
Low	5190	36.518	36.338	42.417	42.306	500	Pass
High	5230	36.379	36.489	42.524	42.420	500	Pass







6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(1)

For the band 5.15–5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak 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 peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to IC RSS-210 §A9.2:

For the 5.15–5.250 GHz bands, the maximum e.i.r.p shall not exceed 200 mW or $10 + 10 \log B$, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p spectral density shall not exceed 10 dBm in any 1.0 MHz band.

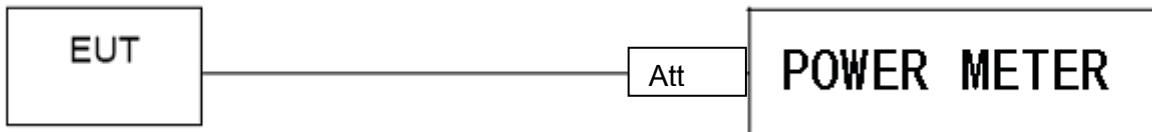
6.1.1 TEST PROCEDURE

- The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz
Test Mode :	TX a/n(5G) Mode		

Test Channel	Frequency (MHz)	Maximum output power. Antenna port				Total Power		LIMIT
		(PK) (dBm)		(AV) (dBm)		(PK)	(AV)	
		ANT A	ANT B	ANT A	ANT B	dBm	dBm	
TX 802.11a Mode								
CH36	5180	8.93	8.23	6.46	5.45	11.60	8.99	16.79
CH40	5200	8.64	8.21	6.37	5.32	11.60	8.94	16.79
CH48	5240	8.59	8.16	6.19	5.21	11.39	8.74	16.79
TX 802.11 n20M Mode								
CH36	5180	8.46	7.79	5.59	4.43	11.15	8.06	16.79
CH40	5200	8.33	7.62	5.44	4.34	11.07	8.02	16.79
CH48	5240	8.28	7.51	5.37	4.31	10.92	7.88	16.79
TX 802.11 n40M Mode								
CH38	5190	7.59	6.81	4.48	3.76	10.23	7.15	16.79
CH46	5230	7.53	6.72	4.57	3.71	10.19	7.12	16.79

The antenna gain of 5 GHz is 6.21 dBi; therefore, the power spectral density limit is reduced by 0.21 dB

7. OUT OF BAND EMISSIONS

APPLICABLE STANDARD

According to FCC §15.407(b)

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 EIRP of -27 dBm/MHz

According to RSS-210 §A8.5,

in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

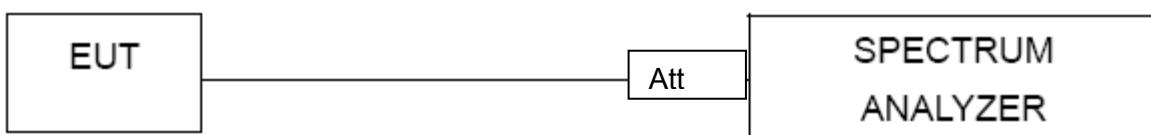
TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

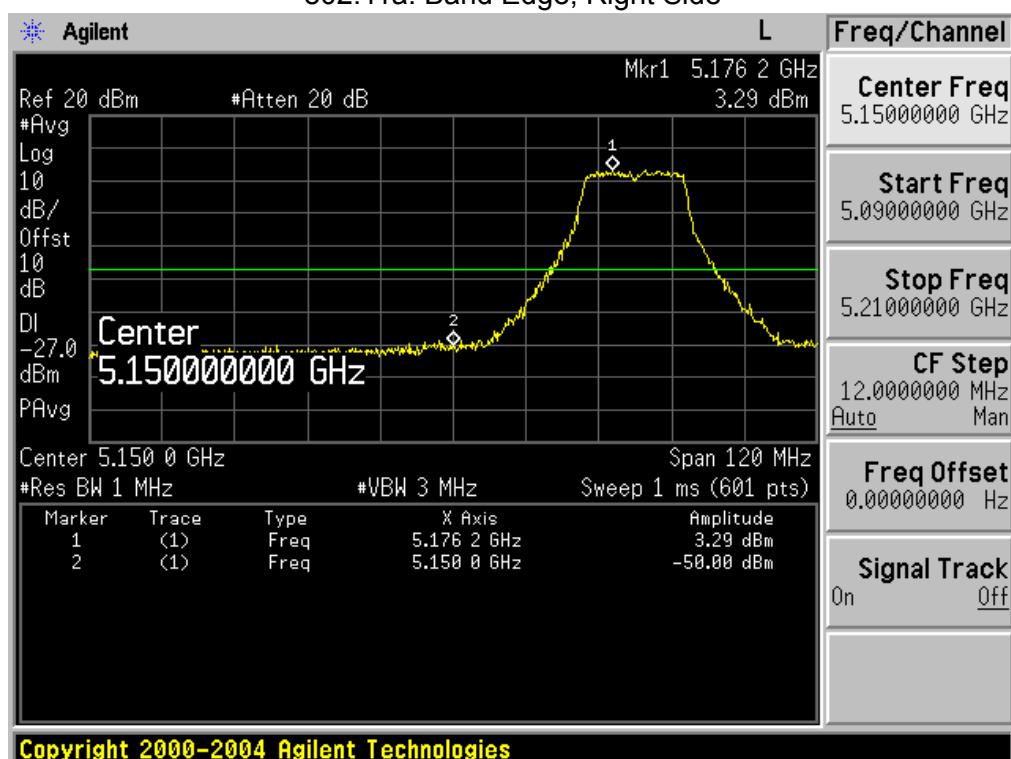
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.4 TEST RESULTS

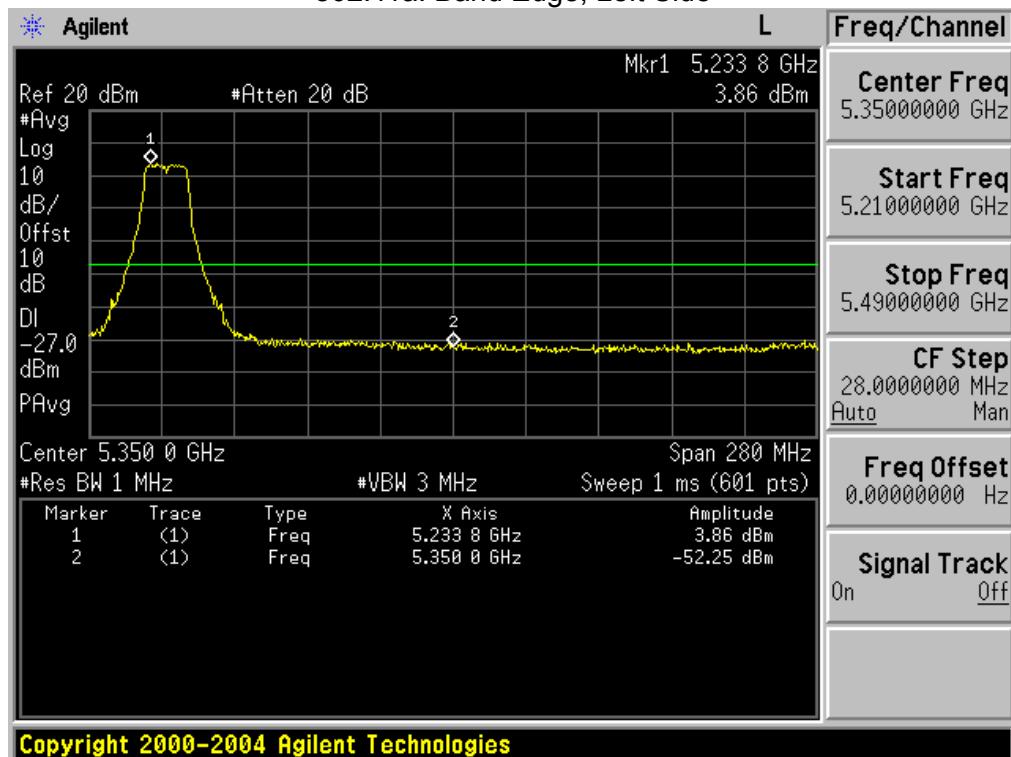
EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz

Antenna A

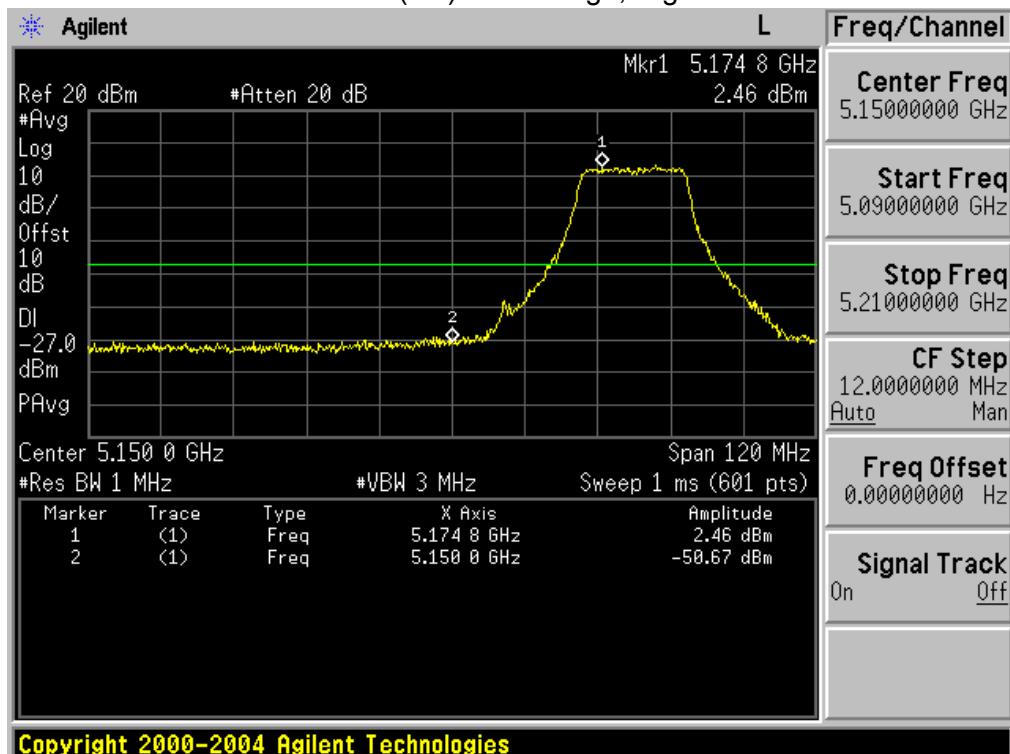
802.11a: Band Edge, Right Side



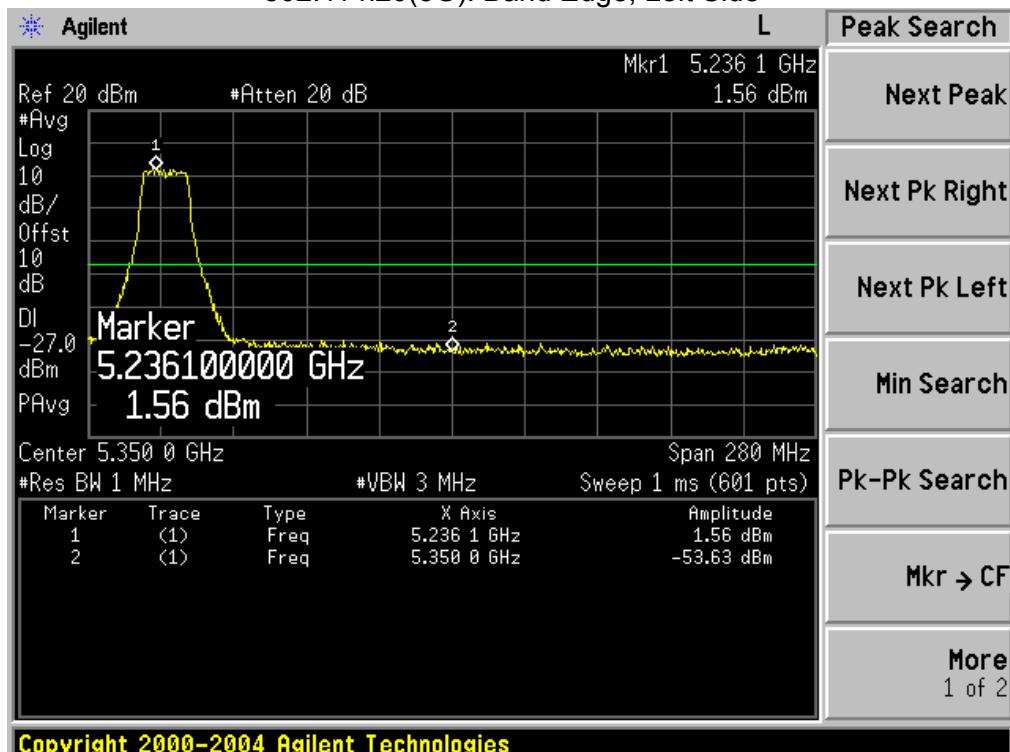
802.11a: Band Edge, Left Side



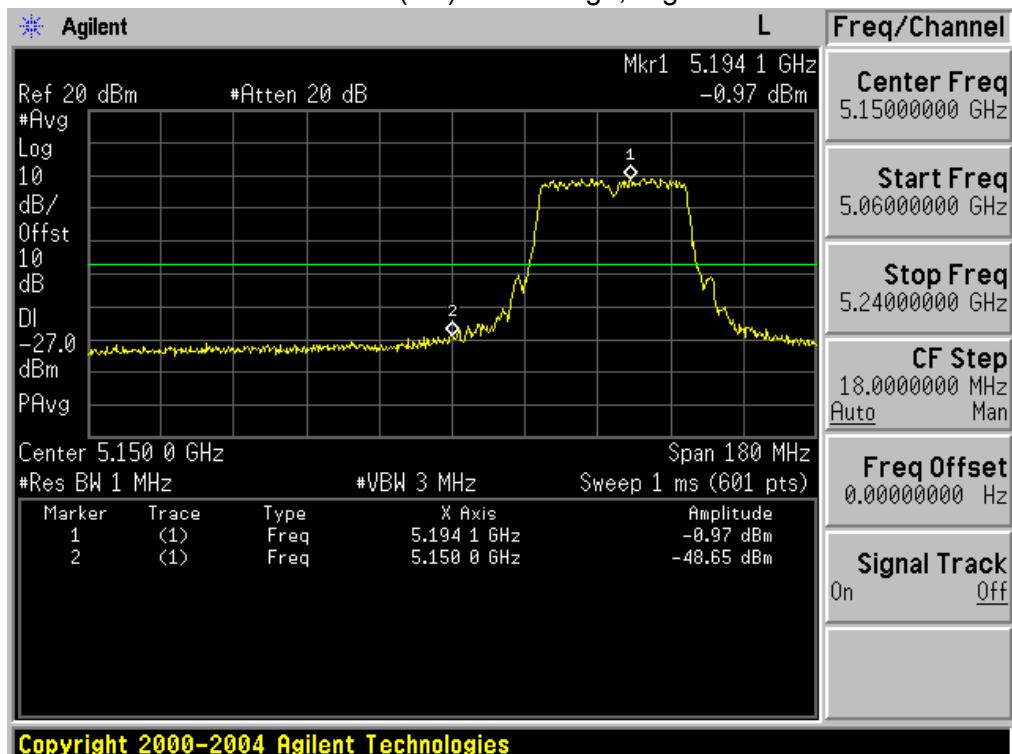
802.11 n20(5G): Band Edge, Right Side



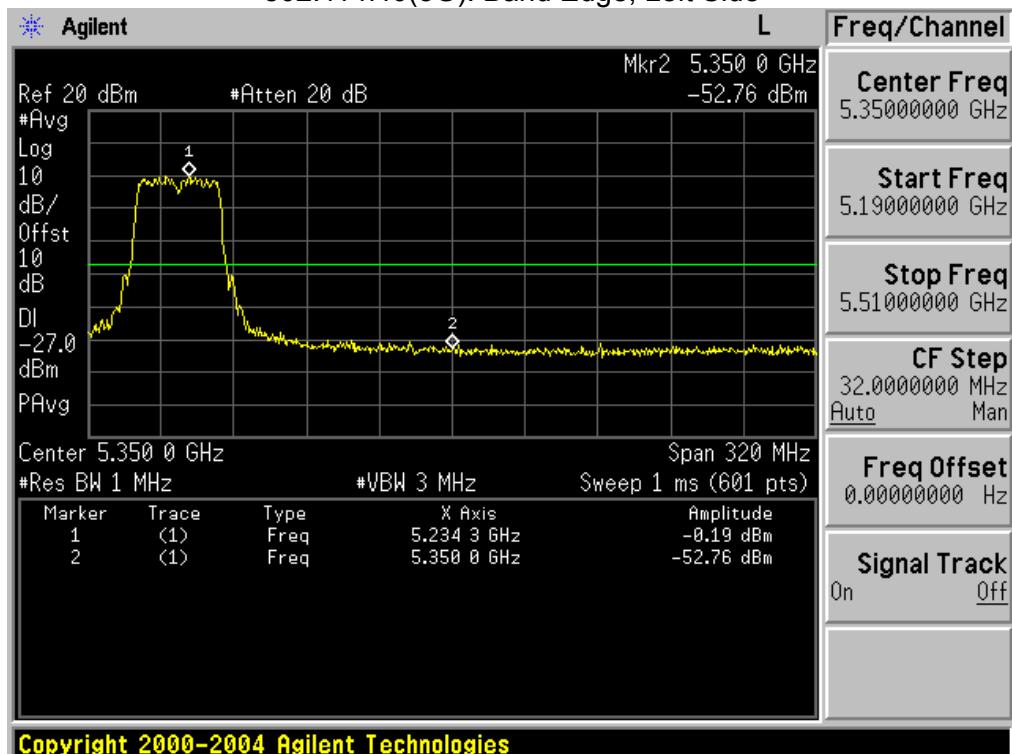
802.11 n20(5G): Band Edge, Left Side



802.11 n40(5G): Band Edge, Right Side

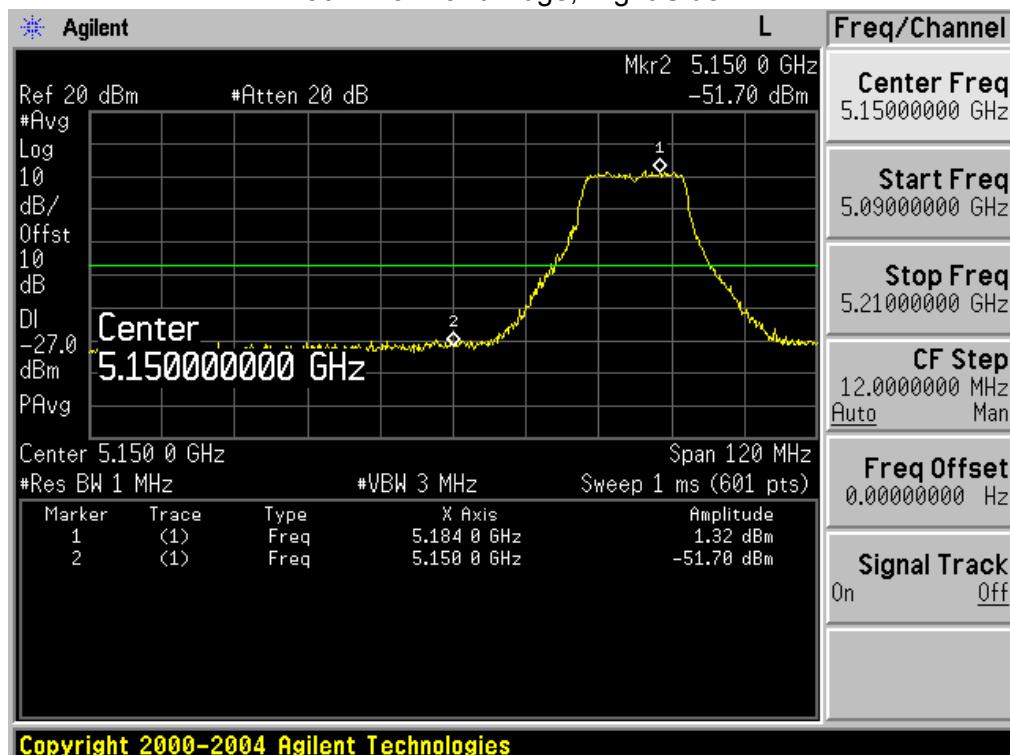


802.11 n40(5G): Band Edge, Left Side

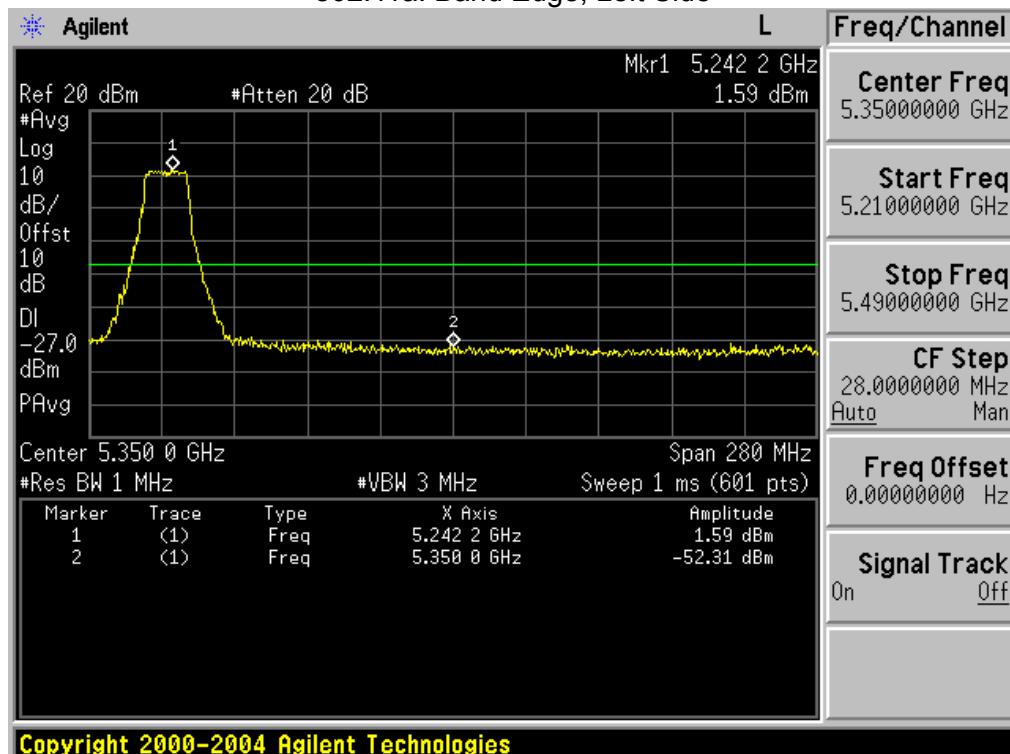


Antenna B

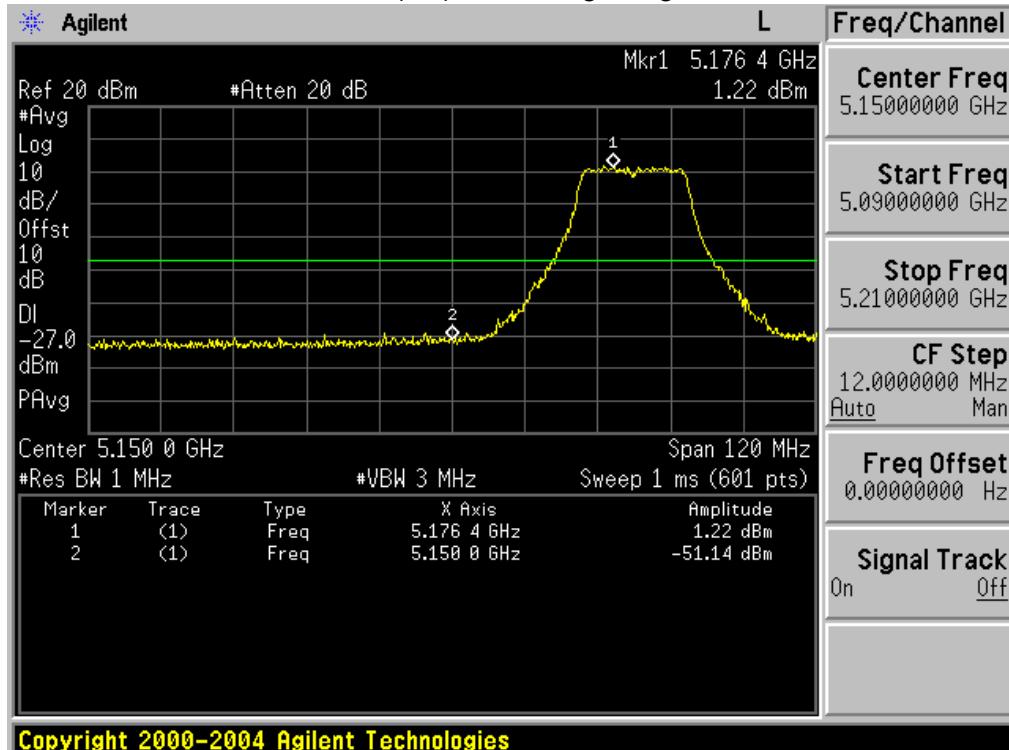
802.11a: Band Edge, Right Side



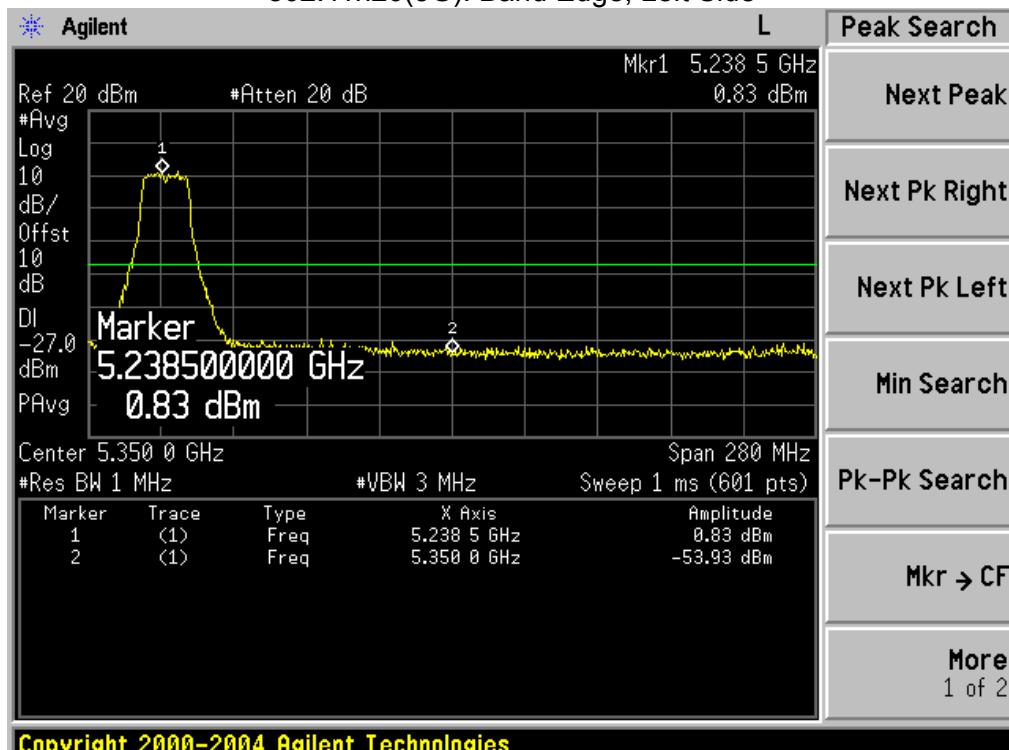
802.11a: Band Edge, Left Side



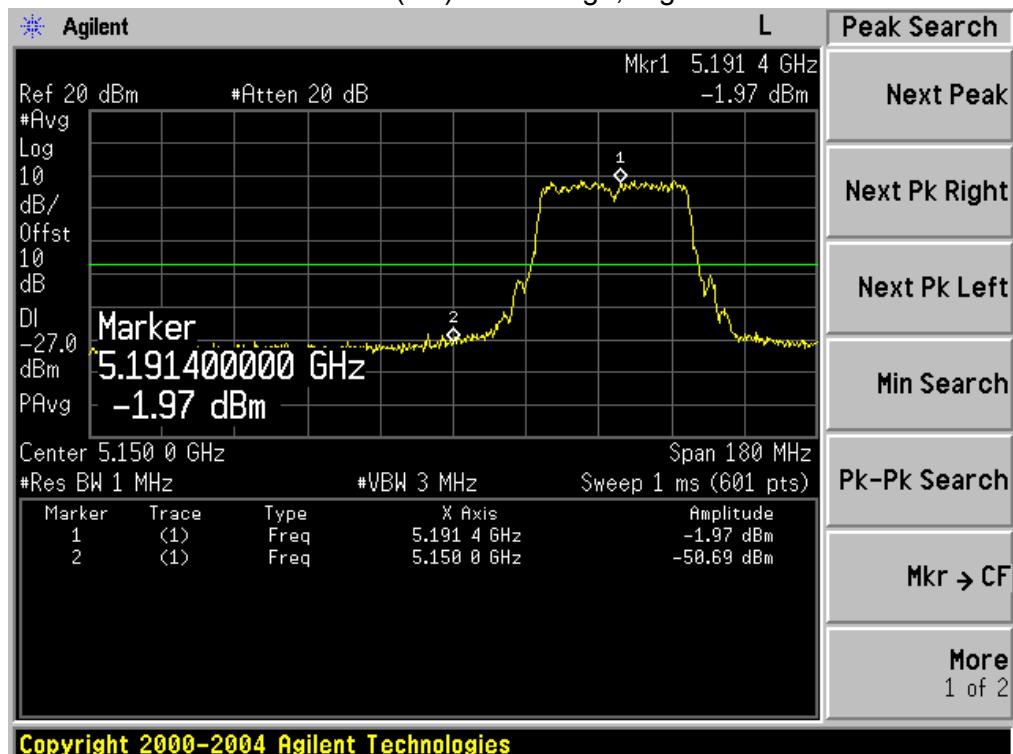
802.11n20(5G): Band Edge, Right Side



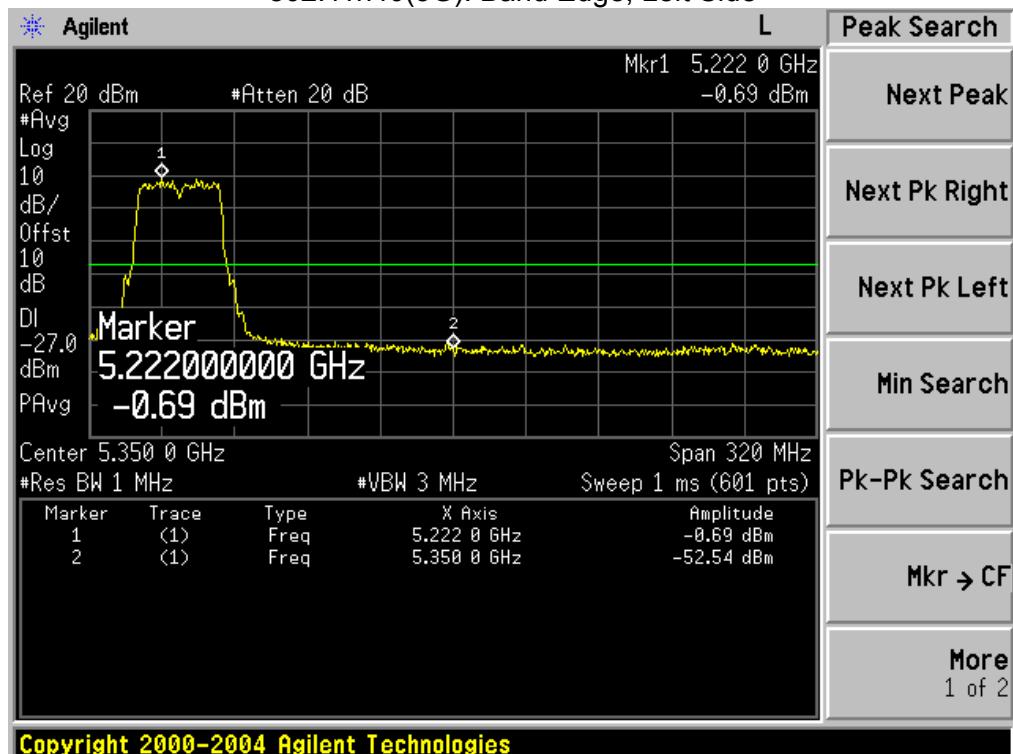
802.11n20(5G): Band Edge, Left Side



802.11n40(5G): Band Edge, Right Side



802.11n40(5G): Band Edge, Left Side



8. PEAK EXCURSION RATIO

8.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a) (6), the ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

8.1.1 TEST PROCEDURE

The largest difference between the following two traces must be ≤ 13 dB for all frequencies across the emission bandwidth. Submit a plot.

1st Trace:

- Set RBW = 1 MHz, VBW \geq 3 MHz with peak detector and maxhold settings.

2nd Trace:

- create the 2nd trace using the settings described in the section “FCC §15.407(a)(1)(2) – CONDUCTED TRANSMITTER OUTPUT POWER”.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

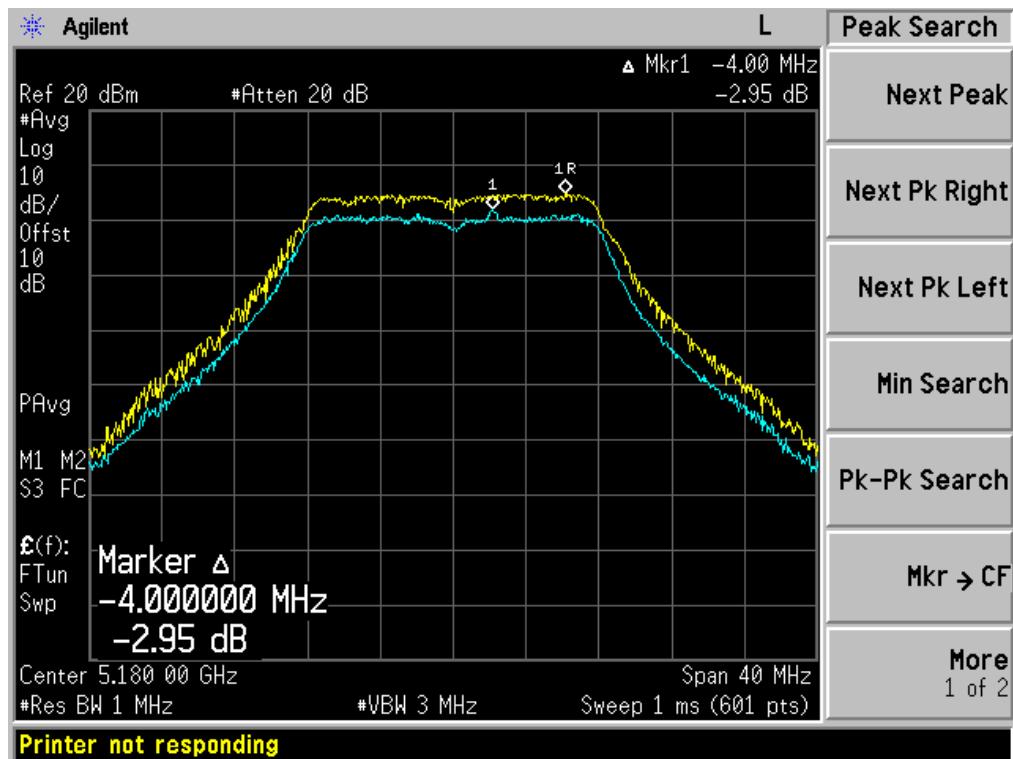
8.1.5 TEST RESULTS

EUT :	ScreenBeam Enterprise Wireless Display Receiver	Model Name :	SBWD700A
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 5V From adapter AC120V/60Hz

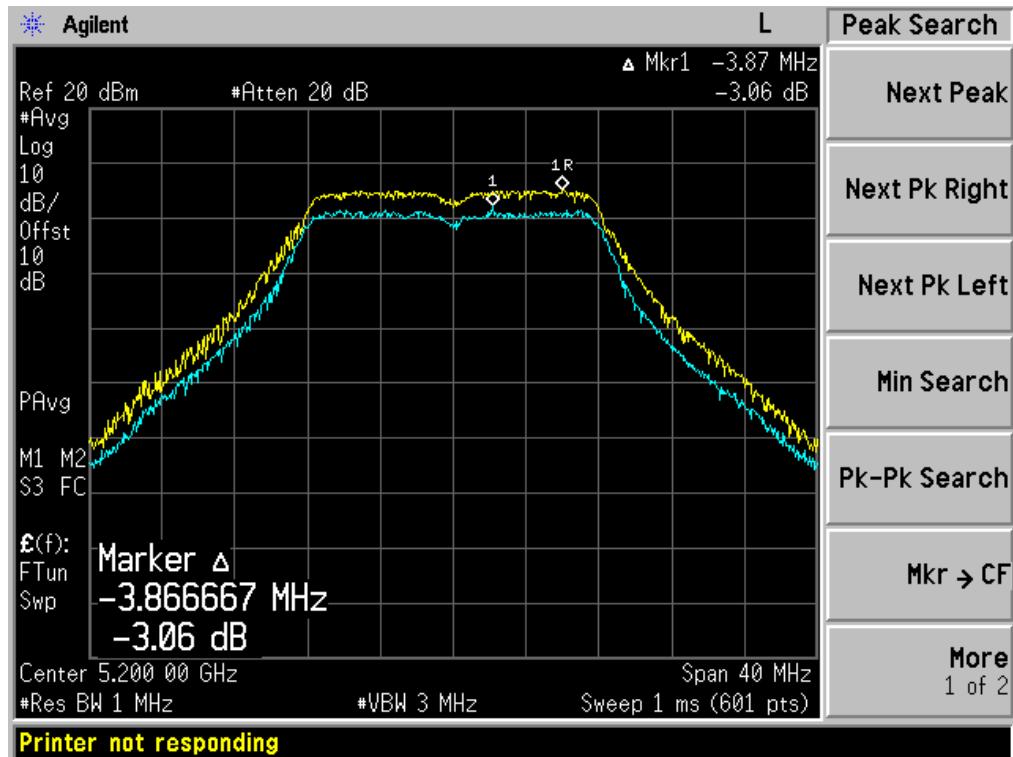
Channel	Frequency (MHz)	TX ANT A PER(dB)	TX ANT B PER(dB)	Limit (dB)
802.11a mode				
Low	5180	-2.95	-3.74	13
Middle	5200	-3.06	-3.84	
High	5240	-2.76	-3.57	
802.11n HT20 mode				
Low	5180	-3.19	-3.85	13
Middle	5200	-2.96	-3.27	
High	5240	-2.82	-3.24	
802.11n HT40 mode				
Low	5190	-2.96	-2.77	13
High	5230	-1.96	-2.52	

Antenna A

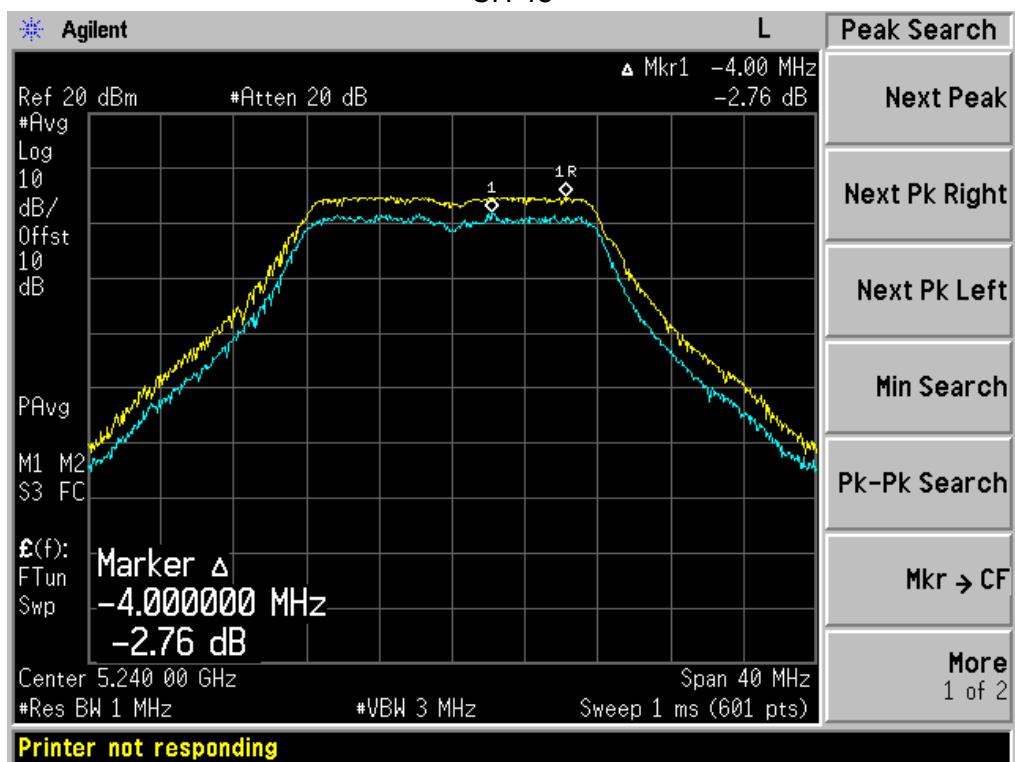
802.11a:CH 36



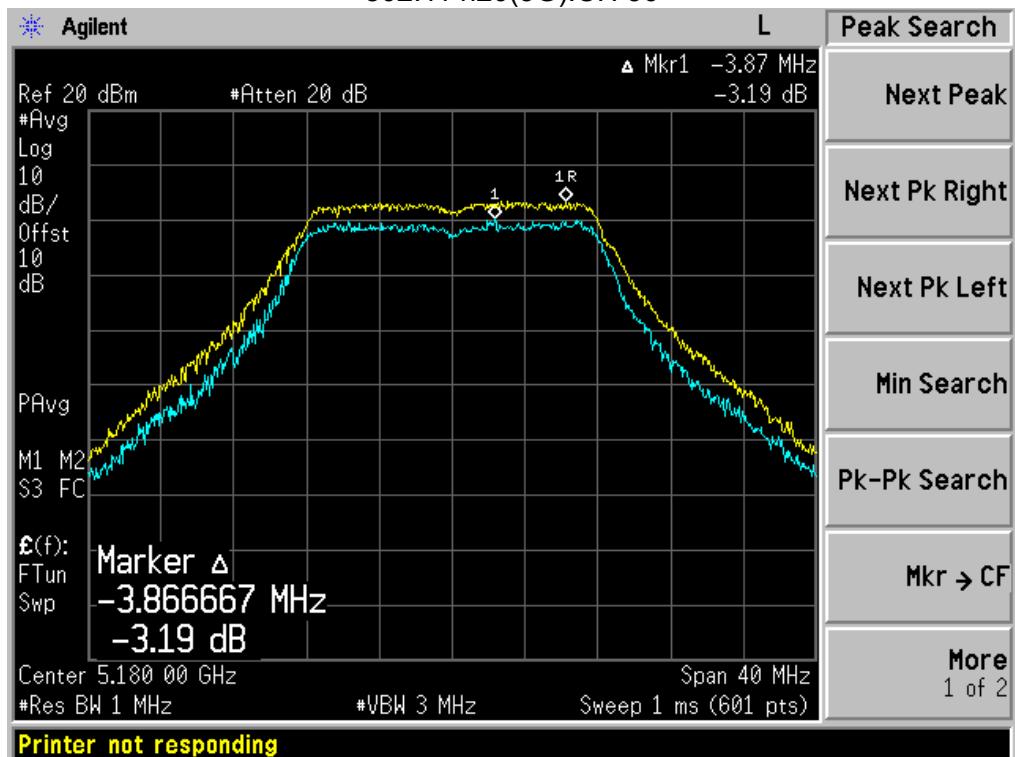
CH 40



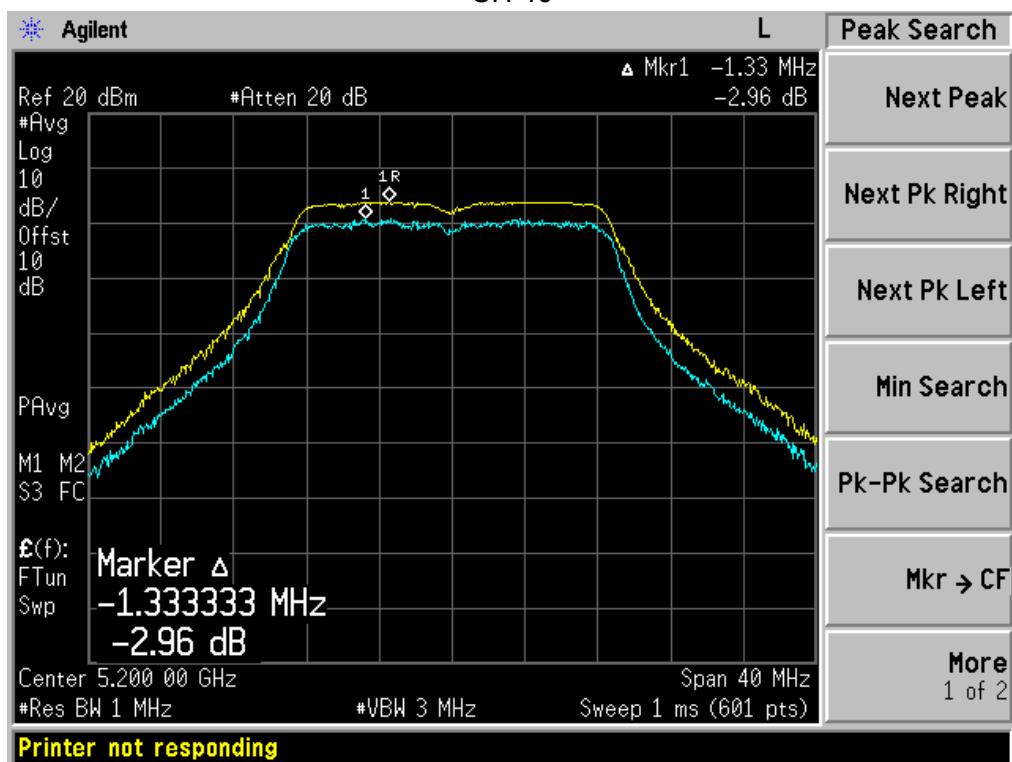
CH 48



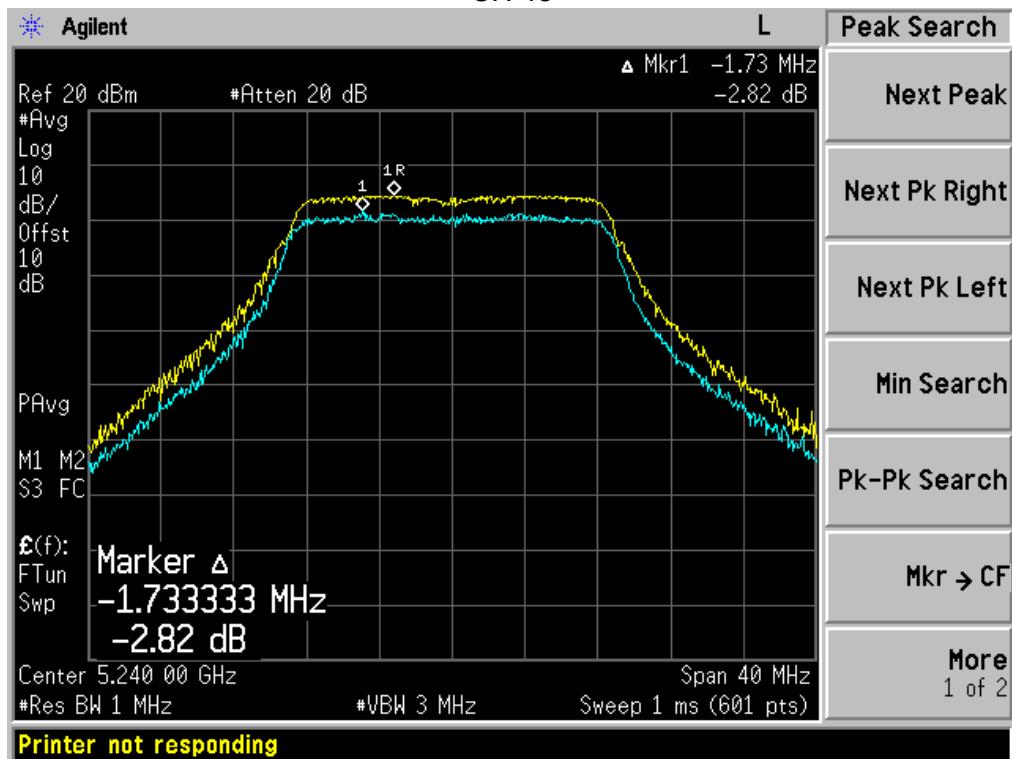
802.11 n20(5G):CH 36



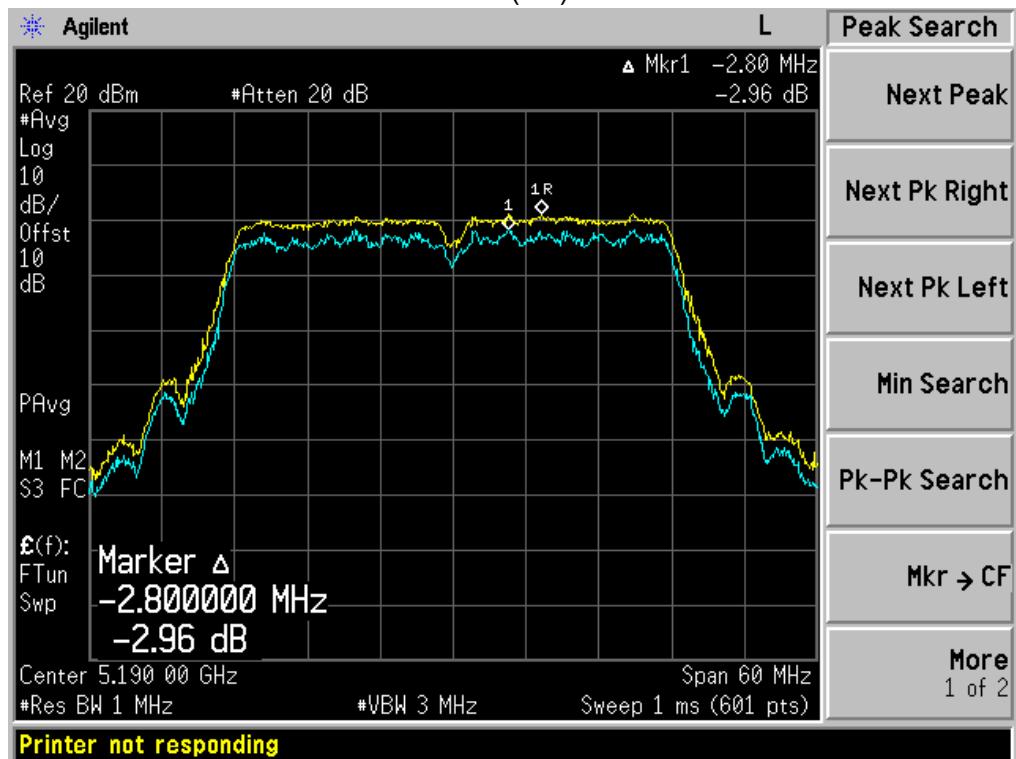
CH 40



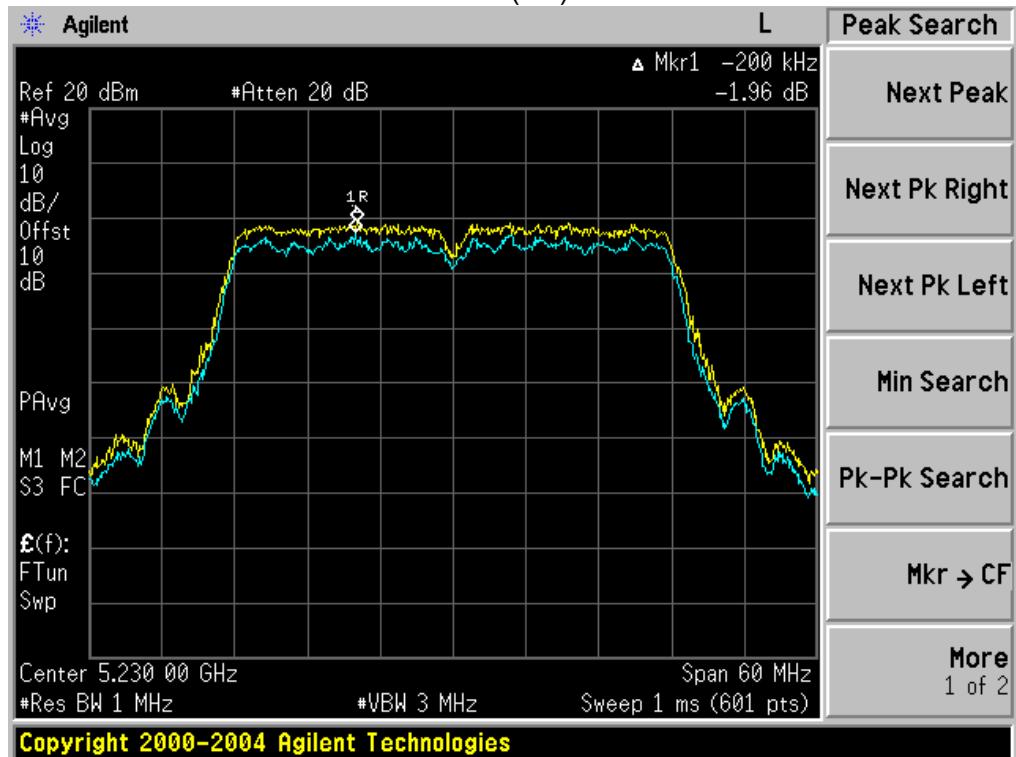
CH 48



802.11 n40(5G):CH 38

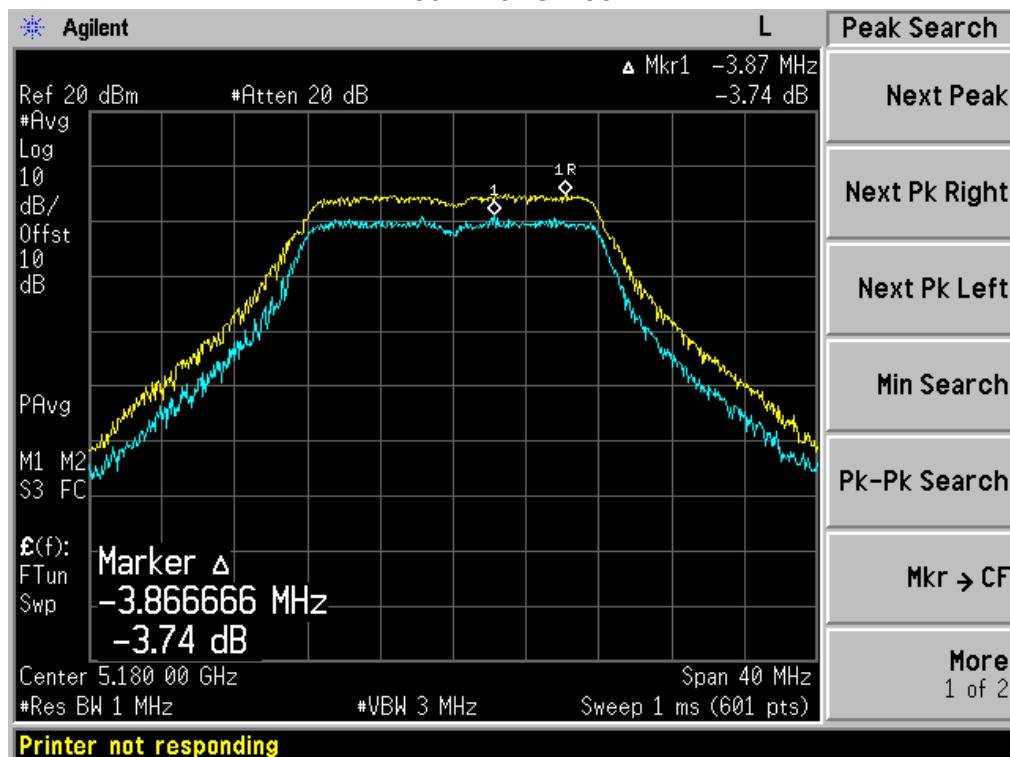


802.11 n20(5G):CH 46

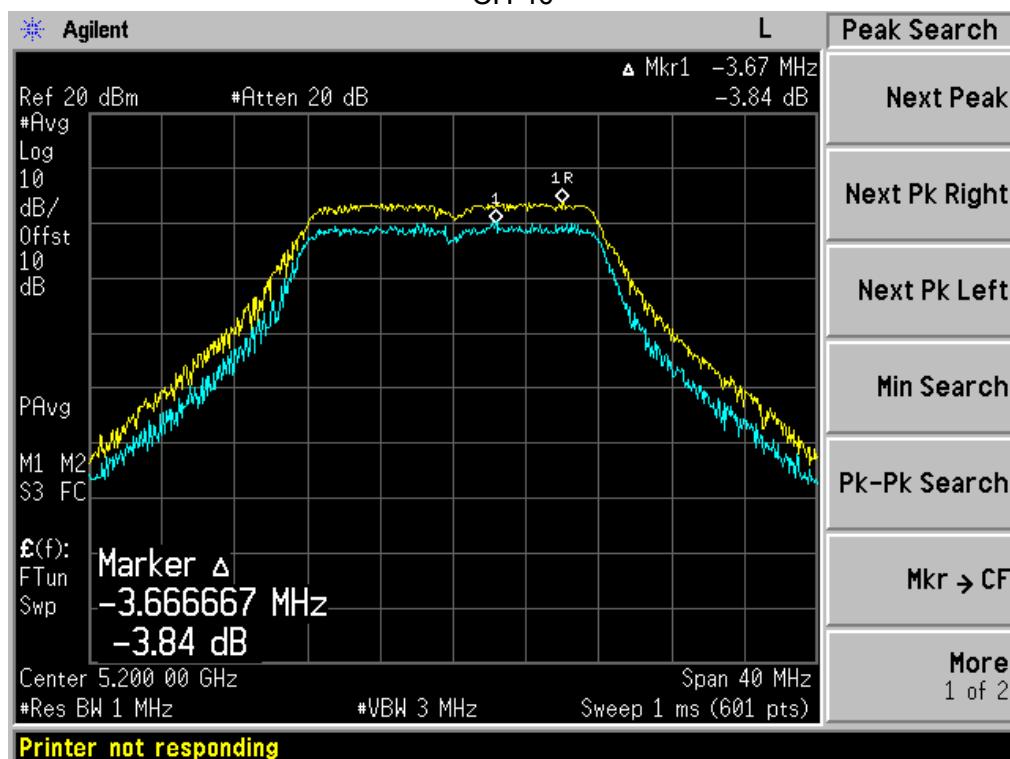


Antenna B

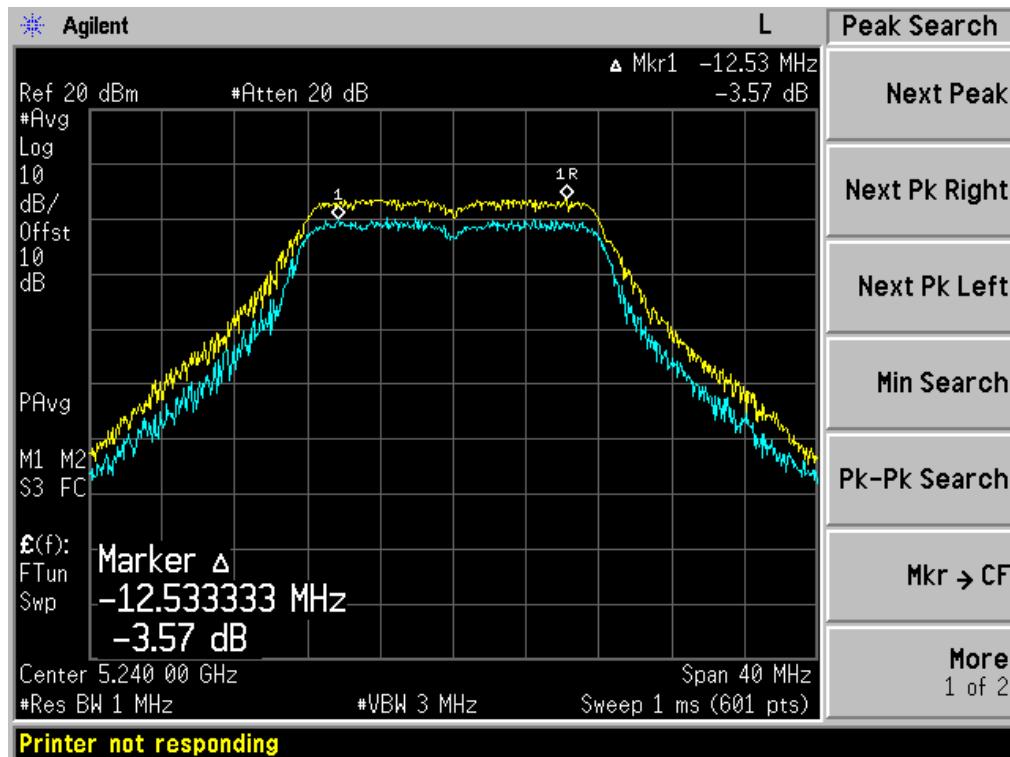
802.11a: CH 36



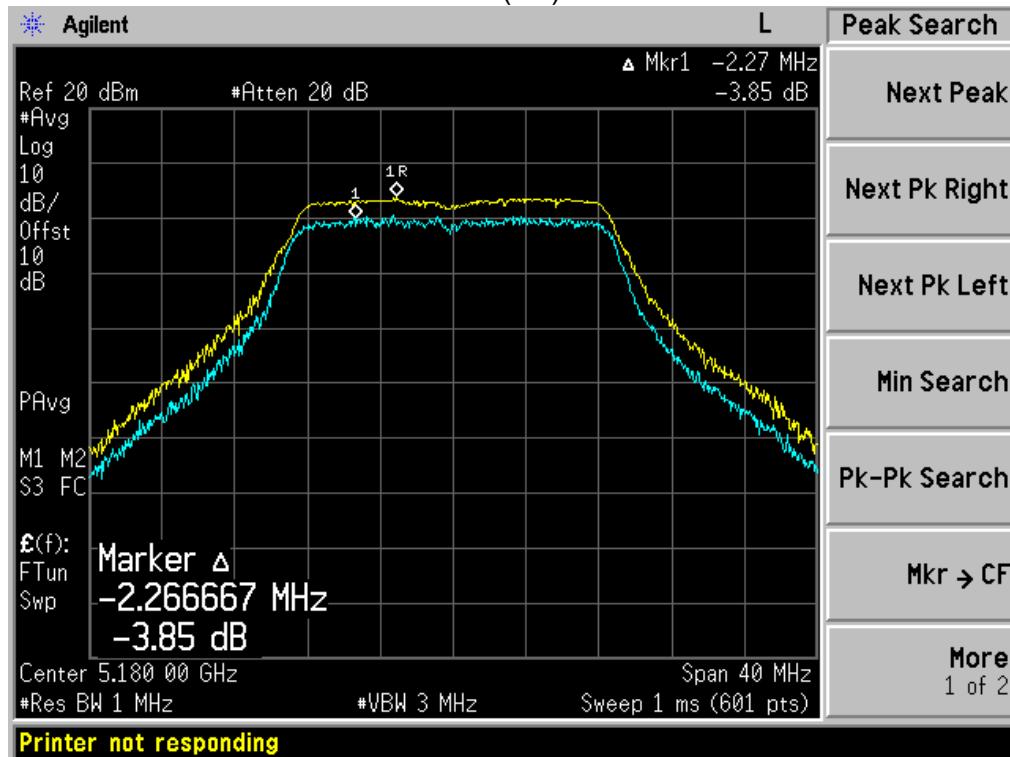
CH 40



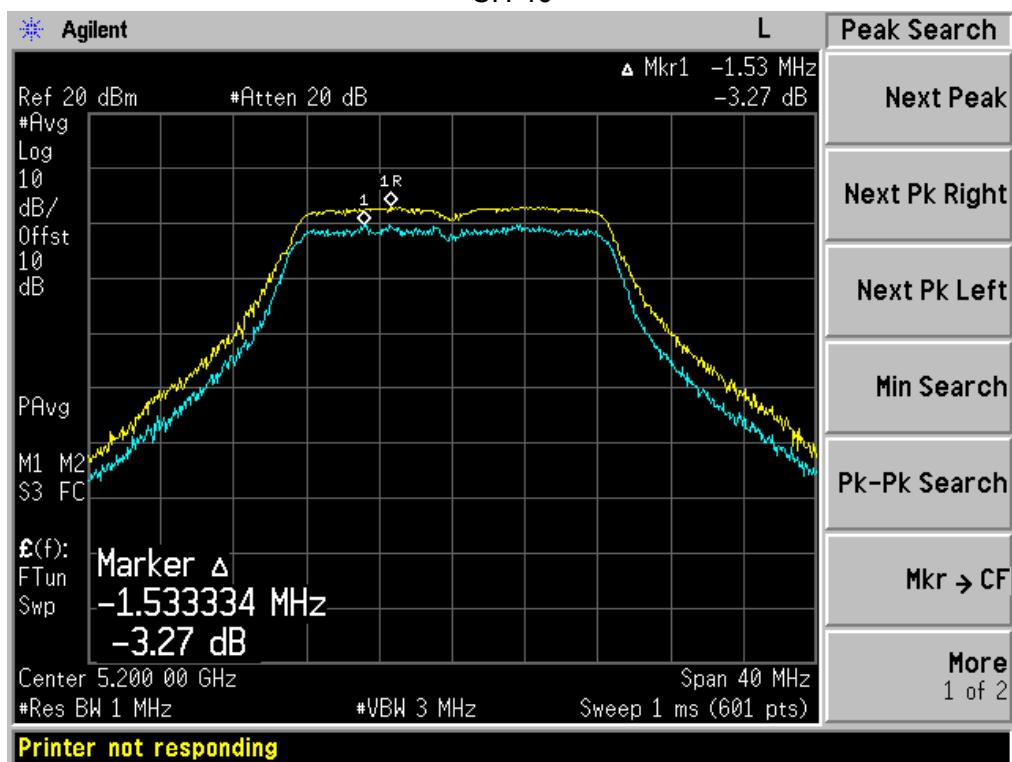
CH 48



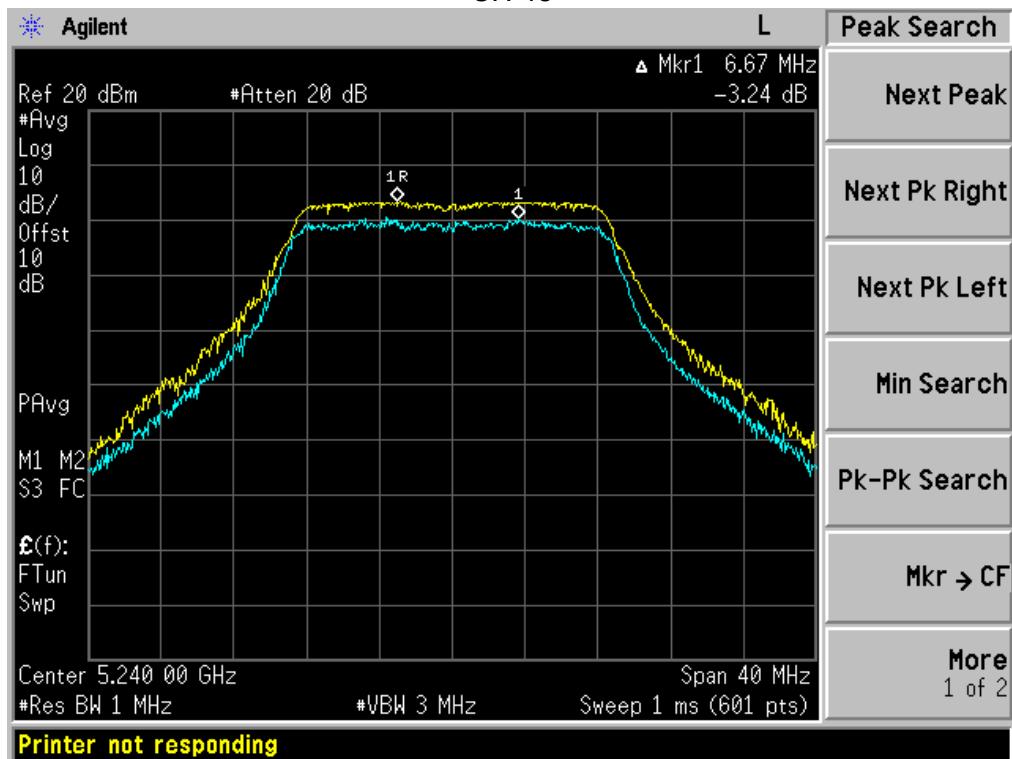
802.11n20(5G): CH 36



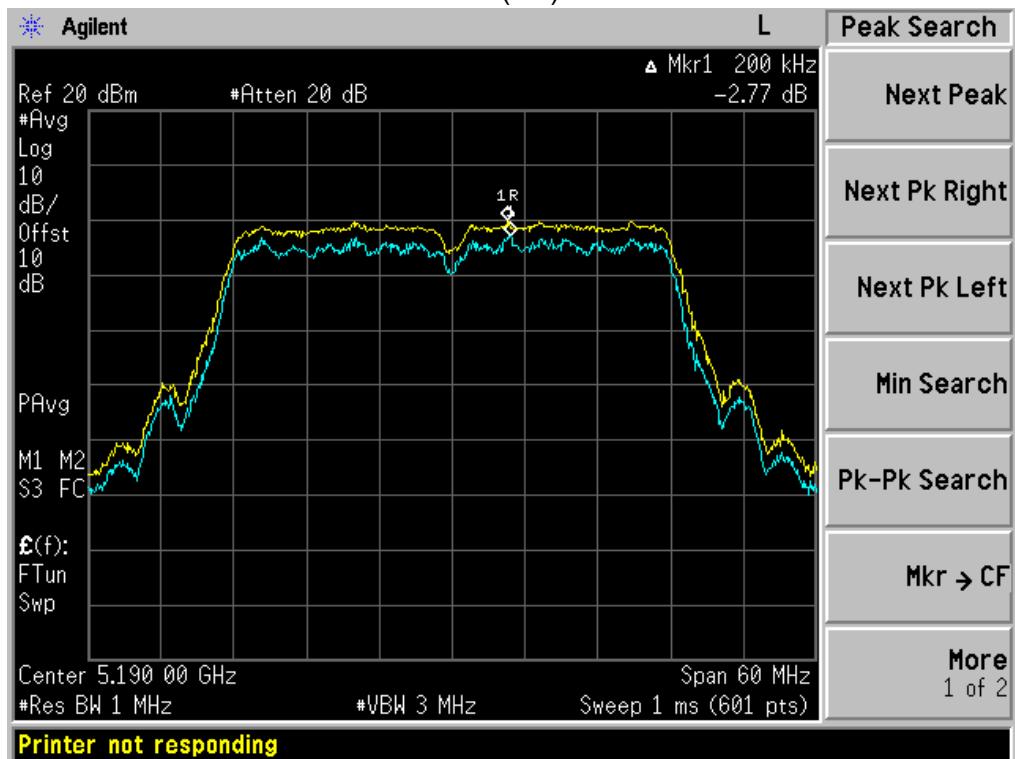
CH 40



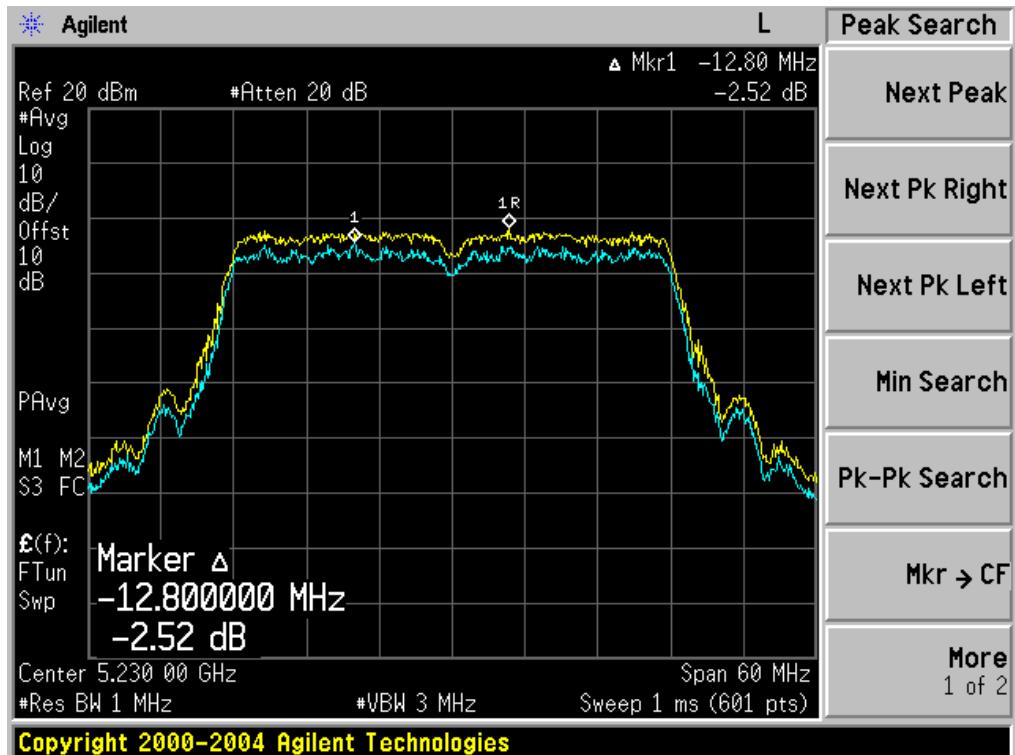
CH 48



802.11n40(5G): CH 38



CH 46



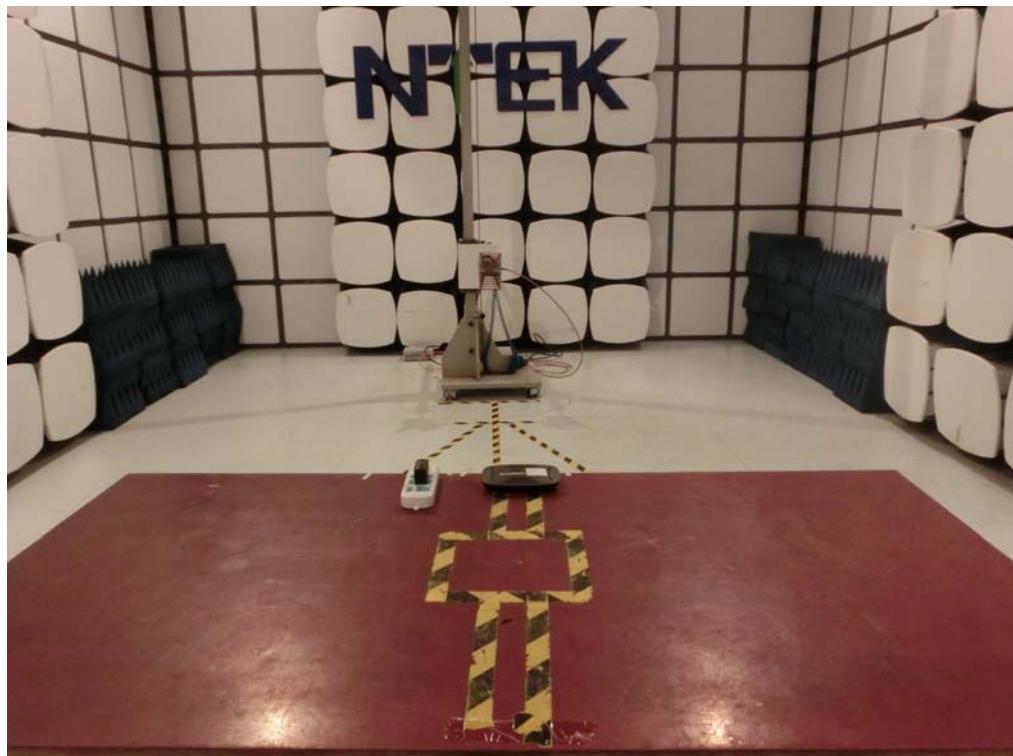
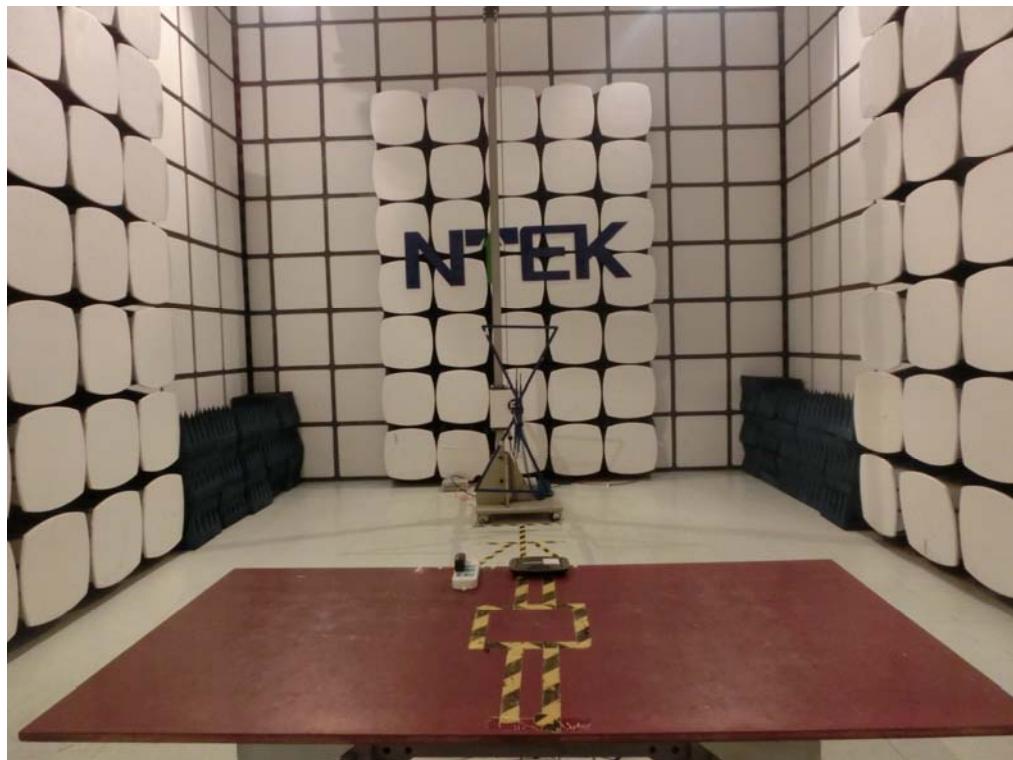
9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is PCB antenna. It comply with the standard requirement.

10. EUT TEST PHOTO**Radiated Measurement Photos**

Conducted Measurement Photos