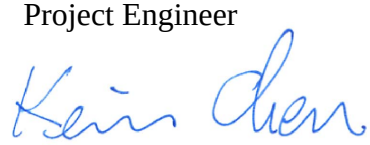
EMC
TEST REPORT

Report No. : EME-060720
Model No. : AG-320
Issued Date : July 3, 2006

Applicant : ZyXEL Communications Corporation
No. 6, Innovation Rd. II, Science-Based Industrial Park,
Hsin-Chu, Taiwan

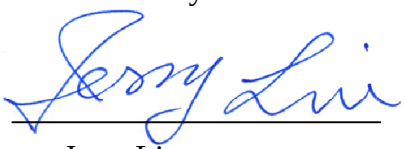
Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
Shiang-Shan District, Hsinchu City, Taiwan

Project Engineer



Kevin Chen

Reviewed By



Jerry Liu

Table of Contents

Summary of Tests

802.11a/g Wireless PCI Adapter -Model: AG-320
FCC ID: I88AG320

1. 802.11b+g (2412-2462MHz)

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Pass
Maximum Output Power test	15.247(b)	Pass
Radiated Spurious Emission test	15.205, 15.209	Pass
Power Spectrum Density test	15.247(e)	Pass
Emission on the Band Edge test	15.247(d)	Pass
RF Antenna Conducted Spurious test	15.247(c)	Pass
AC Power Line Conducted Emission test	15.207	Pass

2. 802.11a (5180-5240MHz, 5260-5320MHz, 5745-5825MHz)

Test	Reference	Results
Peak output power test	15.407 (a)(1)/(2)/(3)	Pass
Power Spectrum Density test	15.407 (a)(1)/(2)/(3)	Pass
Peak excursion to average ratio test	15.407(a)(6)	Pass
Radiated spurious emission test	15.407(b)(1)/(2)/(3), 15.209	Pass
AC line conducted emission test	15.407(b)(6) 15.207	Pass

1. General information

1.1 Identification of the EUT

Applicant	: ZyXEL Communications Corporation
Product	: 802.11a/g Wireless PCI Adapter
Model No.	: AG-320
FCC ID.	: I88AG320
Frequency Range	: 1. 2412 MHz ~ 2462 MHz 2. 5180 MHz ~ 5320 MHz 3. 5745 MHz ~ 5825 MHz
Channel Number (802.11 a+b+g)	: 1. 11Channels for 2412 MHz ~ 2462 MHz 2. 8Channels for 5180 MHz ~ 5320 MHz 3. 5Channels for 5745 MHz ~ 5825 MHz
Frequency of Each Channel (802.11 a+b+g)	: 1. 2412 MHz + 5k MHz, k=0~10 2. 5180 MHz + 20k MHz, k=0~7 3. 5745 MHz + 20k MHz, k=0~4
Type of Modulation	: DSSS, OFDM
Rated Power	: DC 3.3V from Notebook PC
Power Cord	: N/A
Sample Received	: June 13, 2006
Test Date(s)	: June 13, 2006 ~ Jun. 23, 2006

FCC Part 15 B report has been issued for this EUT.

1.2 Additional information about the EUT

The EUT is an 802.11a/g Wireless PCI Adapter, and was defined as information technology equipment.

The EUT meets special requirements for full modular approval on FCC Public Notice DA 00-1407 and the device is only for OEM integrator, please refer the test result in this report.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”.

1.3 Antenna description

The antenna is affixed to the EUT using a unique connector, which allows for replacement of a broken antenna, but DOES NOT use a standard antenna jack or electrical connector.

Antenna 1

Antenna No. : C034-650521-A
Antenna Gain : 1. 2dBi (2.4GHz ~ 2.5GHz)
2. 2.2dBi (4.9GHz ~ 5.825GHz)
Antenna Type : Dipole antenna.
Connector Type : SMA Reverse

Antenna 2

Antenna No. : C034-510506-A
Antenna Gain : 1. 2dBi (2.4GHz ~ 2.5GHz)
2. 3dBi (4.9GHz ~ 5.825GHz)
Antenna Type : Dipole antenna.
Connector Type : SMA Reverse

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Moniter	Benq	FP557	99L63726A132600064TAA6A1	FCC DoC Approved
Keyborad	Logitech	Y-BF37	MCT32000523	FCC DoC Approved
PRINTER	HP	DeskJet 400	SG5CQ170C0	FCC DoC Approved
Mouse	LOGITECH	M-S34	LZA82706831	FCC DoC Approved
Printer	Dynalink	V1456VQE	00V230A00051494	FCC DoC Approved
PC	Compaq	N/A	N/A	FCC DoC Approved

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Section §15.205、§15.207、§15.209、§15.247 and ANSI C63.4/2003.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

The EUT was performed according to the procedures in FCC Part 15 Subpart E Section §15.207、§15.209 、§15.407 and ANSI C63.4/2001.

The AC power conducted emissions was invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz. (15.207 paragraph)

Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading recorded also on the report.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band were all meet limit requirement, thus we evaluate the EUT pass the specified test.

The EUT setup configurations please refer to the photo of test configuration in item.

2.2 Operation mode

The EUT was supplied with 3.3Vdc from Notebook PC and it was running in operating mode.

Plug the EUT into Notebook via a PCMCIA to CF Card Simulator. Power on the notebook then run the test program “ZD12X Evalution Tool”.

The EUT was transmitted continuously during the test.

With individual verifying, the maximum output power was found at 1Mbps data rate for 802.11b mode, 6Mbps data rate for 802.11g mode and 6Mbps data rate for 802.11a mode. The final tests were executed under these conditions and recorded in this report individually.

After verifying two antennas (Antenna 1 and Antenna 2). The worst adapter was found in Antenna 1.

2.3 Test equipment

Equipment	Brand	Frequency range	Model No.	Intertek ID No.	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	EC303	04/17/2007
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	EC317	08/07/2006
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/24/2006
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2006
Horn Antenna	SCHWARZBECK	1GHz~18GHz	BBHA 9120 D	EC371	12/22/2007
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	EC351	07/08/2007
Bilog Antenna	SCHWARZBECK	25MHz~2GHz	VULB 9168	EC347	12/23/2007
Pre-Amplifier	MITEQ	100MHz~26.5GHz	919981	EC373	02/11/2007
Wideband Peak Power Meter/ Sensor	Anritsu	100MHz~18GHz	ML2497A/ MA2491A	EC396	11/10/2006
Controller	HDGmbH	N/A	CM 100	EP346	N/A
Antenna Tower	HDGmbH	N/A	MA 240	EP347	N/A
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	01/13/2007

Note: 1. The above equipments are within the valid calibration period.
2. The test antennas (receiving antenna) are calibration per 3 years.

3. Minimum 6dB Bandwidth test (FCC 15.247)

3.1 Operating environment

Temperature:	25	℃
Relative Humidity:	60	%
Atmospheric Pressure:	1023	hPa

3.2 Test setup & procedure

The minimum 6dB bandwidth per FCC §15.247(a)(2) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100kHz, the video bandwidth set at 100kHz, and the SPAN>>RBW. The test was performed at 3 channels (lowest, middle and highest channel). The minimum 6-dB modulation bandwidth is in the following Table.

3.3 Measured data of Minimum 6dB Bandwidth test results

Test Mode: 802.11b(DSSS Modulation) operating mode

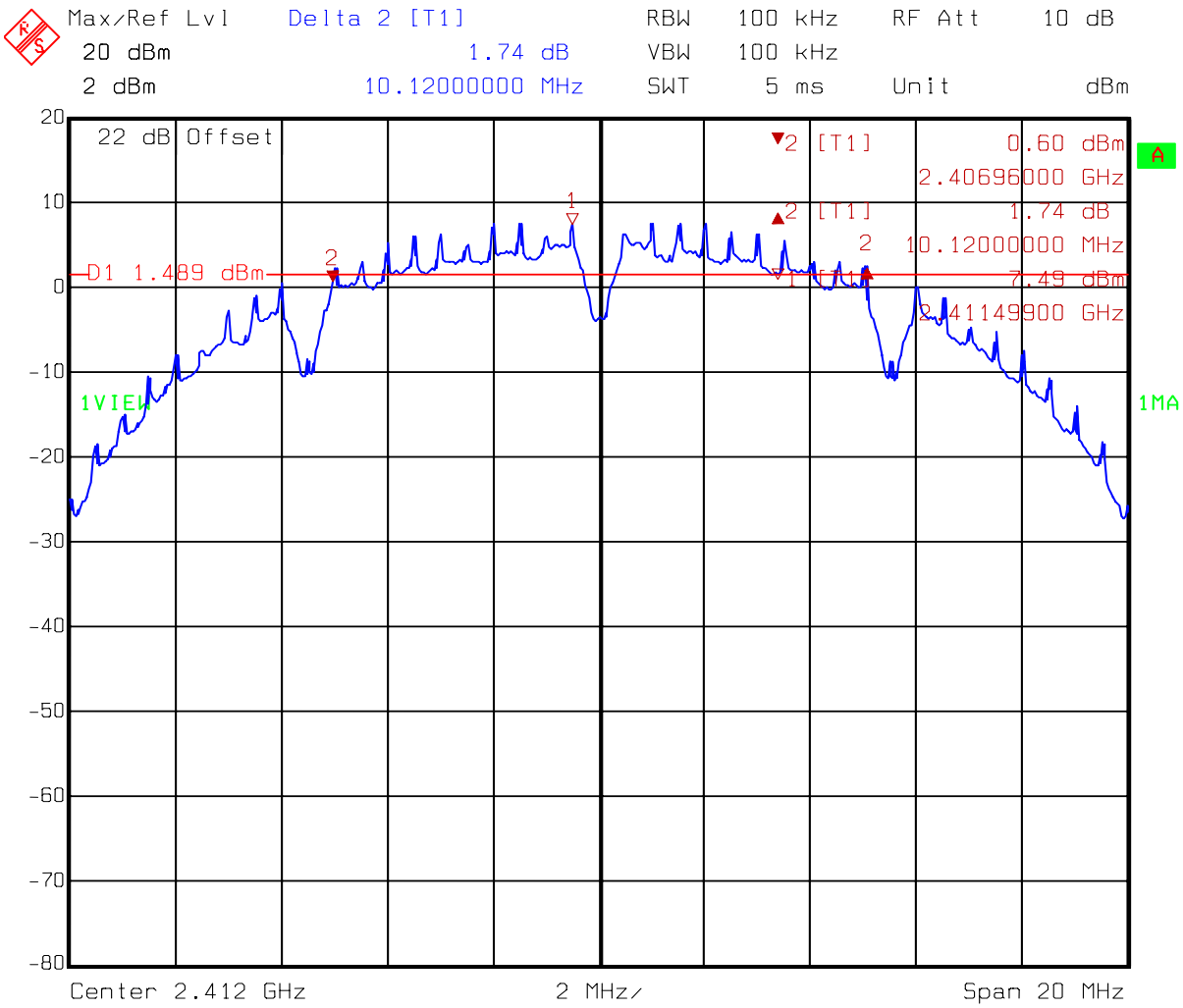
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	10.12	＞500kHz
6 (middle)	2437	10.16	＞500kHz
11 (highest)	2462	9.68	＞500kHz

Test Mode: 802.11g(OFDM Modulation) operating mode

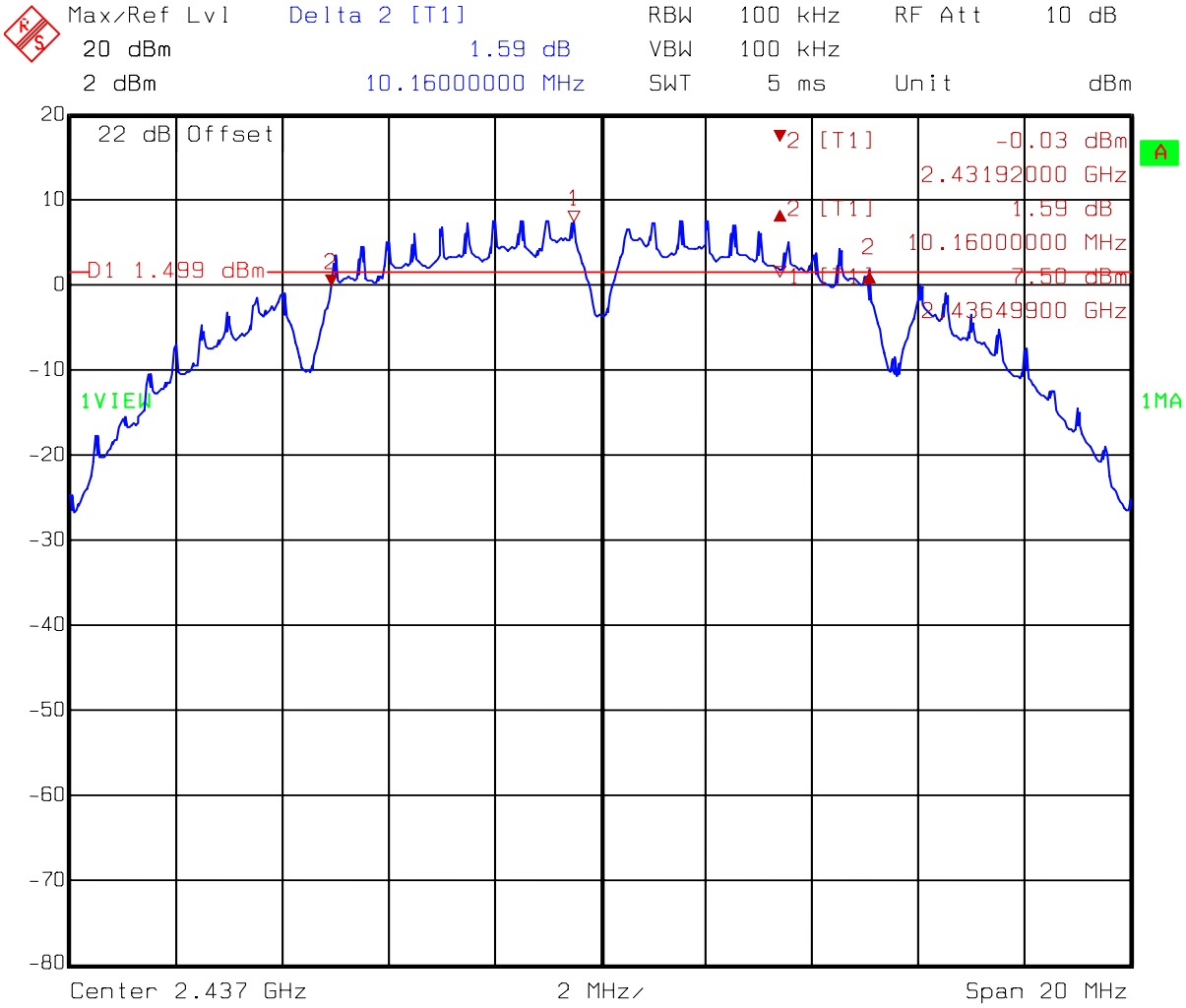
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1 (lowest)	2412	16.60	＞500kHz
6 (middle)	2437	16.60	＞500kHz
11 (highest)	2462	16.60	＞500kHz

Please see the plot below.

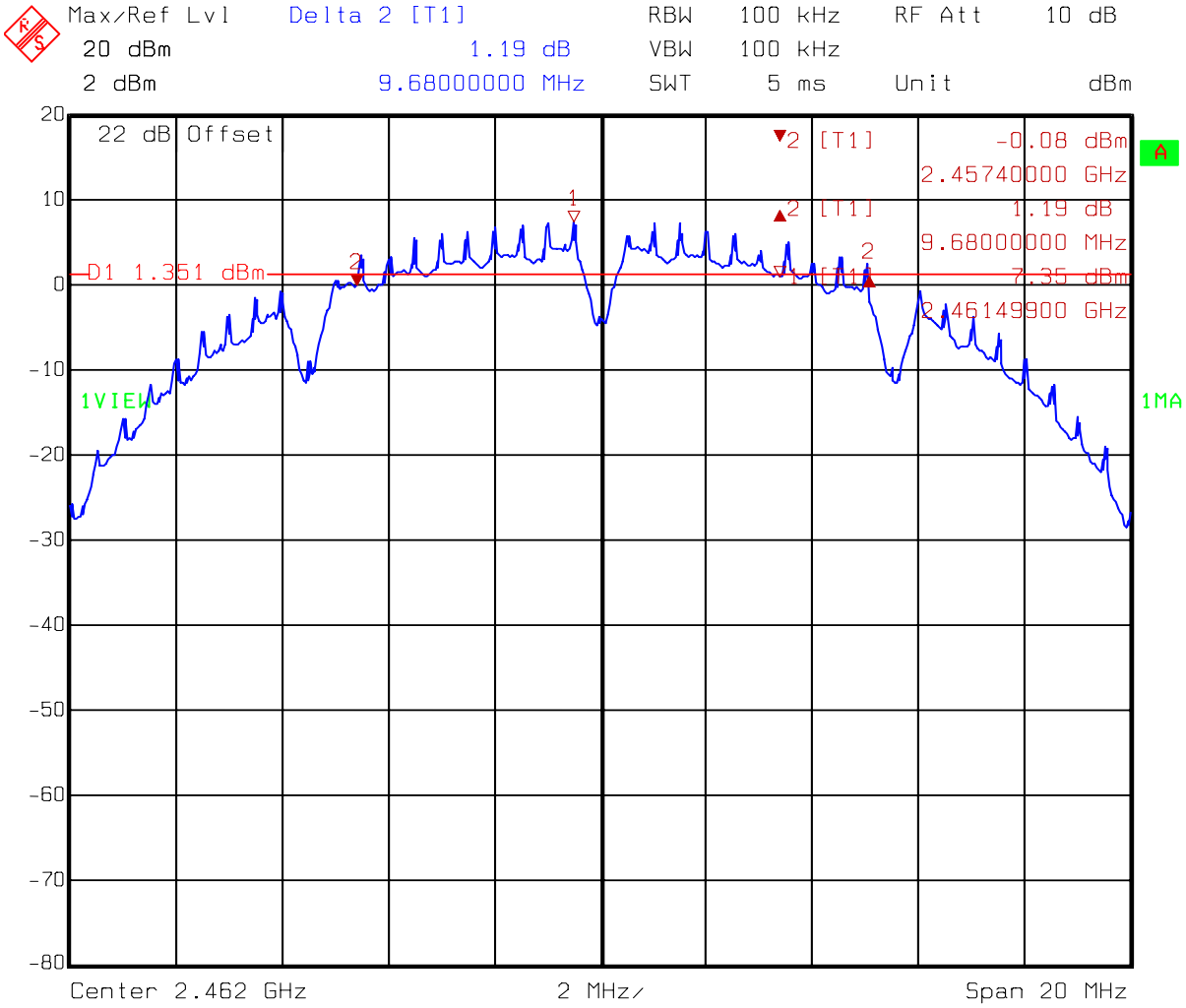
Test Mode: 802.11b(DSSS Modulation) operating mode



Title: 6dB Bandwidth
Comment A: Channel 01 at 802.11b mode
Date: 16.JUN.2006 09:21:38

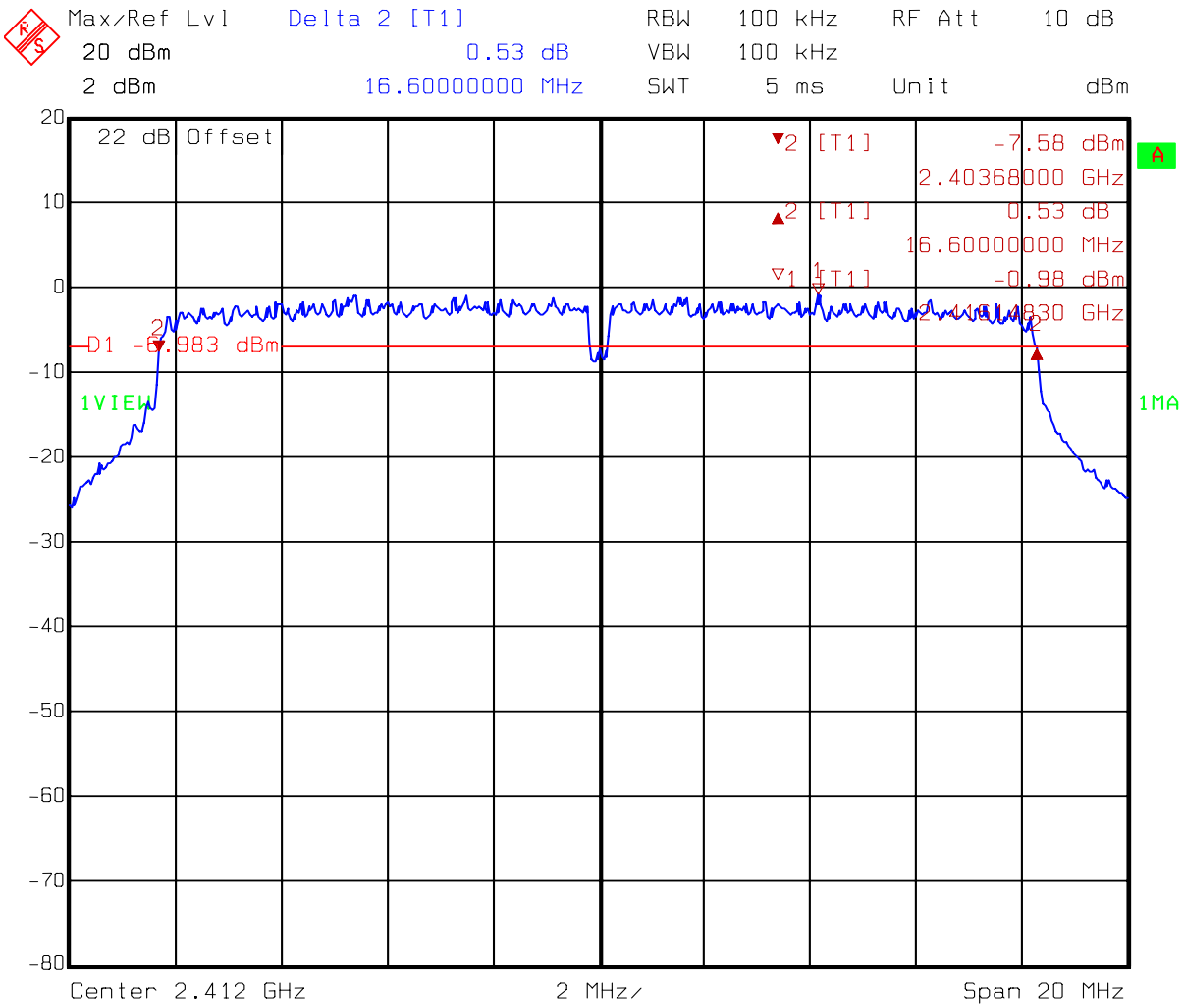


Title: 6dB Bandwidth
Comment A: Channel 06 at 802.11b mode
Date: 16.JUN.2006 09:30:38

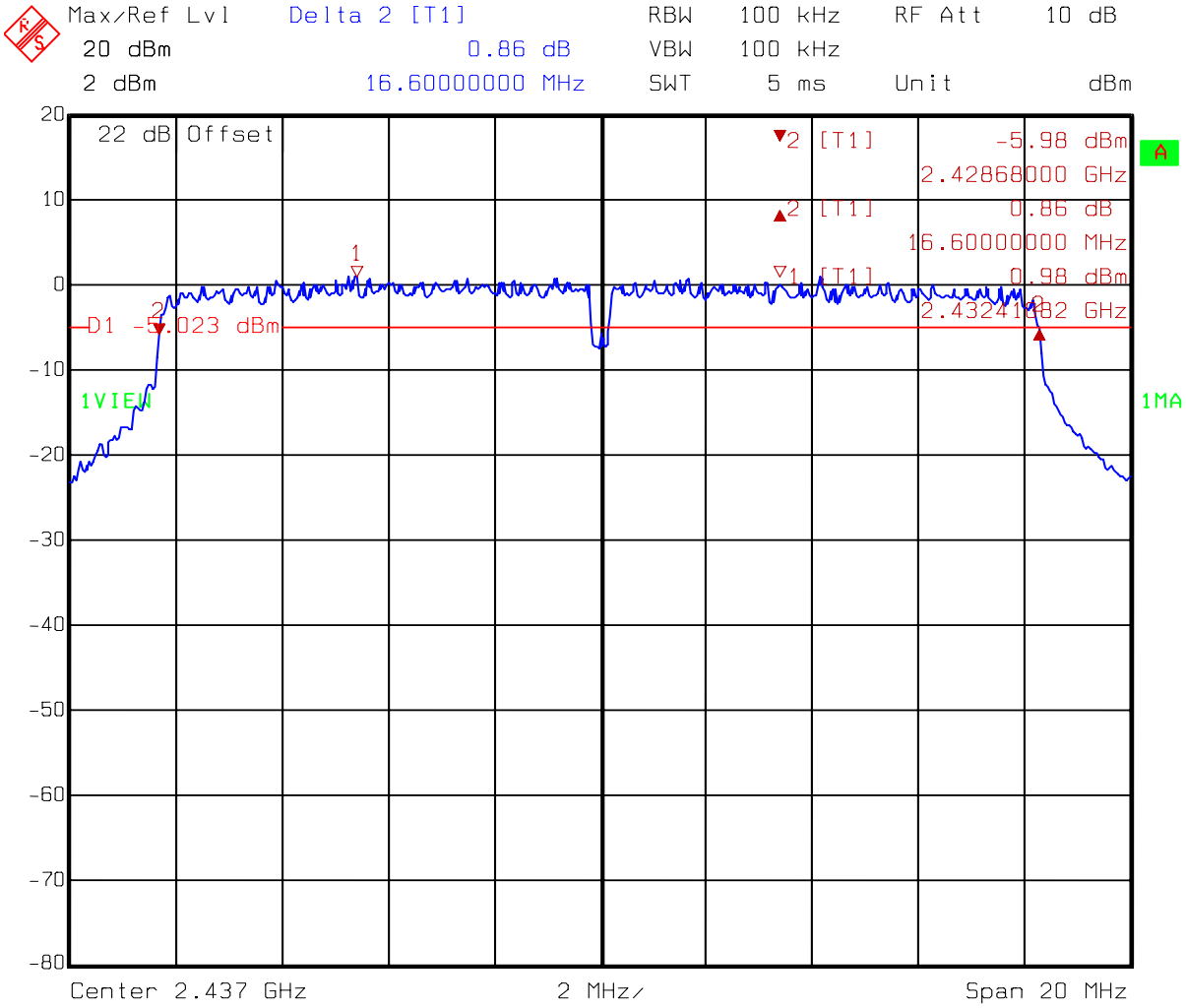


Title: 6dB Bandwidth
Comment A: Channel 11 at 802.11b mode
Date: 16.JUN.2006 09:33:59

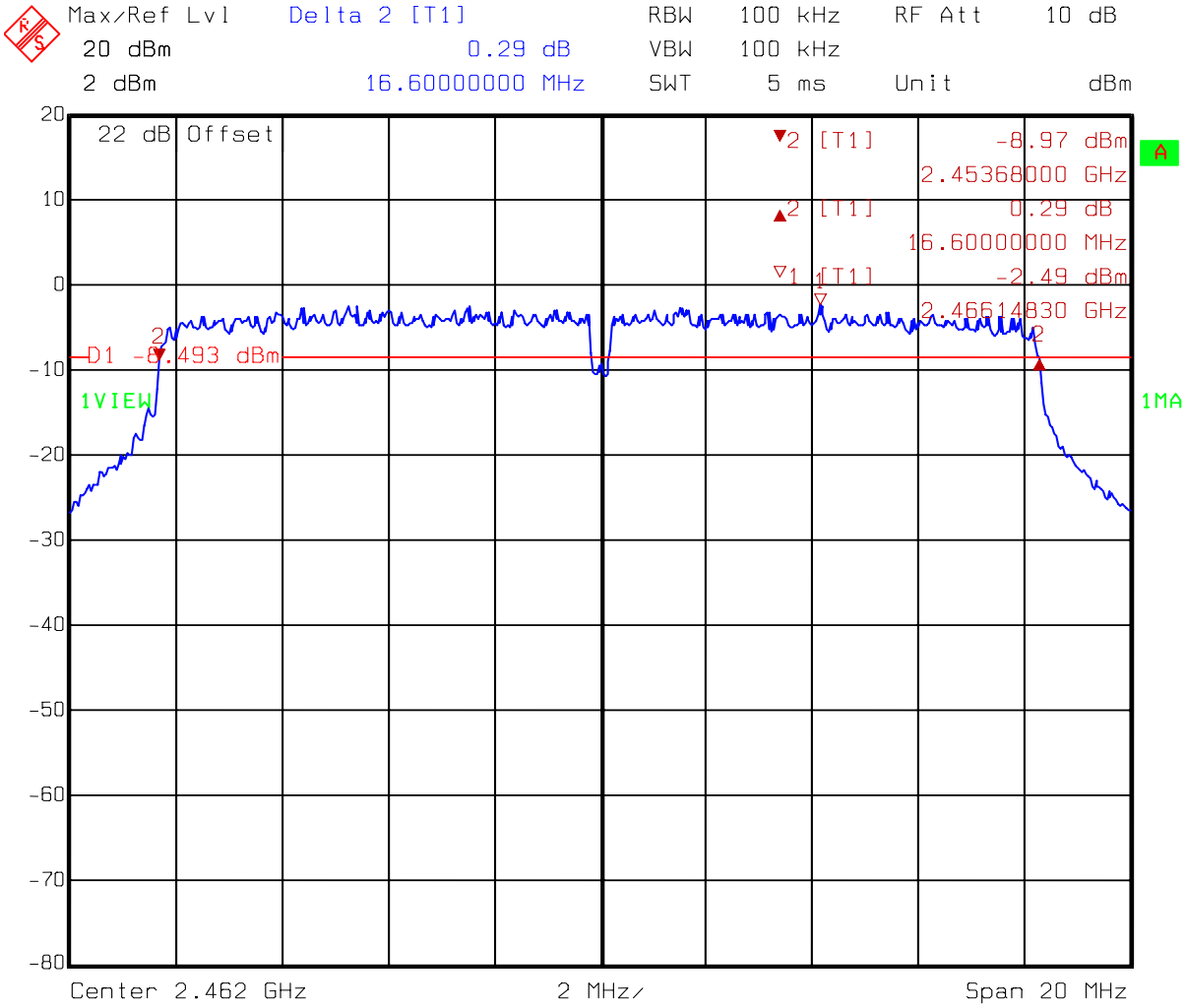
Test Mode: 802.11g(OFDM Modulation) operating mode



Title: 6dB Bandwidth
Comment A: Channel 01 at 802.11g mode
Date: 16.JUN.2006 09:40:01



Title: 6dB Bandwidth
Comment A: Channel 06 at 802.11g mode
Date: 16.JUN.2006 09:45:04



Title: 6dB Bandwidth
Comment A: Channel 11 at 802.11g mode
Date: 16.JUN.2006 09:47:35

4. Maximum Output Power test (FCC 15.247)

4.1 Operating environment

Temperature: 25 ℃
Relative Humidity: 55 %
Atmospheric Pressure: 1023 hPa

4.2 Test setup & procedure

The power output per FCC §15.247(b) was measured on the EUT using a 50 ohm SMA cable connected to peak power meter via power sensor. Power was read directly and cable loss correction (2 dB) was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel).

4.3 Measured data of Maximum Output Power test results

Test Mode: 802.11b(DSSS Modulation) operating mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	2	16.81	19.39	86.90	30
6 (middle)	2437	2	16.75	19.41	87.30	30
11 (highest)	2462	2	16.58	18.89	77.45	30

Remark:

Conducted Peak Output Power = Reading + C.L.

Test Mode: 802.11g(OFDM Modulation) operating mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	2	20.64	22.51	178.24	30
6 (middle)	2437	2	20.34	23.52	224.91	30
11 (highest)	2462	2	20.32	21.82	152.05	30

Remark:

Conducted Peak Output Power = Reading + C.L.

5. RF Antenna Conducted Spurious test

5.1 Operating environment

Temperature:	25	℃
Relative Humidity:	58	%

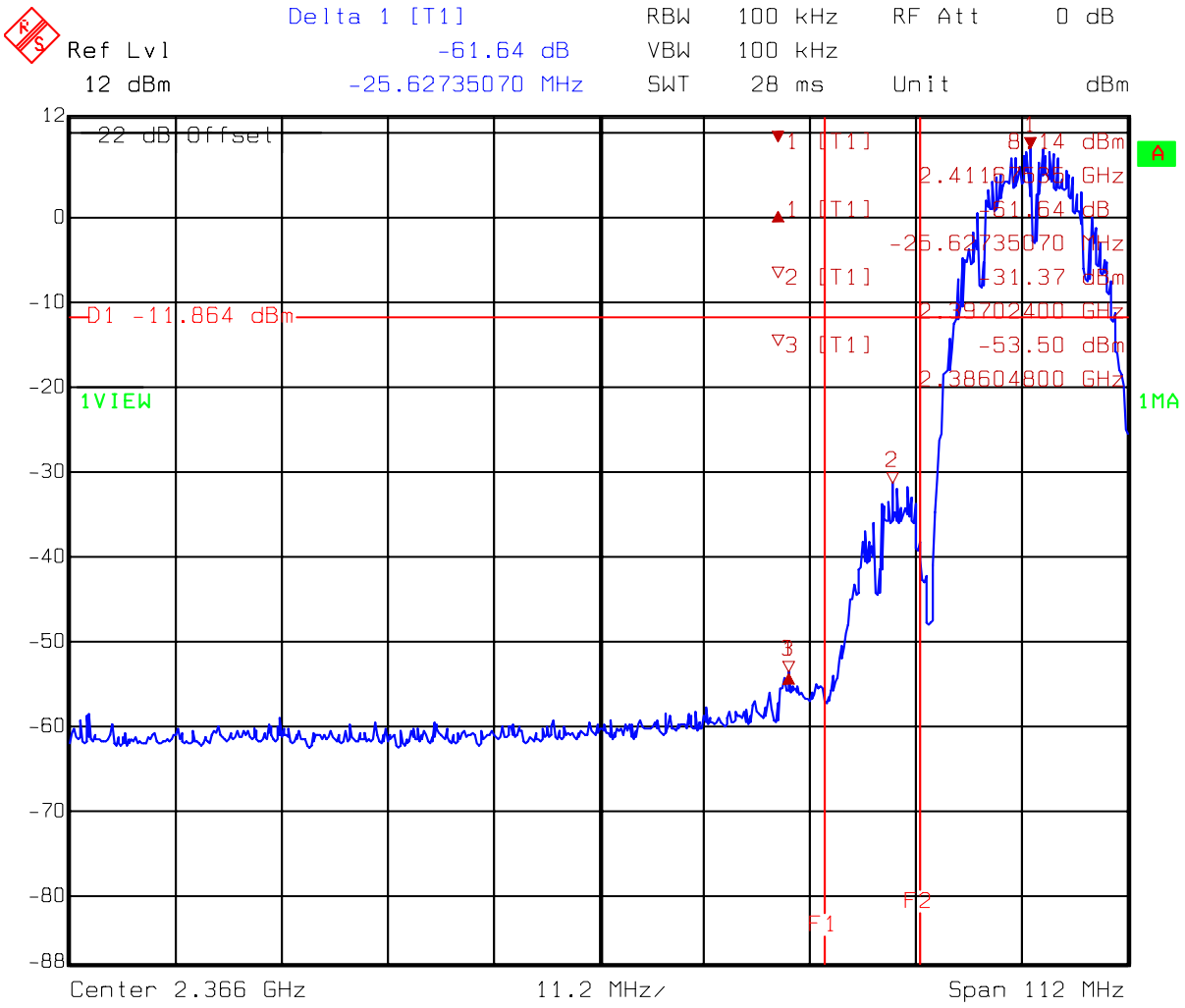
5.2 Test setup & procedure

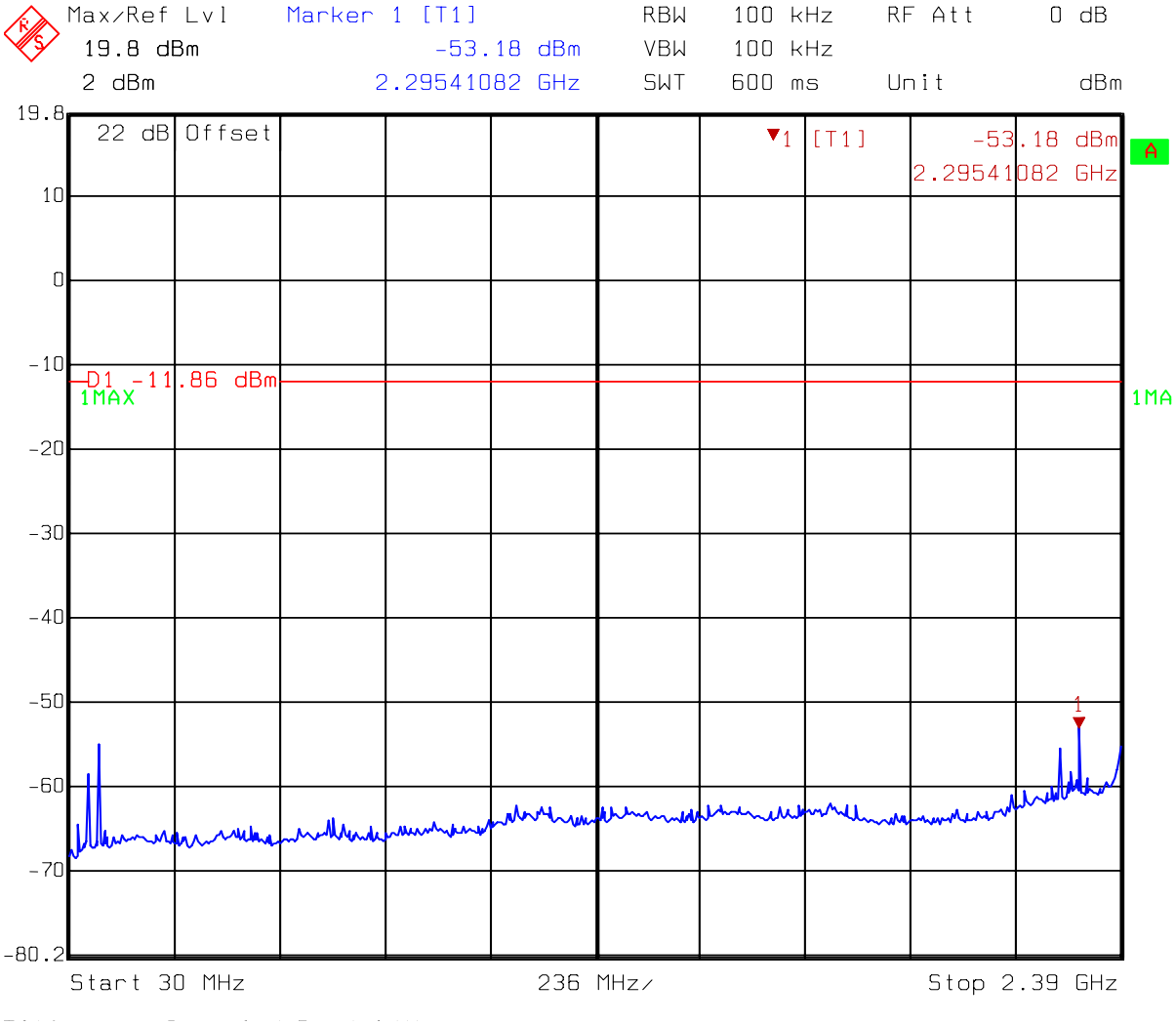
The measurements were performed from 30MHz to 25GHz RF antenna conducted per FCC 15.247 (c) was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.
Harmonics and spurious noise must be at least 20dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. The table below is the results from the highest emission for each channel within the authorized band. This table was used to determine the spurious limits for each channel.

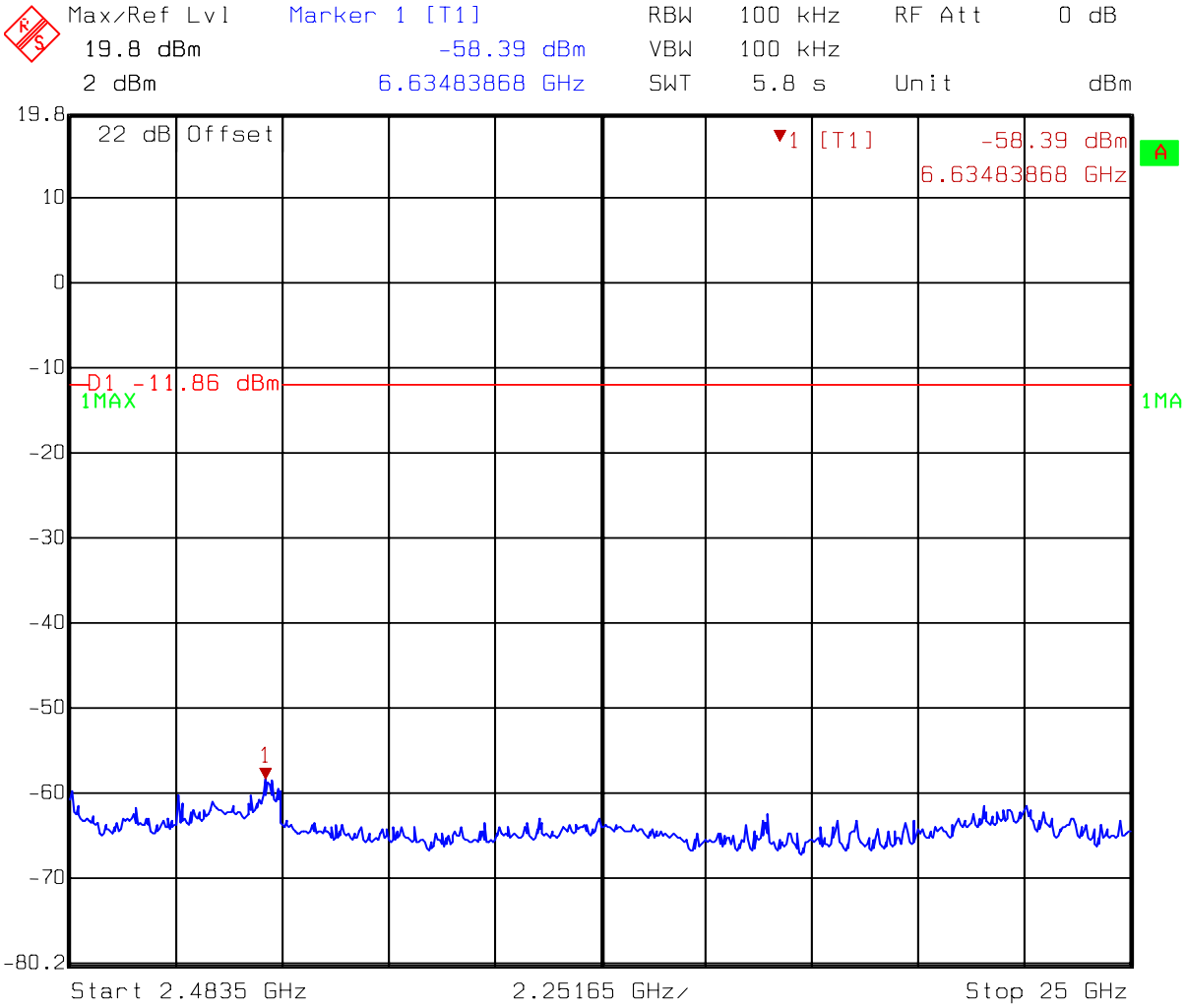
5.3 Measured data of the highest RF Antenna Conducted Spurious test result

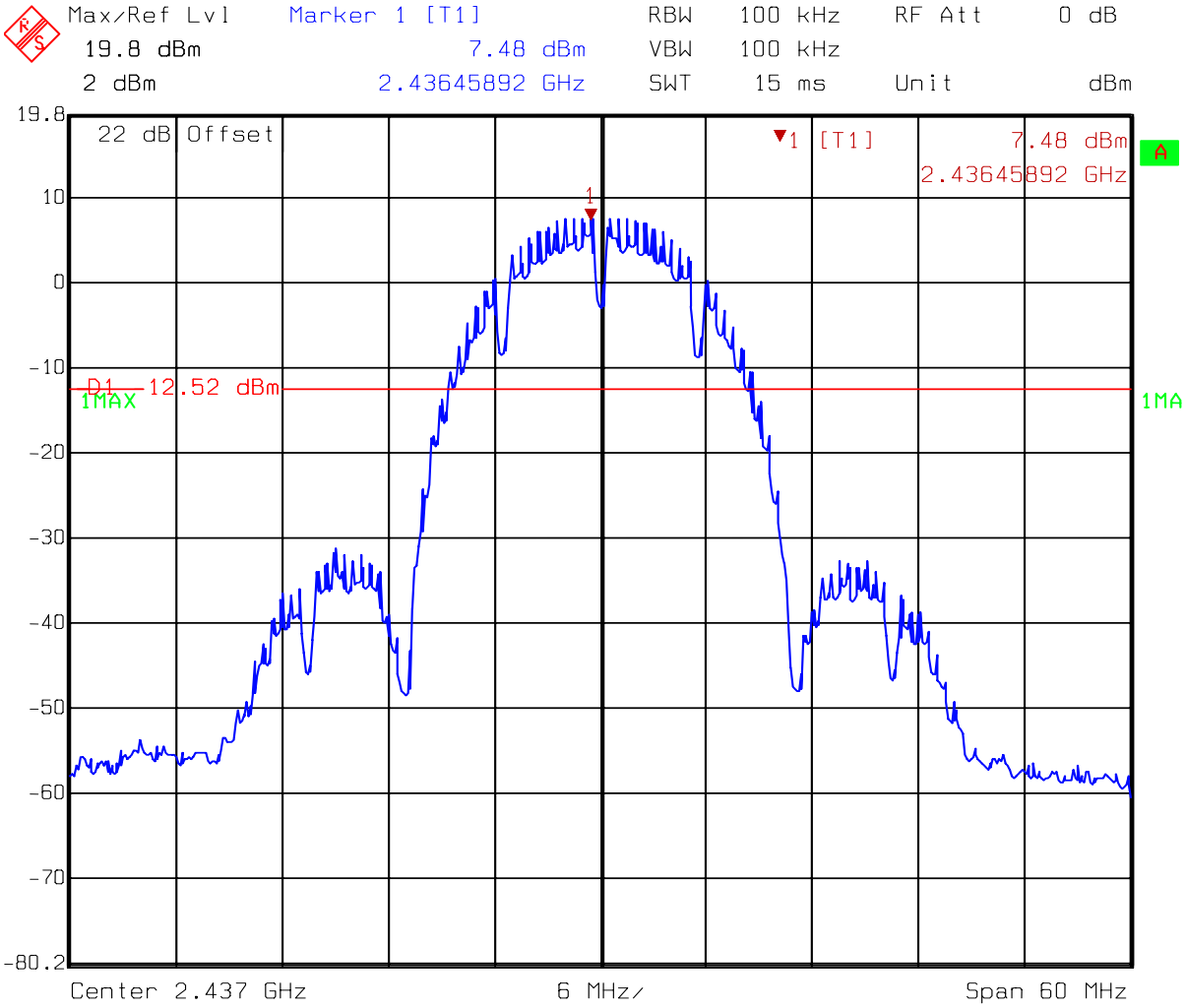
The test results please see the plot below.

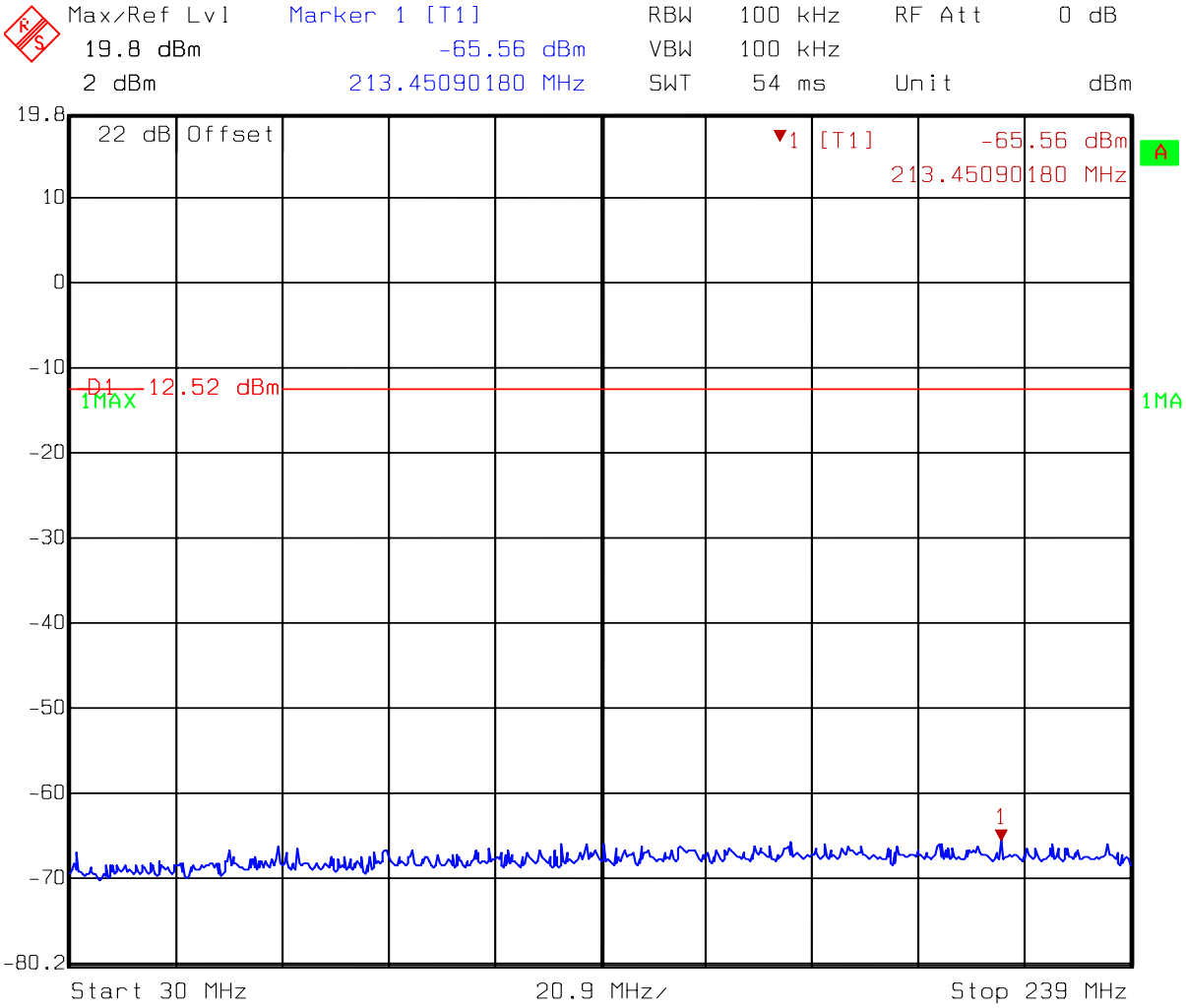
Test Mode: 802.11b(DSSS Modulation) operating mode

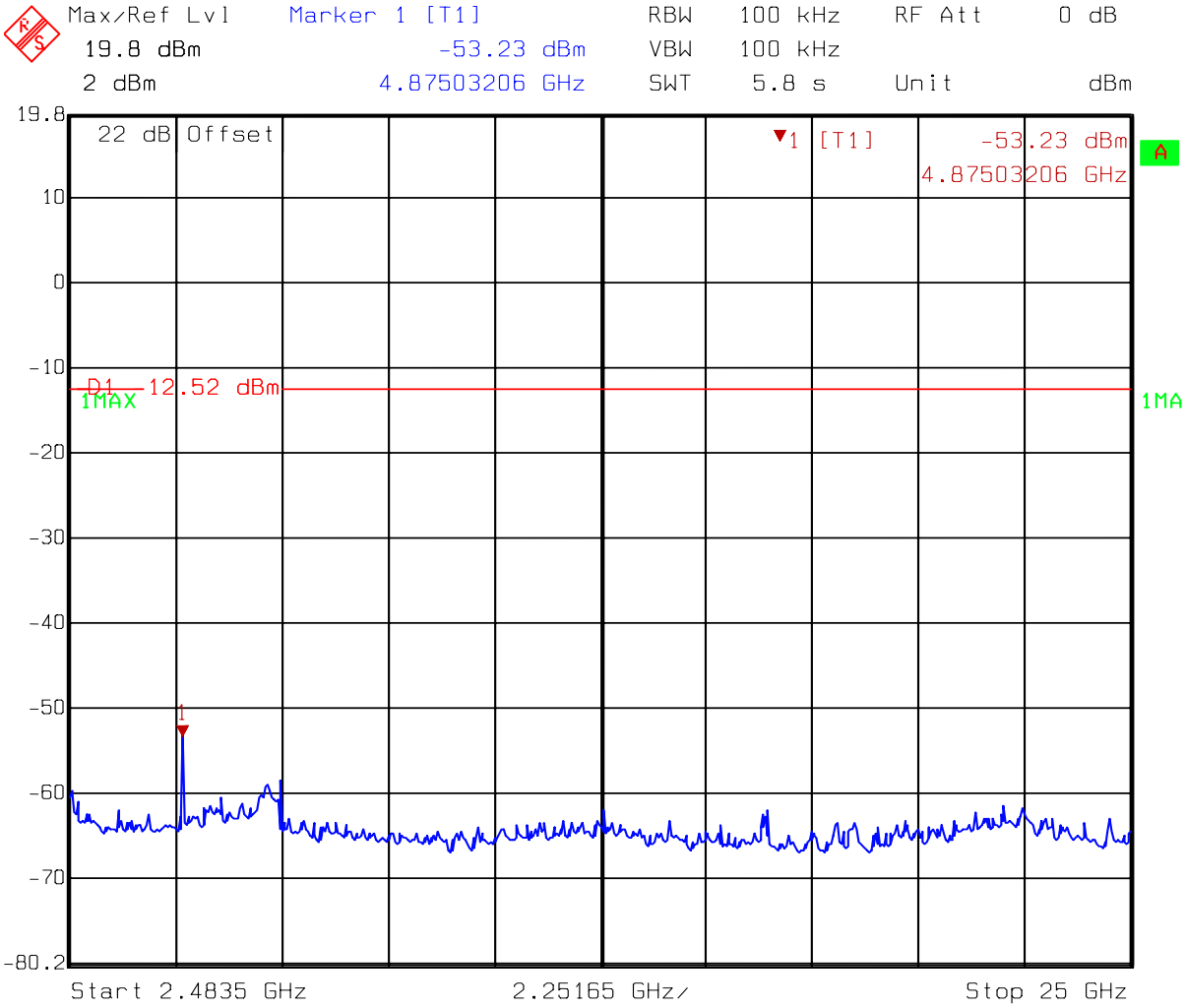


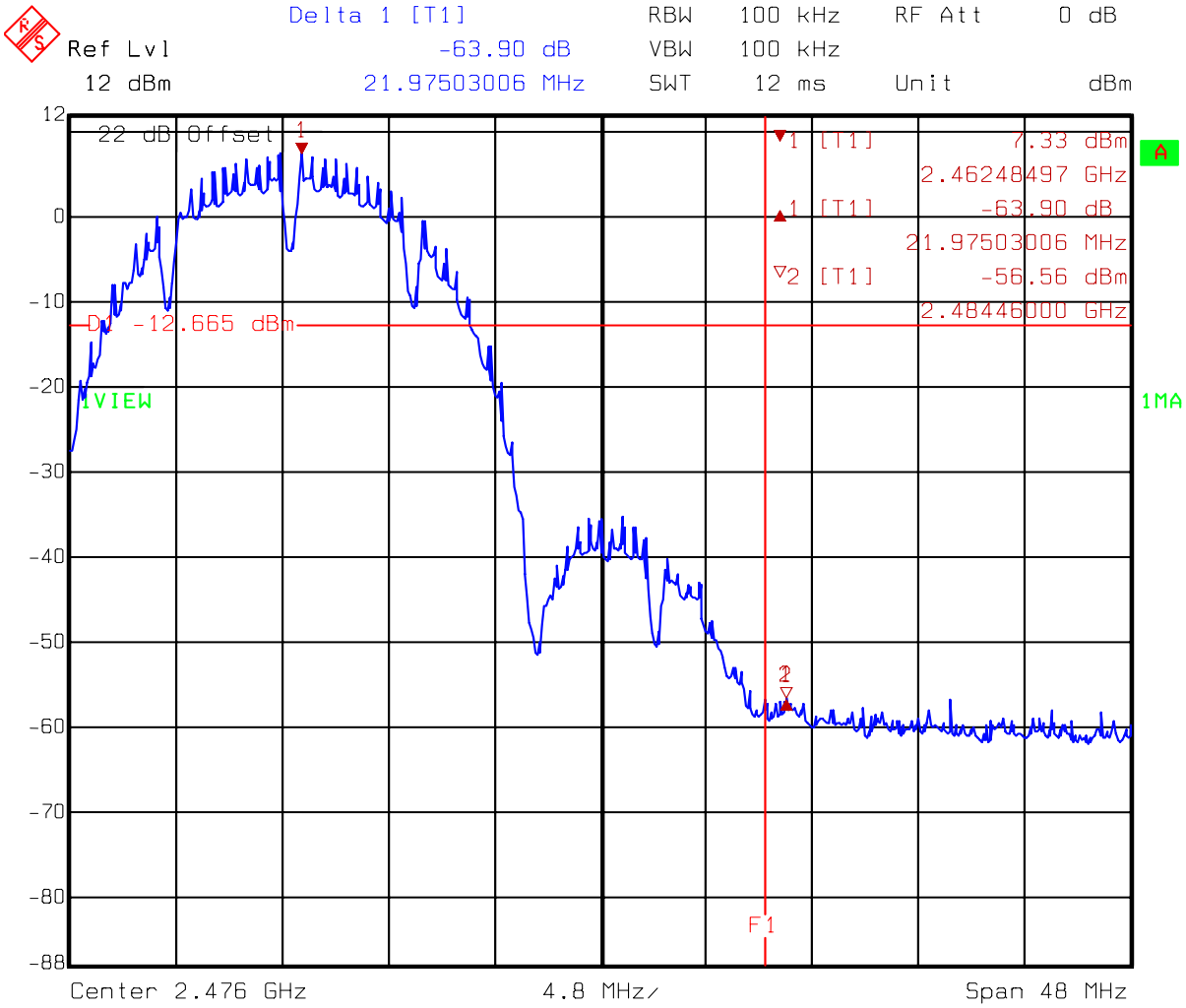

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-53.18 dBm
2.29541082 GHz
RBW 100 kHz
VBW 100 kHz
SWT 600 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-53.18 dBm
2.29541082 GHz
D1 -11.86 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
236 MHz/
Stop 2.39 GHz

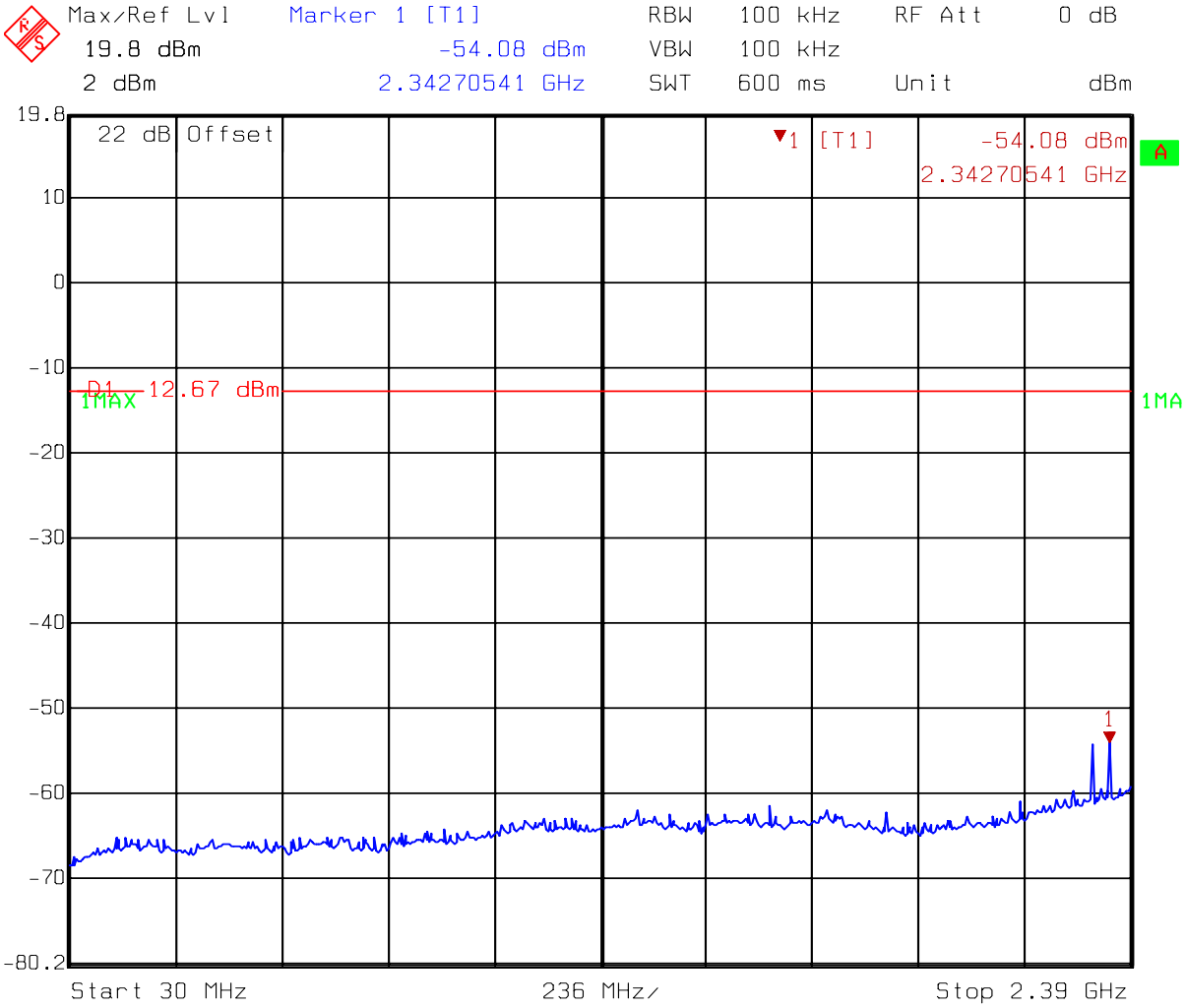

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-58.39 dBm
6.63483868 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-58.39 dBm
6.63483868 GHz
D1 -11.86 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz

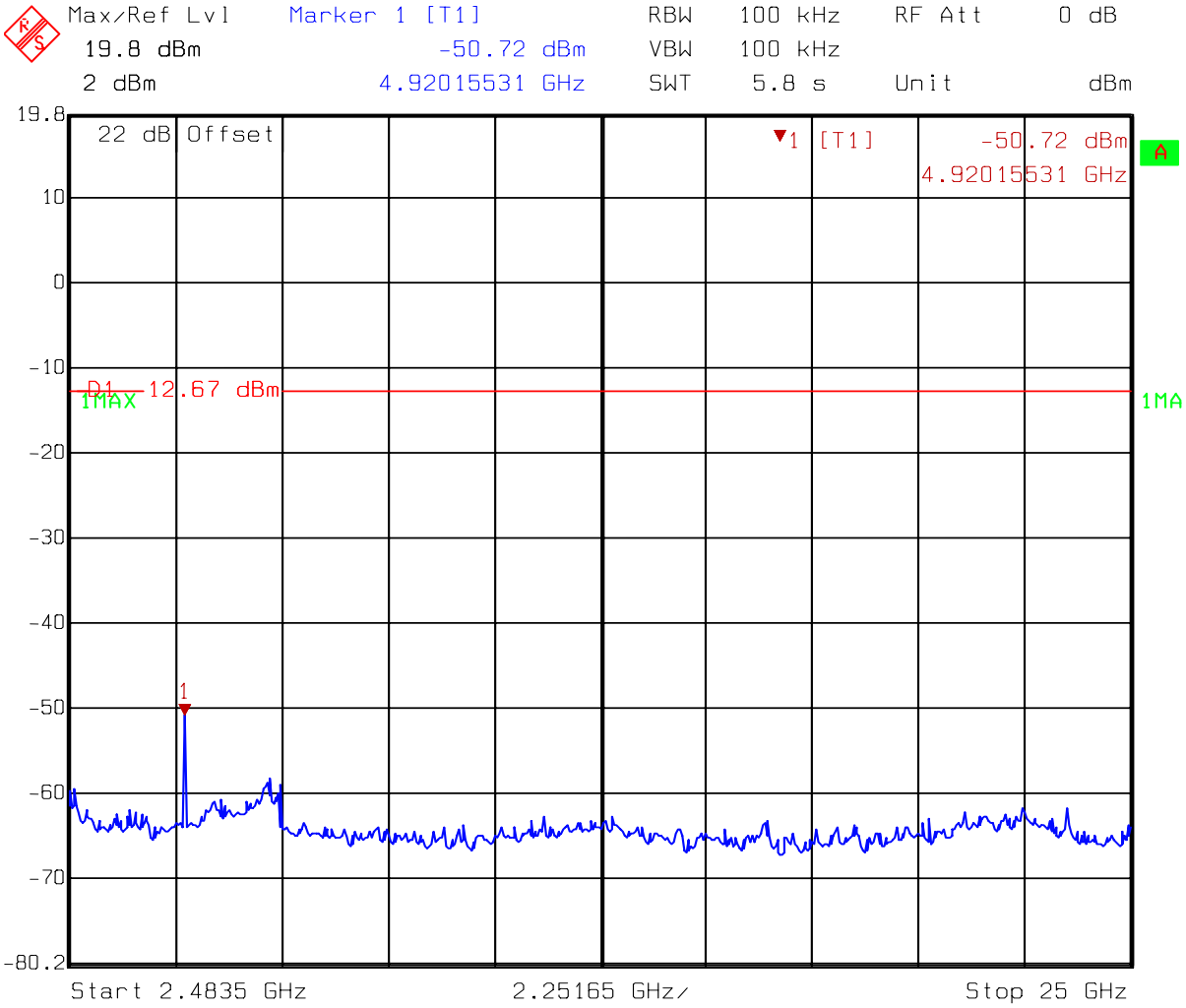

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
7.48 dBm
2.43645892 GHz
RBW 100 kHz
VBW 100 kHz
SWT 15 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
7.48 dBm
2.43645892 GHz
D1 12.52 dBm
1MAX
1MA
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Center 2.437 GHz
6 MHz/
Span 60 MHz


Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-65.56 dBm
213.45090180 MHz
RBW 100 kHz
VBW 100 kHz
SWT 54 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-65.56 dBm
213.45090180 MHz
D1 12.52 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
20.9 MHz/
Stop 239 MHz

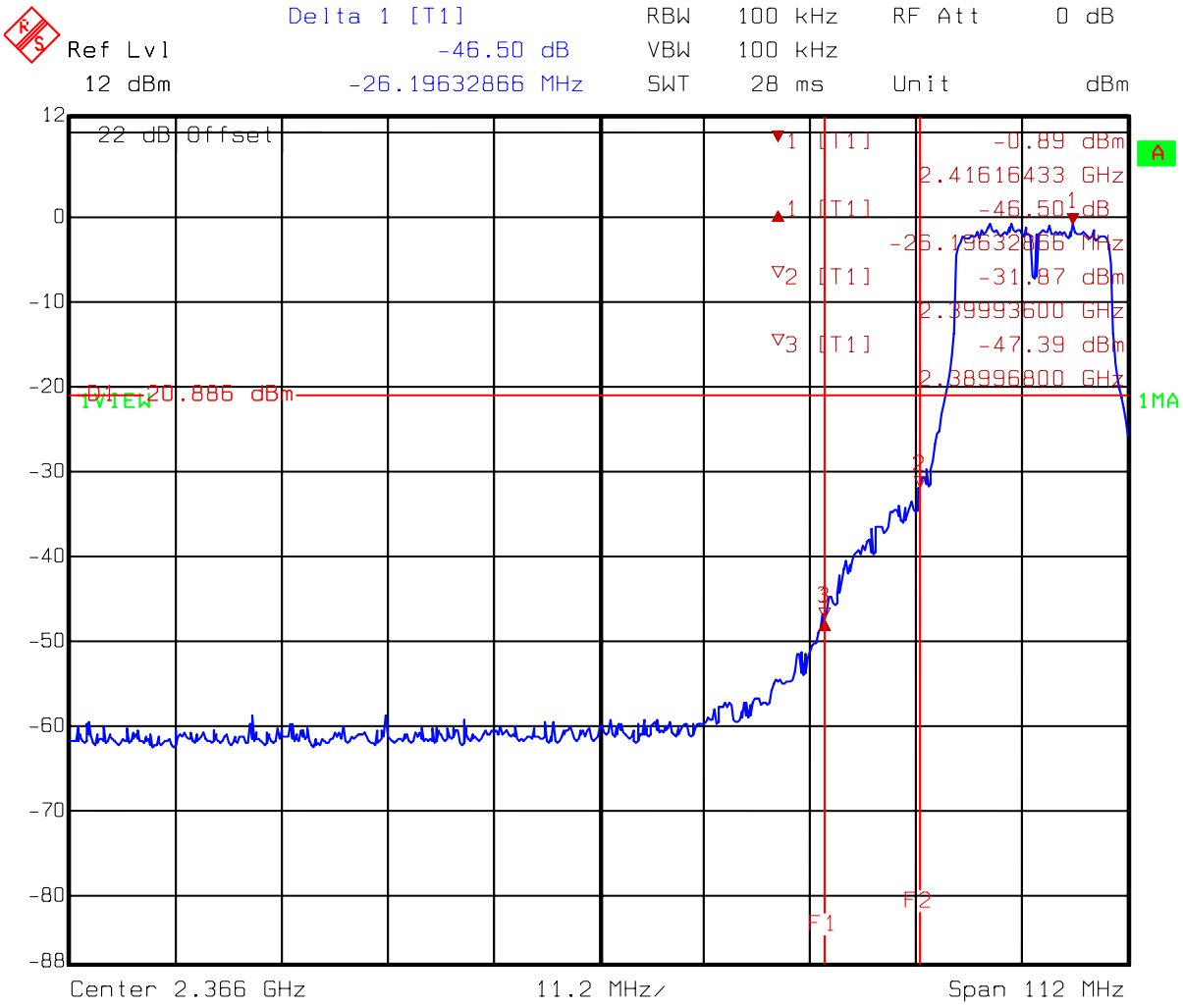

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-53.23 dBm
4.87503206 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-53.23 dBm
4.87503206 GHz
D1 12.52 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz

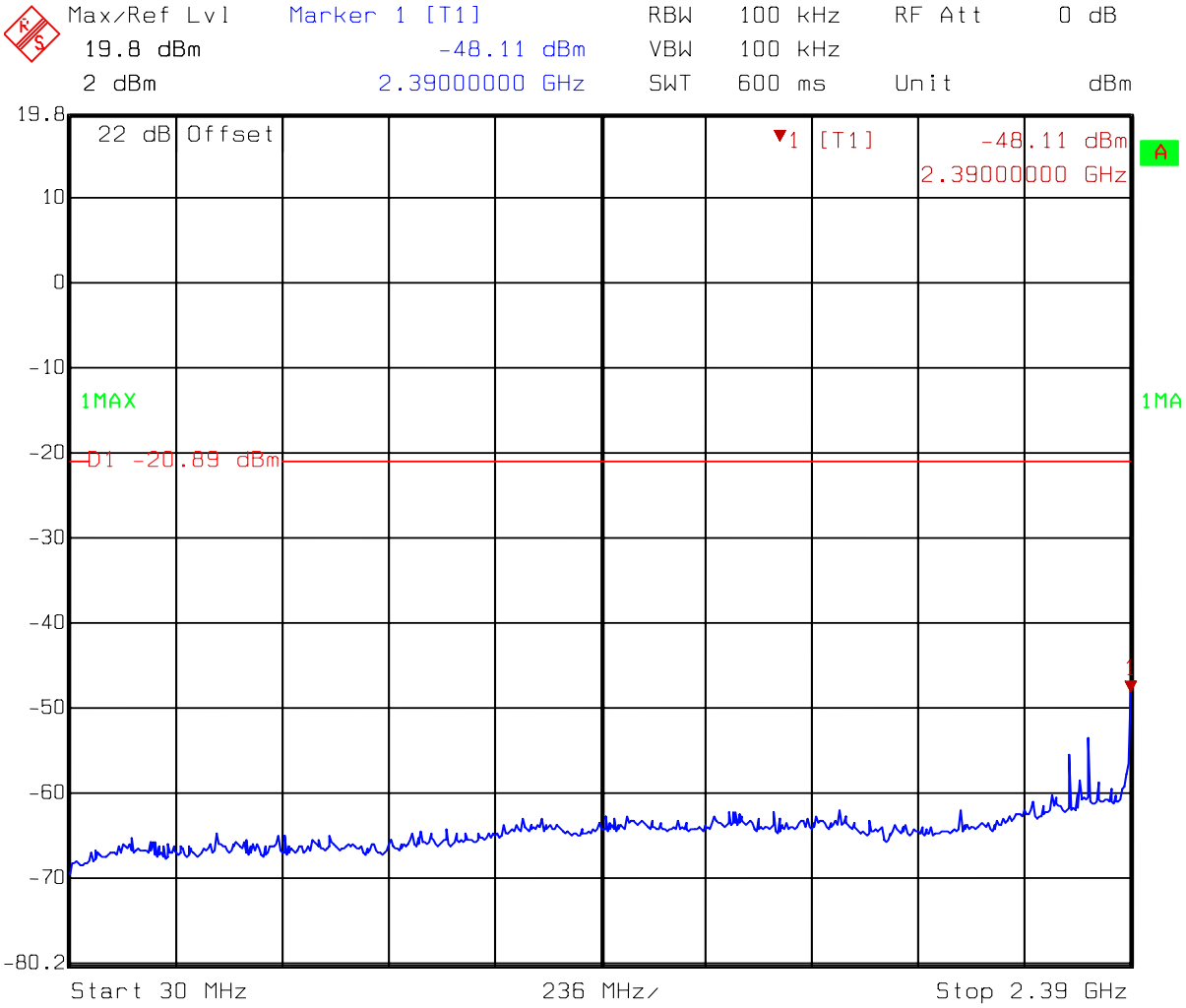

Delta 1 [T1]
RBW 100 kHz
RF Att 0 dB
Ref Lvl
-63.90 dB
VBW 100 kHz
12 dBm
21.97503006 MHz
SWT 12 ms
Unit dBm
22 dB Offset
1 [T1] 7.33 dBm
2.46248497 GHz
1 [T1] -63.90 dB
21.97503006 MHz
2 [T1] -56.56 dBm
2.48446000 GHz
D1 -12.665 dBm
1VIEW
1MA
A
12
0
-10
-20
-30
-40
-50
-60
-70
-80
-88
F1
Center 2.476 GHz
4.8 MHz/
Span 48 MHz

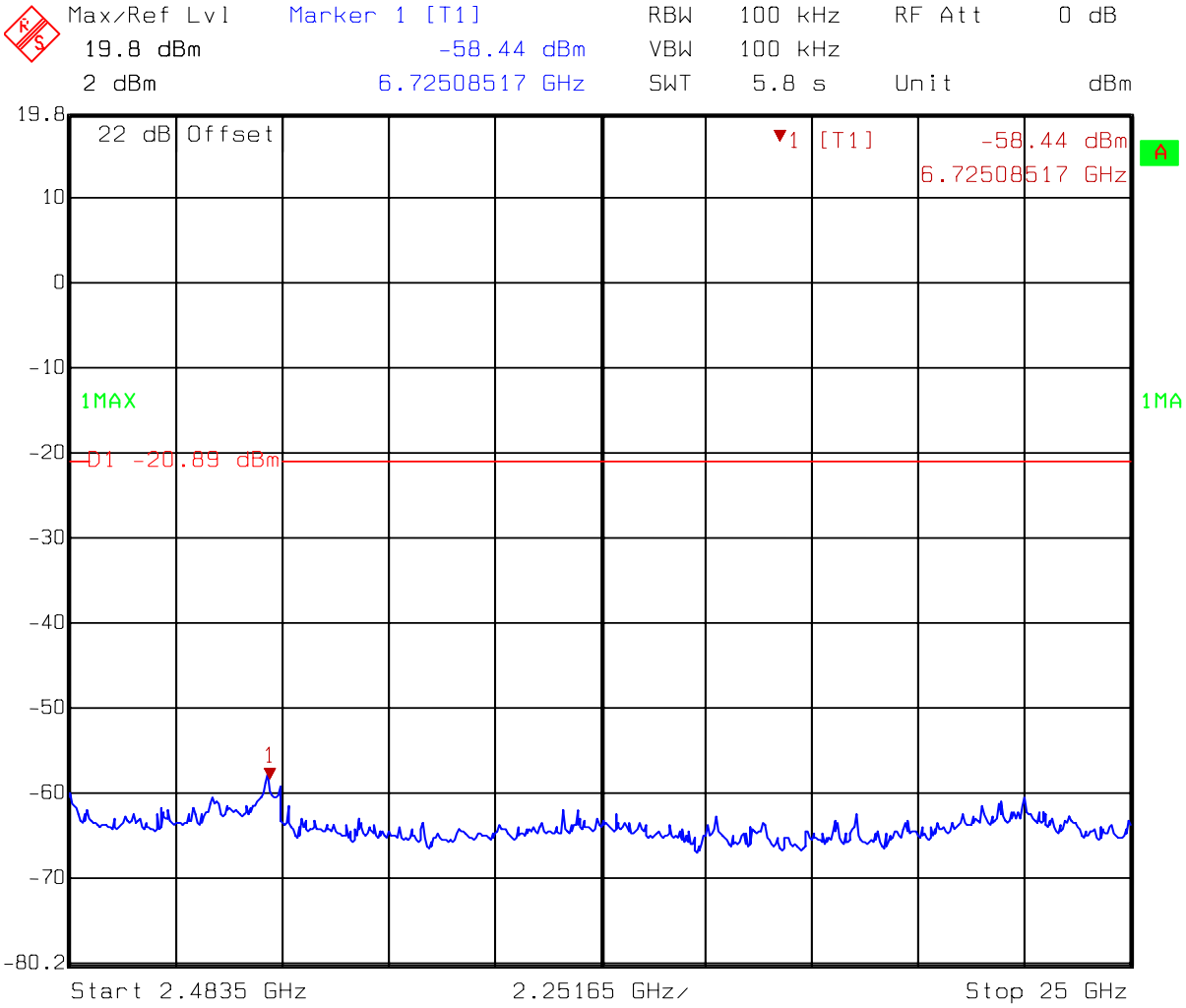

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-54.08 dBm
2.34270541 GHz
RBW 100 kHz
VBW 100 kHz
SWT 600 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-54.08 dBm
2.34270541 GHz
D1 12.67 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
236 MHz/
Stop 2.39 GHz

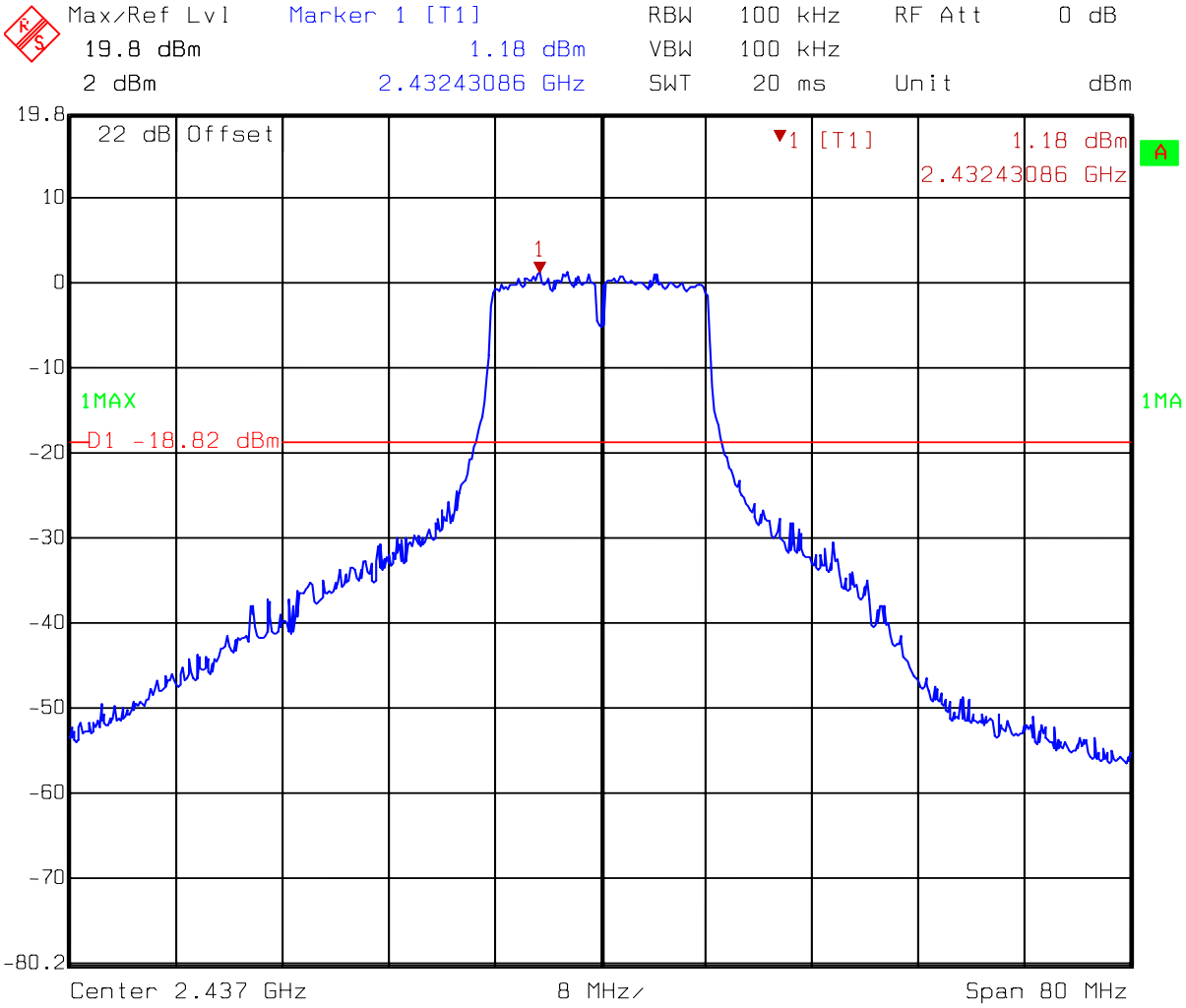

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-50.72 dBm
4.92015531 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-50.72 dBm
4.92015531 GHz
D1 12.67 dBm
1MAX
1MA
A
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz

Test Mode: 802.11g(OFDM Modulation) operating mode

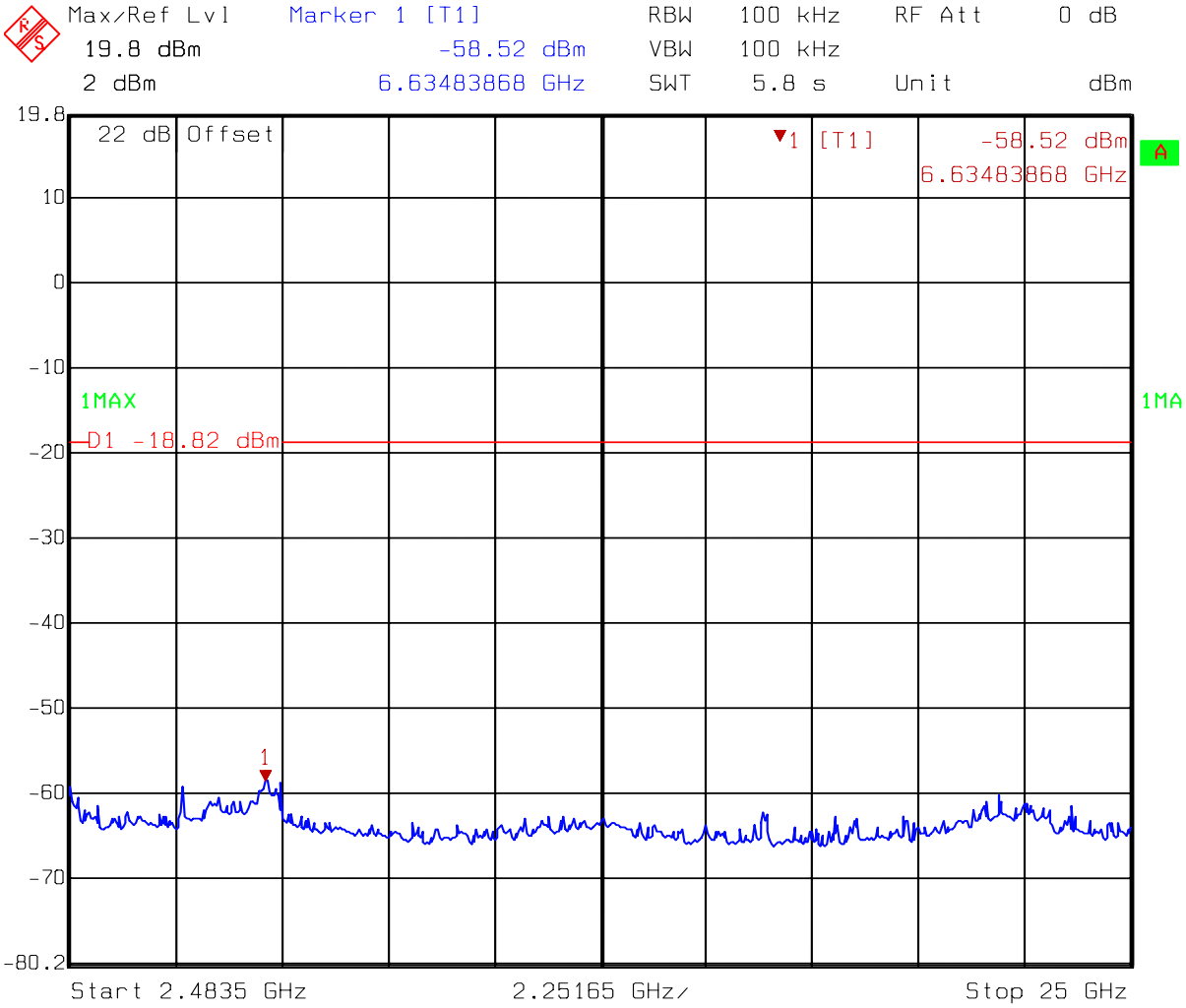


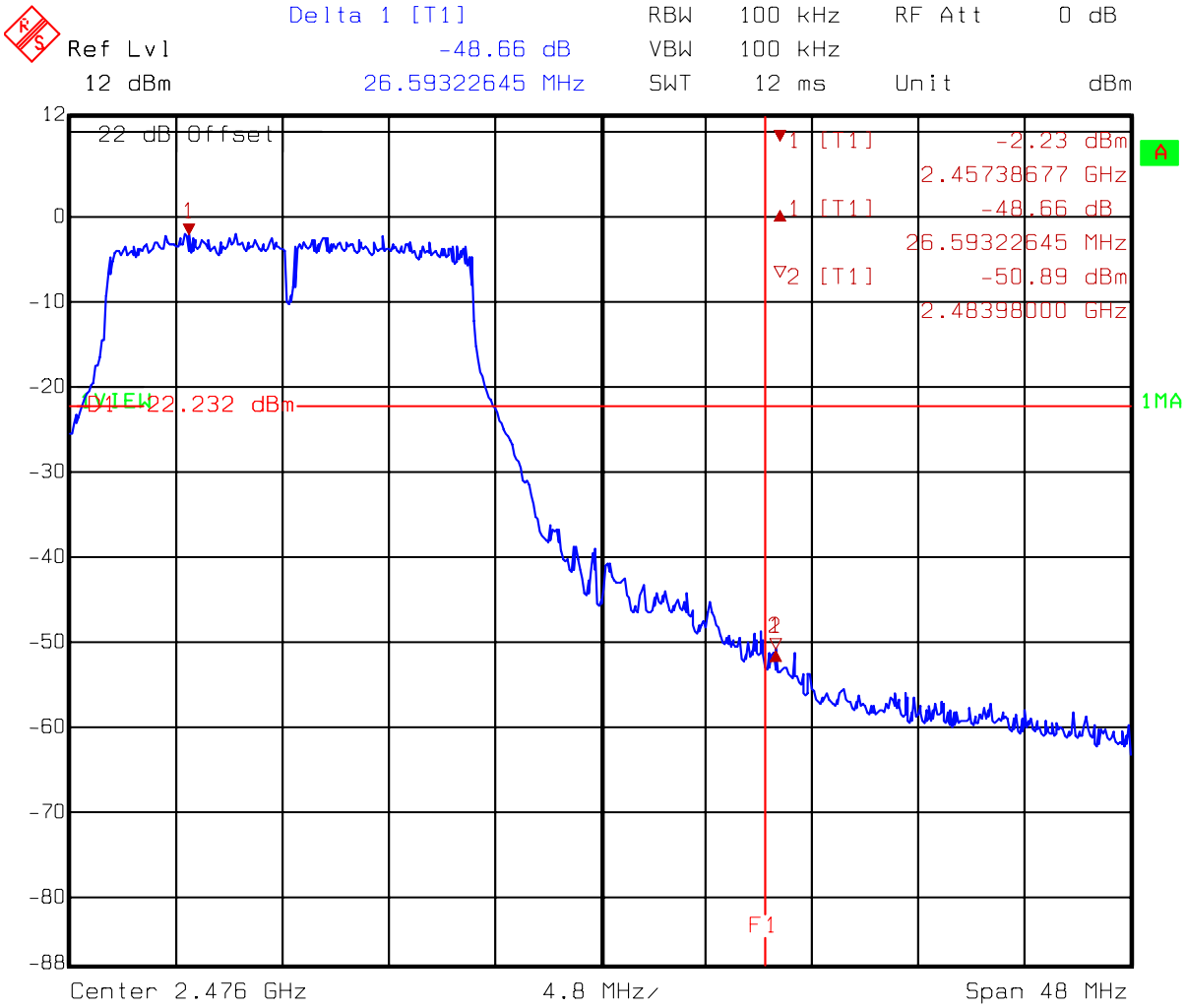

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-48.11 dBm
2.39000000 GHz
RBW 100 kHz
VBW 100 kHz
SWT 600 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-48.11 dBm
2.39000000 GHz
1MAX
D1 -20.89 dBm
1MA
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
236 MHz/
Stop 2.39 GHz

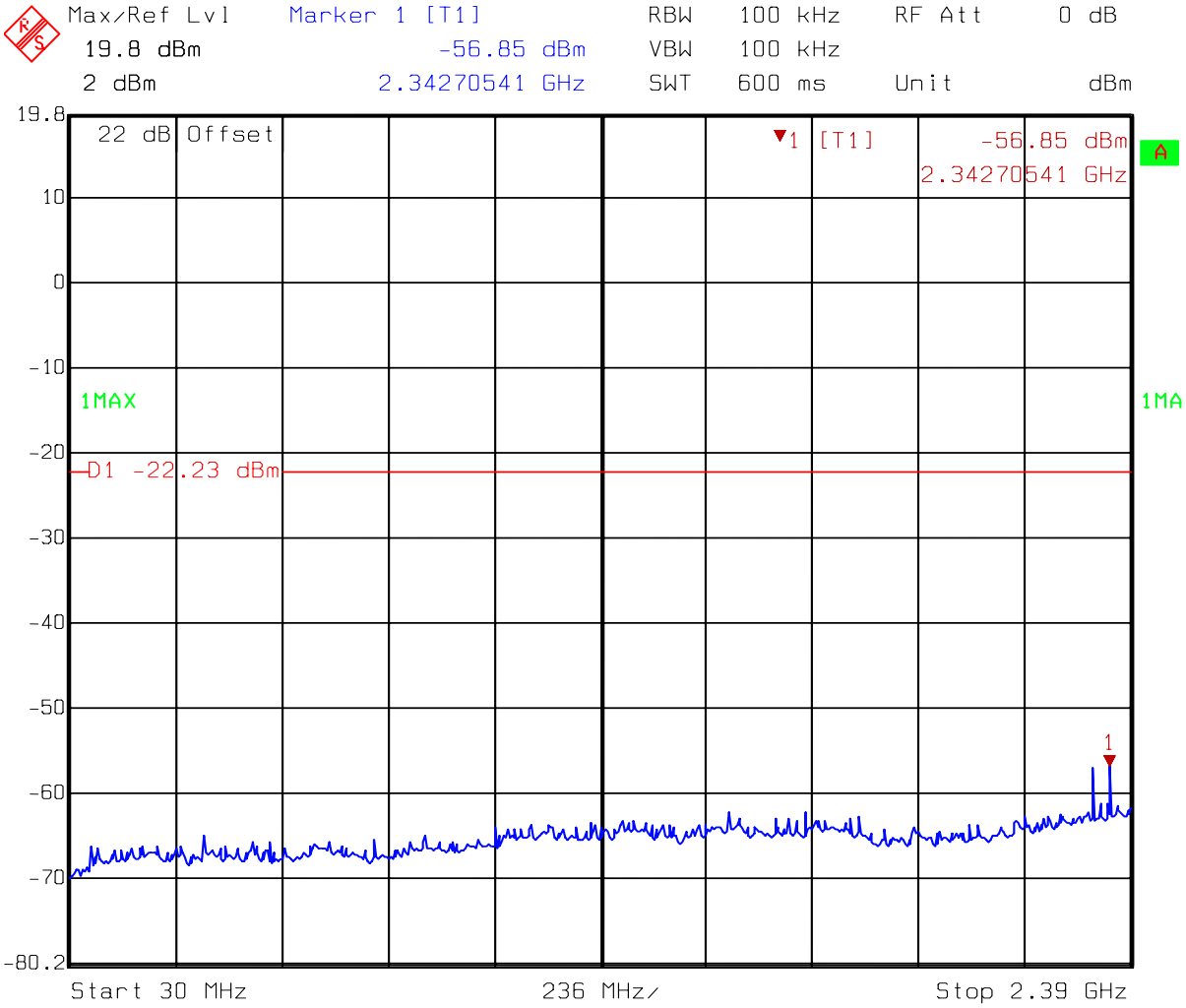

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-58.44 dBm
6.72508517 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-58.44 dBm
6.72508517 GHz
A
1MAX
1MA
D1 -20.89 dBm
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz

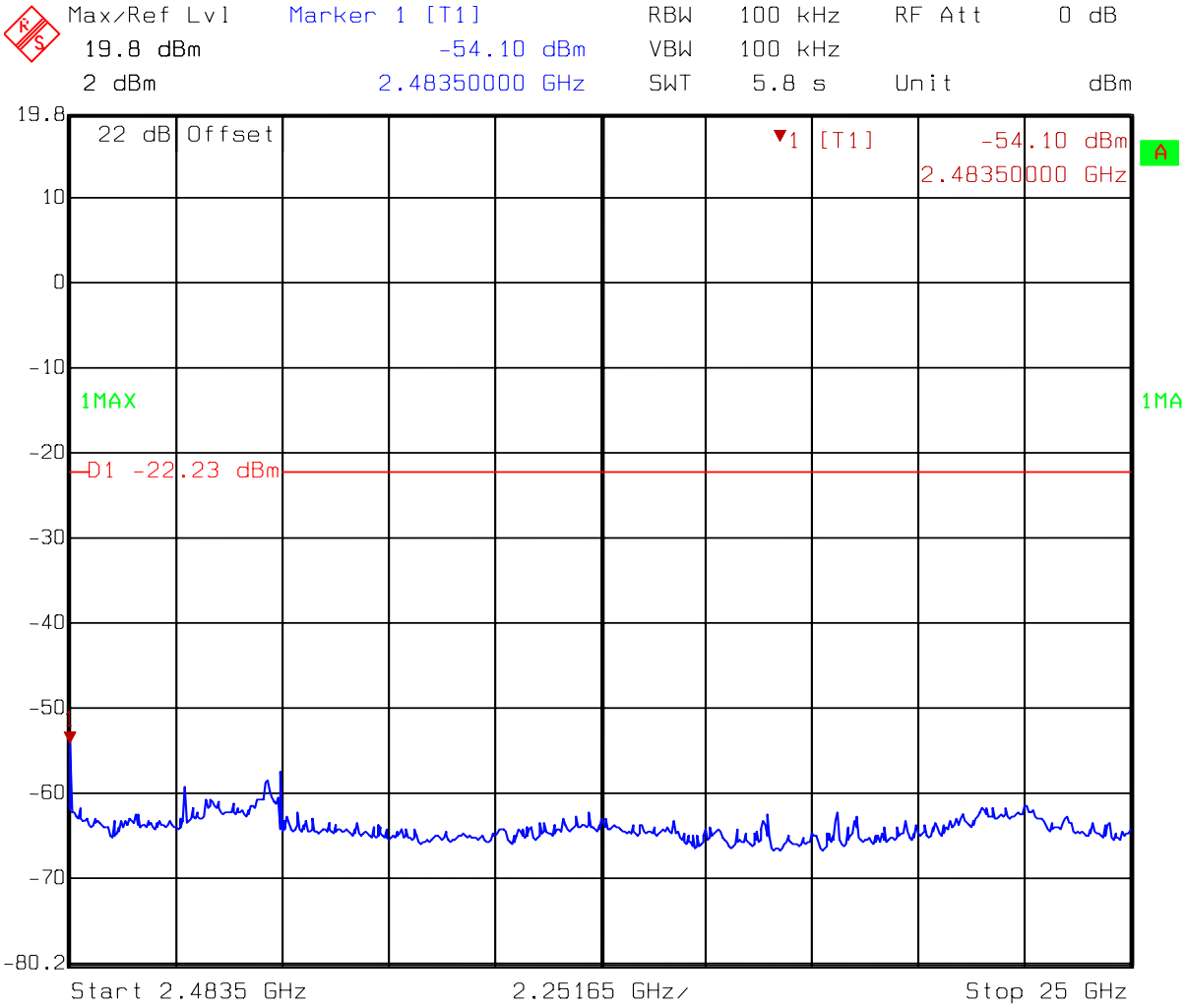

Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
1.18 dBm
2.43243086 GHz
RBW 100 kHz
VBW 100 kHz
SWT 20 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
1.18 dBm
2.43243086 GHz
1MAX
D1 -18.82 dBm
1MA
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Center 2.437 GHz
8 MHz/
Span 80 MHz


Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-54.52 dBm
2.31905812 GHz
RBW 100 kHz
VBW 100 kHz
SWT 600 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-54.52 dBm
2.31905812 GHz
A
1MAX
D1 -18.82 dBm
1MA
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
236 MHz/
Stop 2.39 GHz


Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-58.52 dBm
6.63483868 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-58.52 dBm
6.63483868 GHz
A
1MAX
D1 -18.82 dBm
1MA
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz


Delta 1 [T1]
-48.66 dB
26.59322645 MHz
RBW 100 kHz
VBW 100 kHz
SWT 12 ms
RF Att 0 dB
Unit dBm
Ref Lvl
12 dBm
22 dB Offset
1 [T1] -2.23 dBm
2.45738677 GHz
1 [T1] -48.66 dB
26.59322645 MHz
▽2 [T1] -50.89 dBm
2.48398000 GHz
D1 VIEW -22.232 dBm
1MA
A
12
0
-10
-20
-30
-40
-50
-60
-70
-80
-88
F1
Center 2.476 GHz
4.8 MHz/
Span 48 MHz


Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-56.85 dBm
2.34270541 GHz
RBW 100 kHz
VBW 100 kHz
SWT 600 ms
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-56.85 dBm
2.34270541 GHz
A
1MAX
1MA
D1 -22.23 dBm
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 30 MHz
236 MHz/
Stop 2.39 GHz


Max/Ref Lvl
19.8 dBm
2 dBm
Marker 1 [T1]
-54.10 dBm
2.48350000 GHz
RBW 100 kHz
VBW 100 kHz
SWT 5.8 s
RF Att 0 dB
Unit dBm
22 dB Offset
1 [T1]
-54.10 dBm
2.48350000 GHz
1MAX
1MA
D1 -22.23 dBm
19.8
10
0
-10
-20
-30
-40
-50
-60
-70
-80.2
Start 2.4835 GHz
2.25165 GHz/
Stop 25 GHz

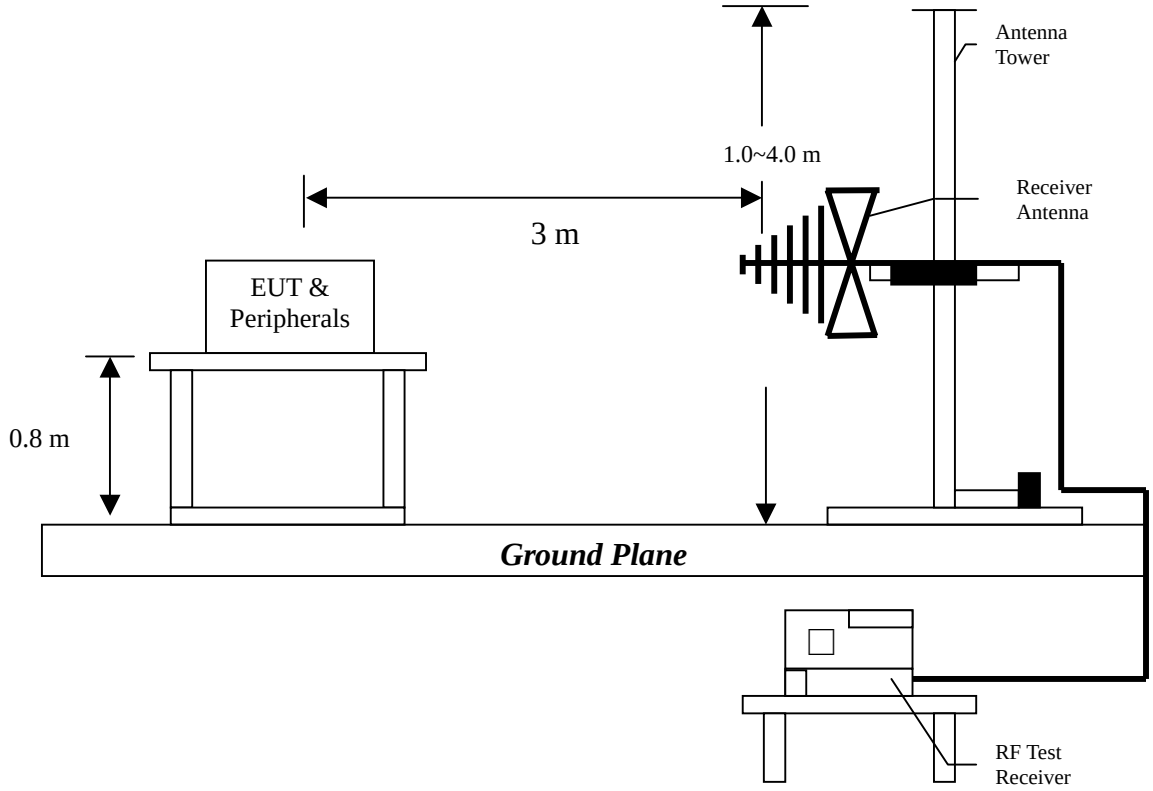
6. Radiated Emission test (FCC 15.247)

6.1 Operating environment

Temperature:	23	℃
Relative Humidity:	58	%
Atmospheric Pressure:	1023	hPa

6.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emissions were invested cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1MHz RBW/VBW) recorded also on the report.
The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent 3 meter reading using inverse scaling with distance.

The EUT test configuration, please refer to the “Spurious set-up photo.pdf”.

6.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of radiated emission measurement is 4.98 dB.

6.4 Radiated spurious emission test data

6.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11a, 802.11b and 802.11g continuously transmitting mode. Channel low, middle and high were verified. The worst case occurred at 802.11b Tx low channel.

EUT : AG-320
Worst Case : 802.11b Tx low channel

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
V	31.940	QP	12.60	13.14	25.74	40.00	-14.27
V	220.120	QP	12.08	16.80	28.88	46.00	-17.12
V	392.780	QP	16.40	8.78	25.18	46.00	-20.82
V	527.610	QP	19.46	6.52	25.98	46.00	-20.02
V	659.530	QP	21.50	12.35	33.85	46.00	-12.15
V	737.130	QP	22.74	8.10	30.84	46.00	-15.16
H	113.420	QP	10.54	9.54	20.08	43.50	-23.43
H	220.120	QP	11.63	17.87	29.50	46.00	-16.51
H	227.880	QP	11.63	16.53	28.16	46.00	-17.85
H	236.610	QP	11.74	12.99	24.73	46.00	-21.27
H	263.770	QP	12.88	10.72	23.60	46.00	-22.40
H	791.450	QP	23.52	7.14	30.66	46.00	-15.34

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

6.4.2 Measurement results: frequency above 1GHz

EUT : AG-320
Test Condition : 802.11bTx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	36.07	37.77	52.93	54.63	74	-19.37
4824.00	AV	V	36.07	37.77	50.72	52.42	54	-1.58
4824.00	PK	H	36.07	37.77	42.01	43.71	54	-10.29

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : AG-320
Test Condition : 802.11b Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	53.82	55.52	74	-18.48
4874.00	AV	V	36.07	37.77	51.46	53.16	54	-0.84
4874.00	PK	H	36.07	37.77	41.39	43.09	54	-10.91

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : AG-320
Test Condition : 802.11b Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	52.36	54.06	74	-19.94
4924.00	AV	V	36.07	37.77	49.8	51.5	54	-2.5
4924.00	AV	H	36.07	37.77	42.39	44.09	54	-9.91

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : AG-320
Test Condition : 802.11g Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4824.00	PK	V	36.07	37.77	45.61	47.31	54	-6.69

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : AG-320
Test Condition : 802.11g Tx at channel 6

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4874.00	PK	V	36.07	37.77	56.93	58.63	74	-15.37
4874.00	AV	V	36.07	37.77	43.86	45.56	54	-8.44
4874.00	PK	H	36.07	37.77	41.9	43.6	54	-10.4

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

EUT : AG-320
Test Condition : 802.11g Tx at channel 11

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
4924.00	PK	V	36.07	37.77	47.58	49.28	54	-4.72

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 25GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV

7. Power Spectrum Density test (FCC 15.247)

7.1 Operating environment

Temperature:	23	℃
Relative Humidity:	50	%
Atmospheric Pressure	1023	hPa

7.2 Test setup & procedure

The power spectrum density per FCC §15.247(e) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 3kHz, the video bandwidth set at 10kHz, a span of 1.5MHz, and the sweep time set at 500 seconds. Power Density was read directly correction was added to the reading to obtain power at the EUT antenna terminals. The test was performed at 3 channels (lowest, middle and highest channel). The Power Spectral Density measured result is in the following table.

7.3 Measured data of Power Spectrum Density test results

Test Mode: 802.11b(DSSS Modulation) operating mode

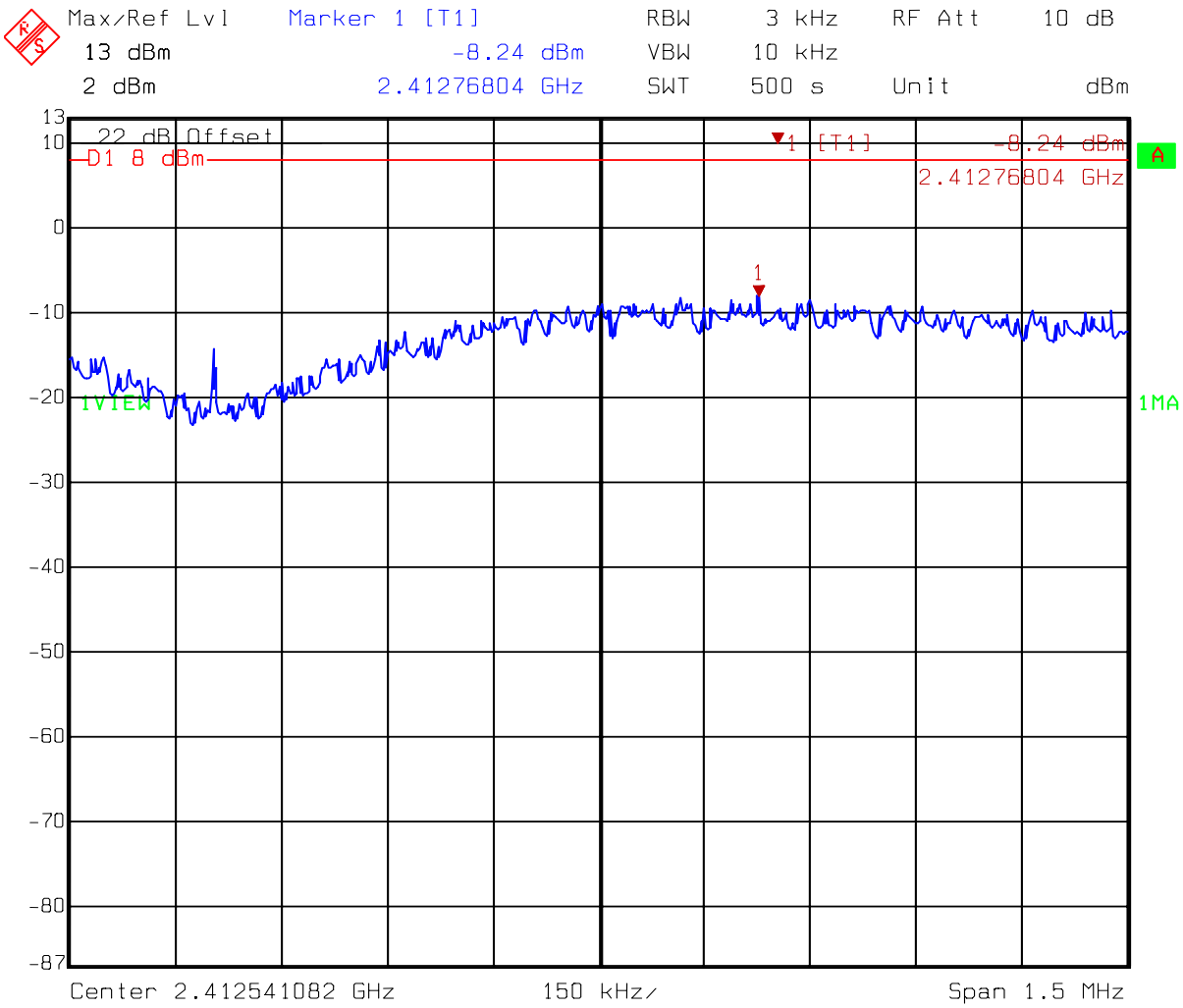
Channel	Frequency (MHz)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	-8.24	8
6 (middle)	2437	-8.79	8
11 (highest)	2462	-9.63	8

Test Mode: 802.11g(OFDM Modulation) operating mode

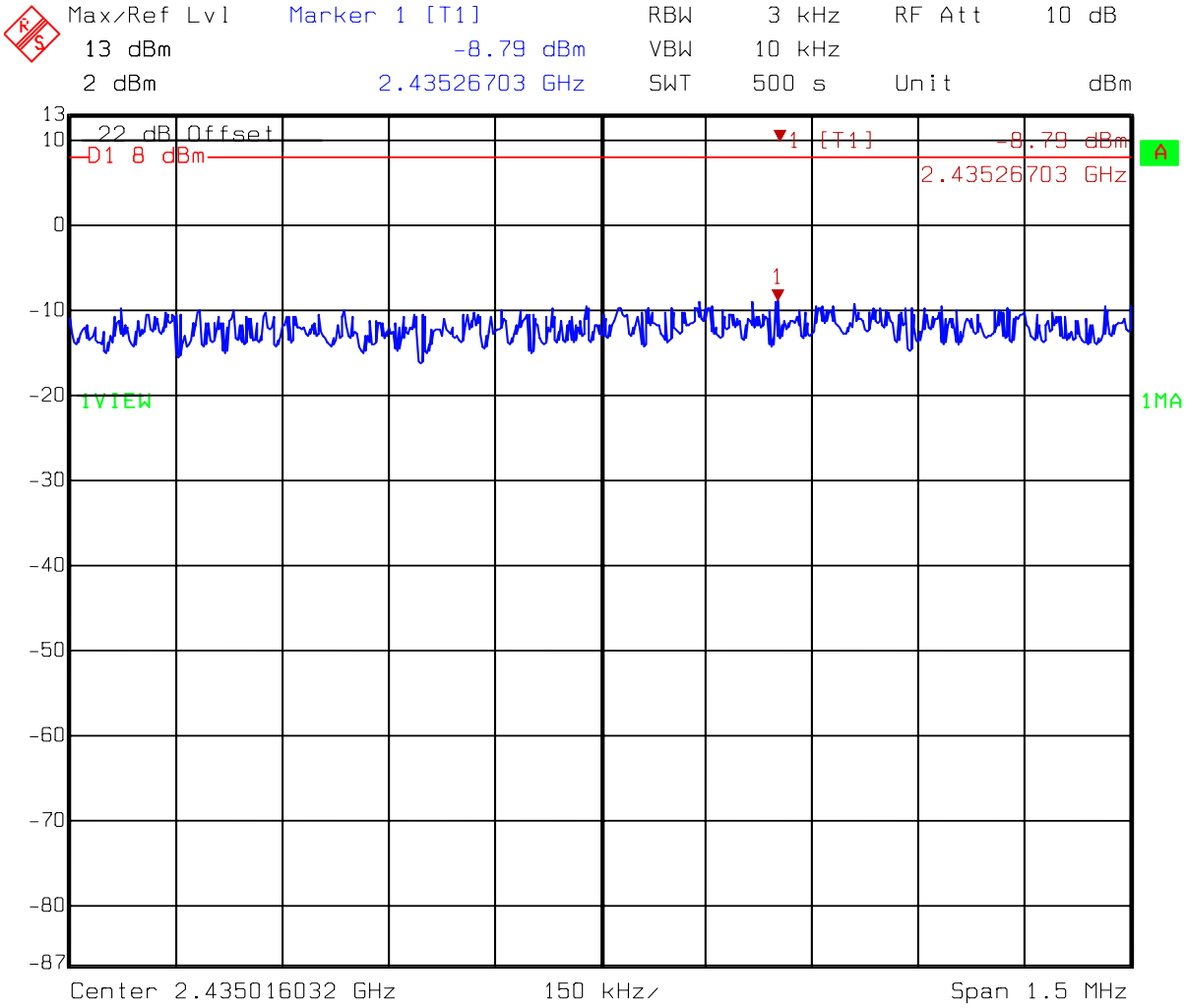
Channel	Frequency (MHz)	Power spectrum density (dBm)	Limit (dBm)
1 (lowest)	2412	-16.15	8
6 (middle)	2437	-13.87	8
11 (highest)	2462	-17.32	8

Please see the plot below.

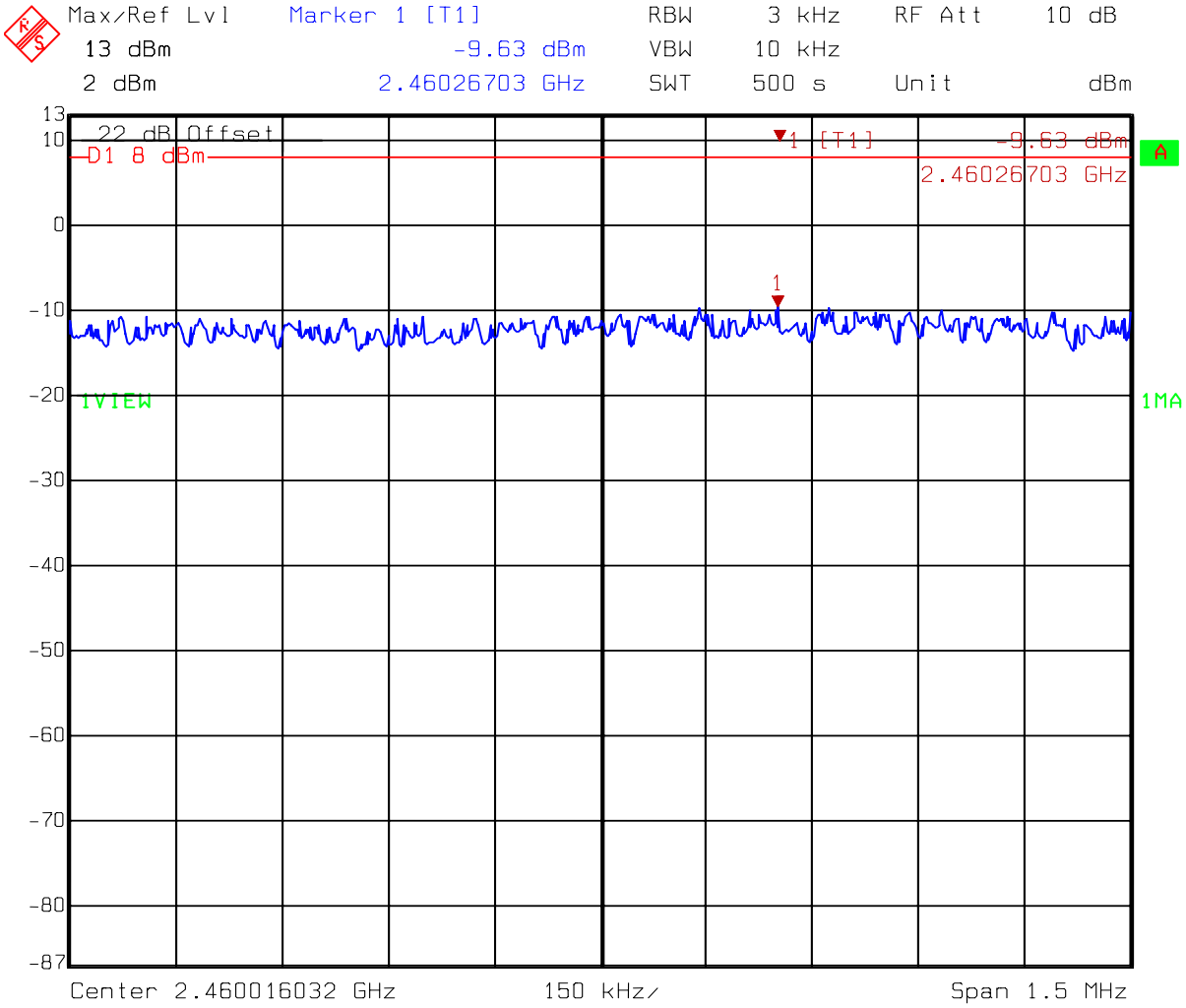
Test Mode: 802.11b(DSSS Modulation) operating mode



Title: Power Spectrum Density
Comment A: Channel 01 at 802.11b mode
Date: 16.JUN.2006 09:21:57

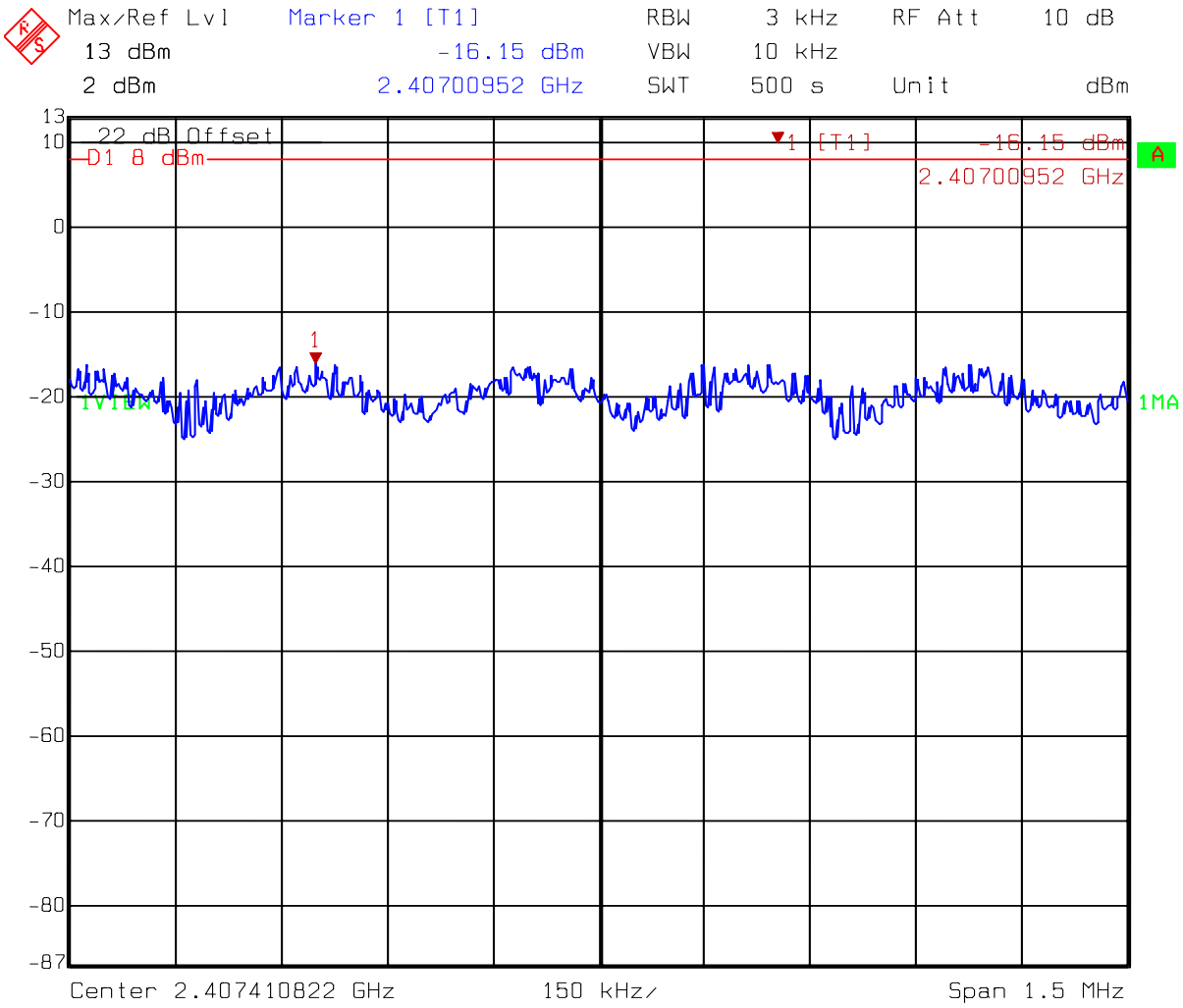


Title: Power Spectrum Density
Comment A: Channel 06 at 802.11b mode
Date: 16.JUN.2006 09:30:57

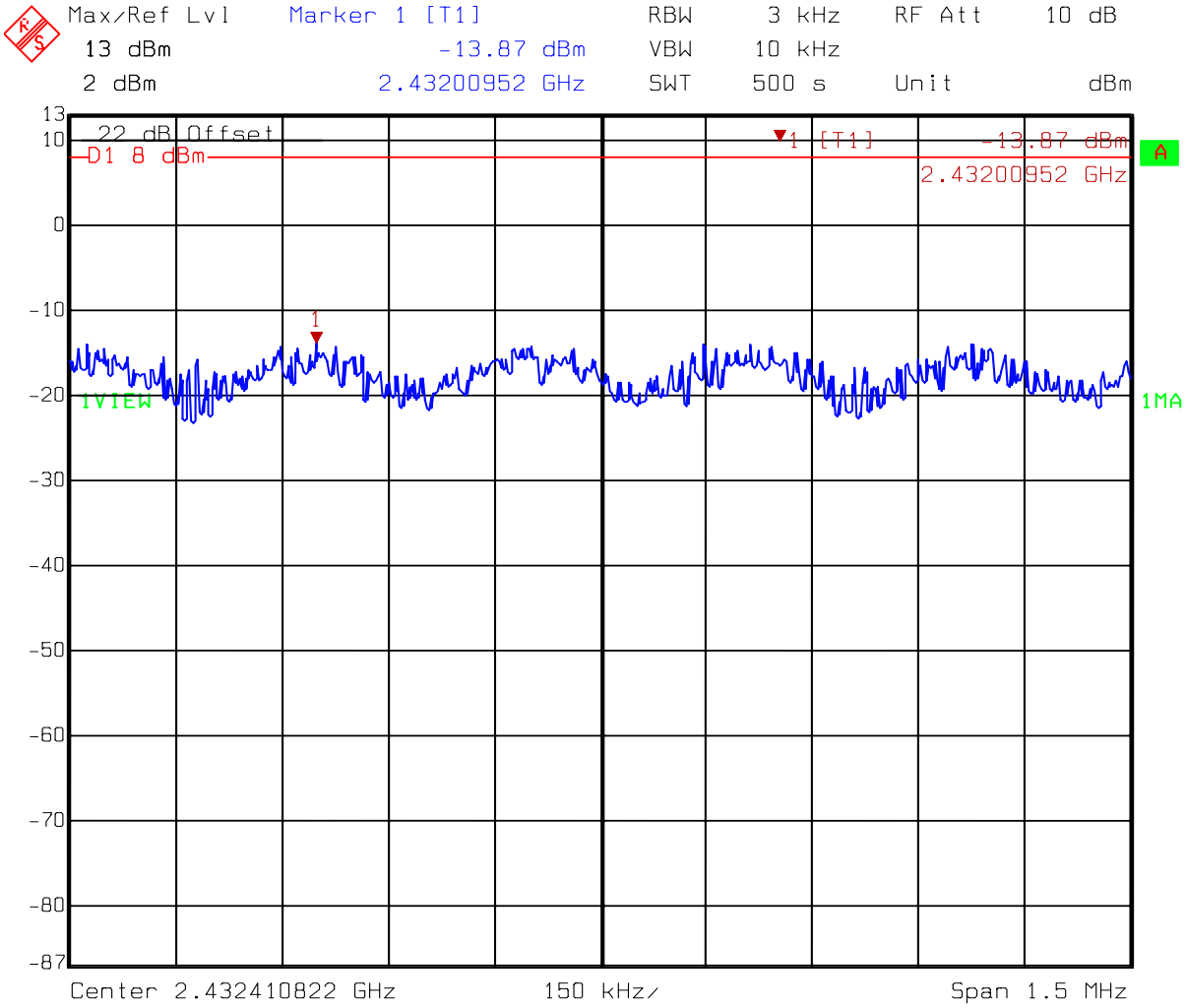


Title: Power Spectrum Density
Comment A: Channel 11 at 802.11b mode
Date: 16.JUN.2006 09:34:17

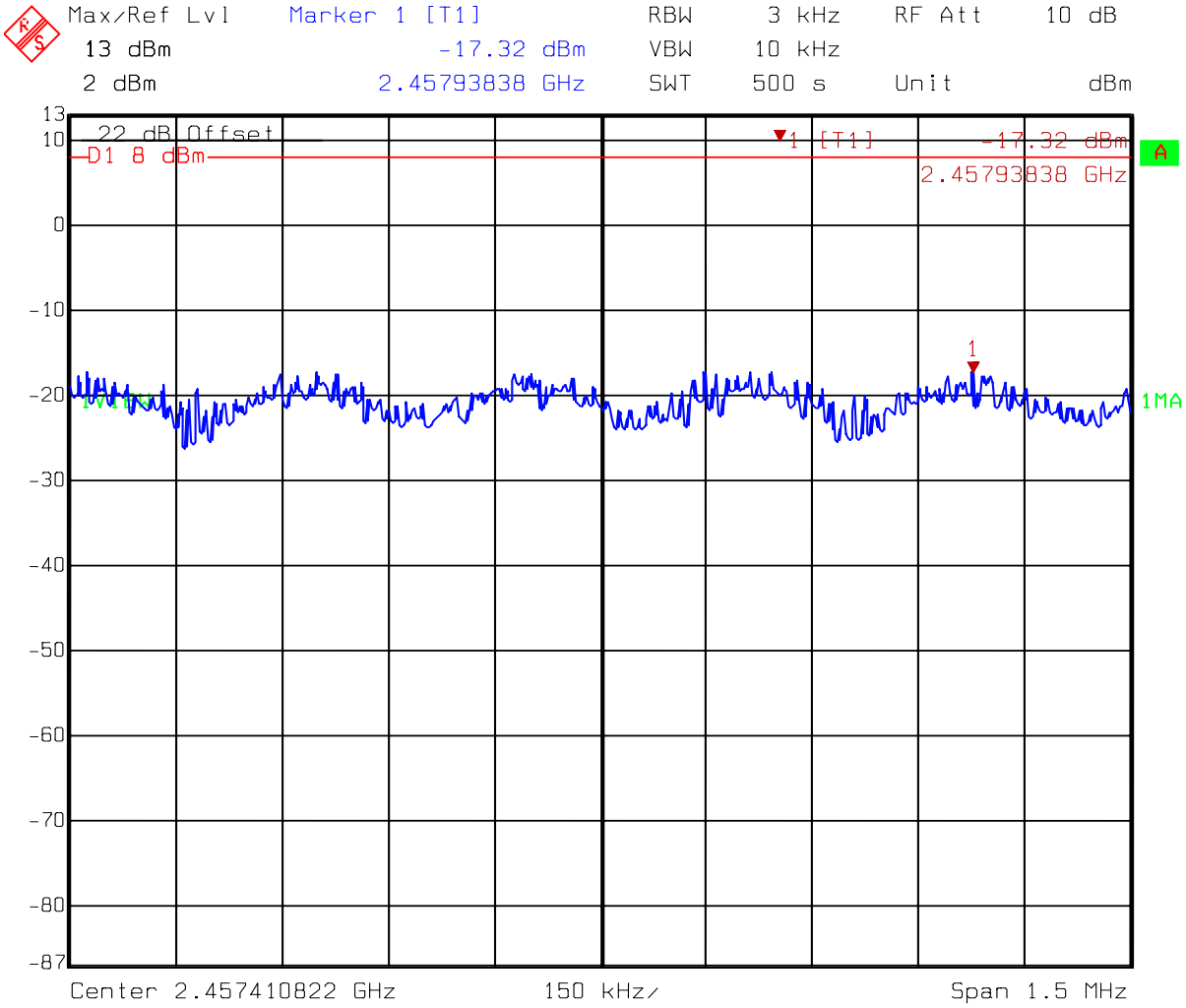
Test Mode: 802.11g(OFDM Modulation) operating mode



Title: Power Spectrum Density
Comment A: Channel 01 at 802.11g mode
Date: 16.JUN.2006 09:40:20



Title: Power Spectrum Density
Comment A: Channel 06 at 802.11g mode
Date: 16.JUN.2006 09:45:23



Title: Power Spectrum Density
Comment A: Channel 11 at 802.11g mode
Date: 16.JUN.2006 09:47:54

8. Emission on the band edge (FCC 15.247)

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

8.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure	1023	hPa

8.2 Test setup & procedure

The output of EUT was connected to spectrum analyzer via a 50ohm cable.

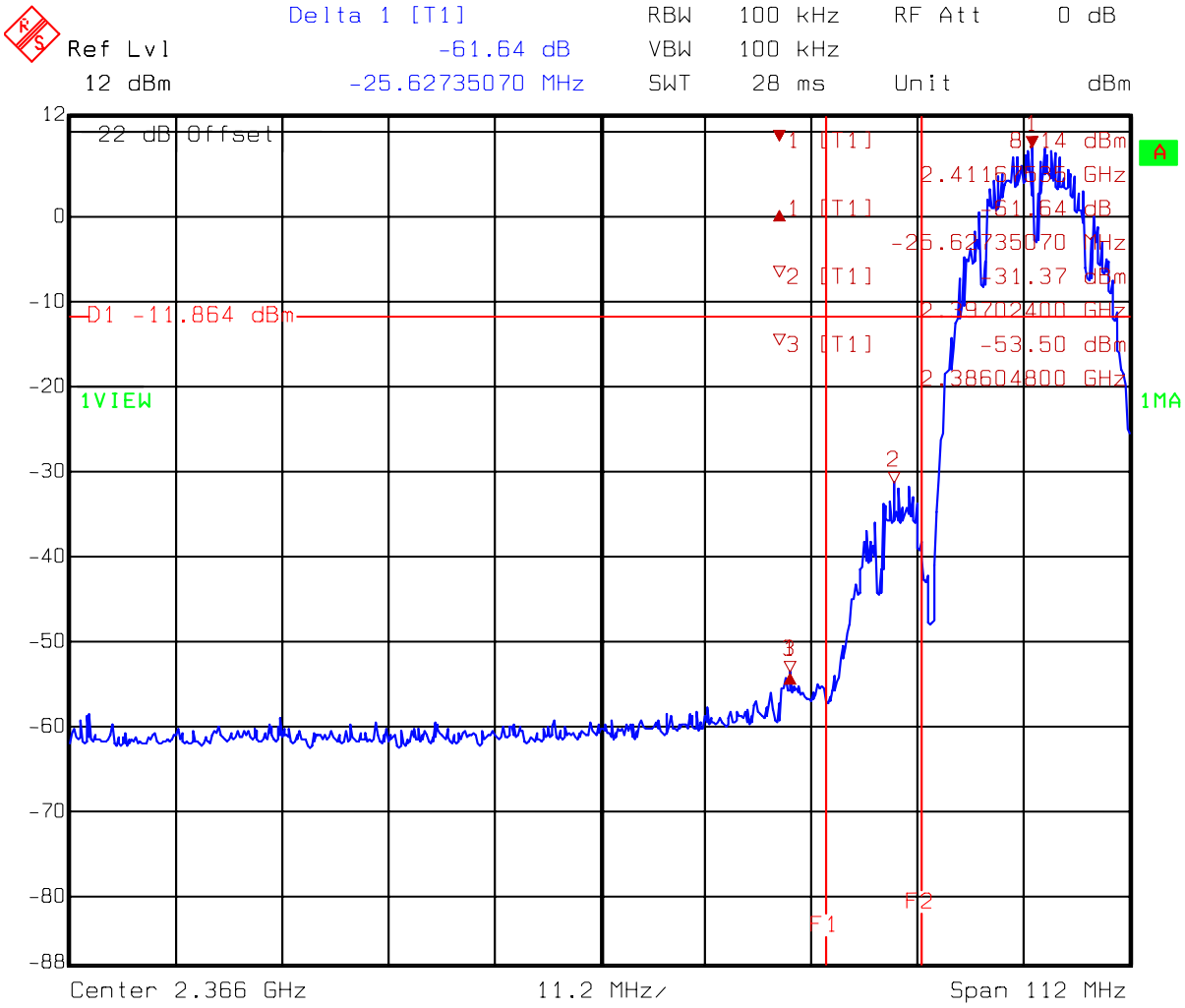
The setting of spectrum analyzer is:

Peak:	RBW = 100kHz ;	VBW = 100kHz
Average:	RBW = 1MHz ;	VBW = 10Hz

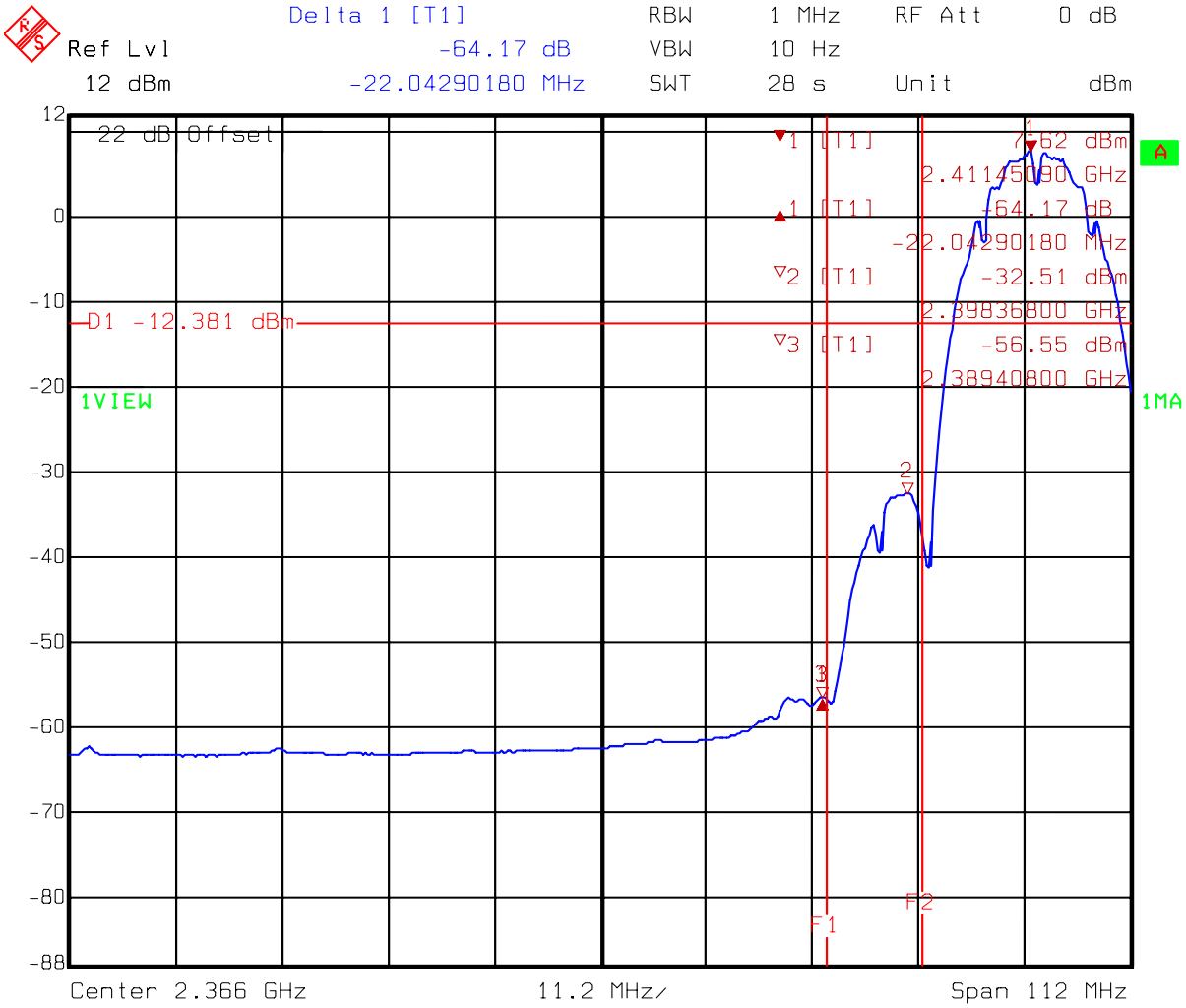
8.3 Test Result

8.3.1 Conducted Method

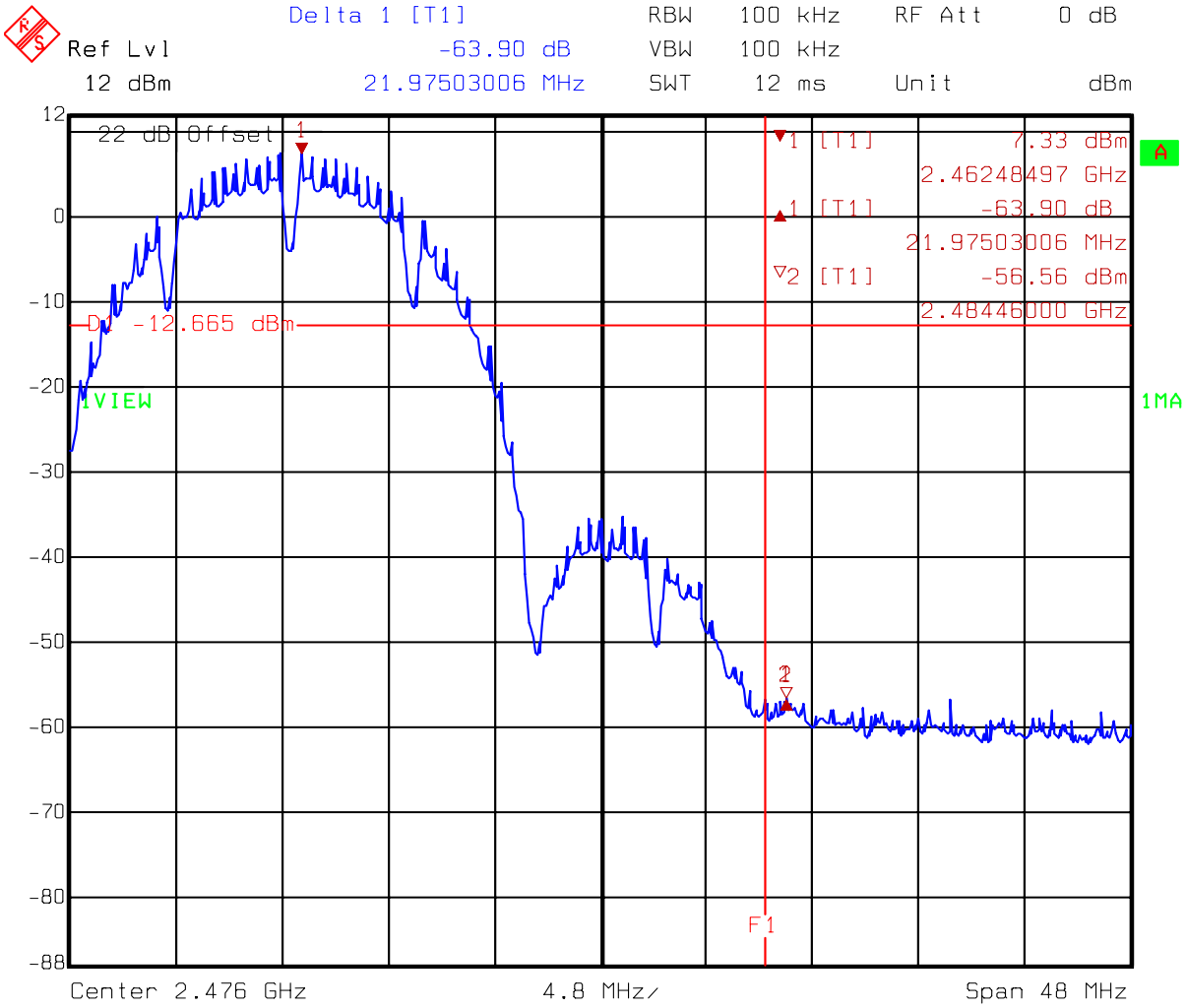
Test Mode: 802.11b(DSSS Modulation) operating mode



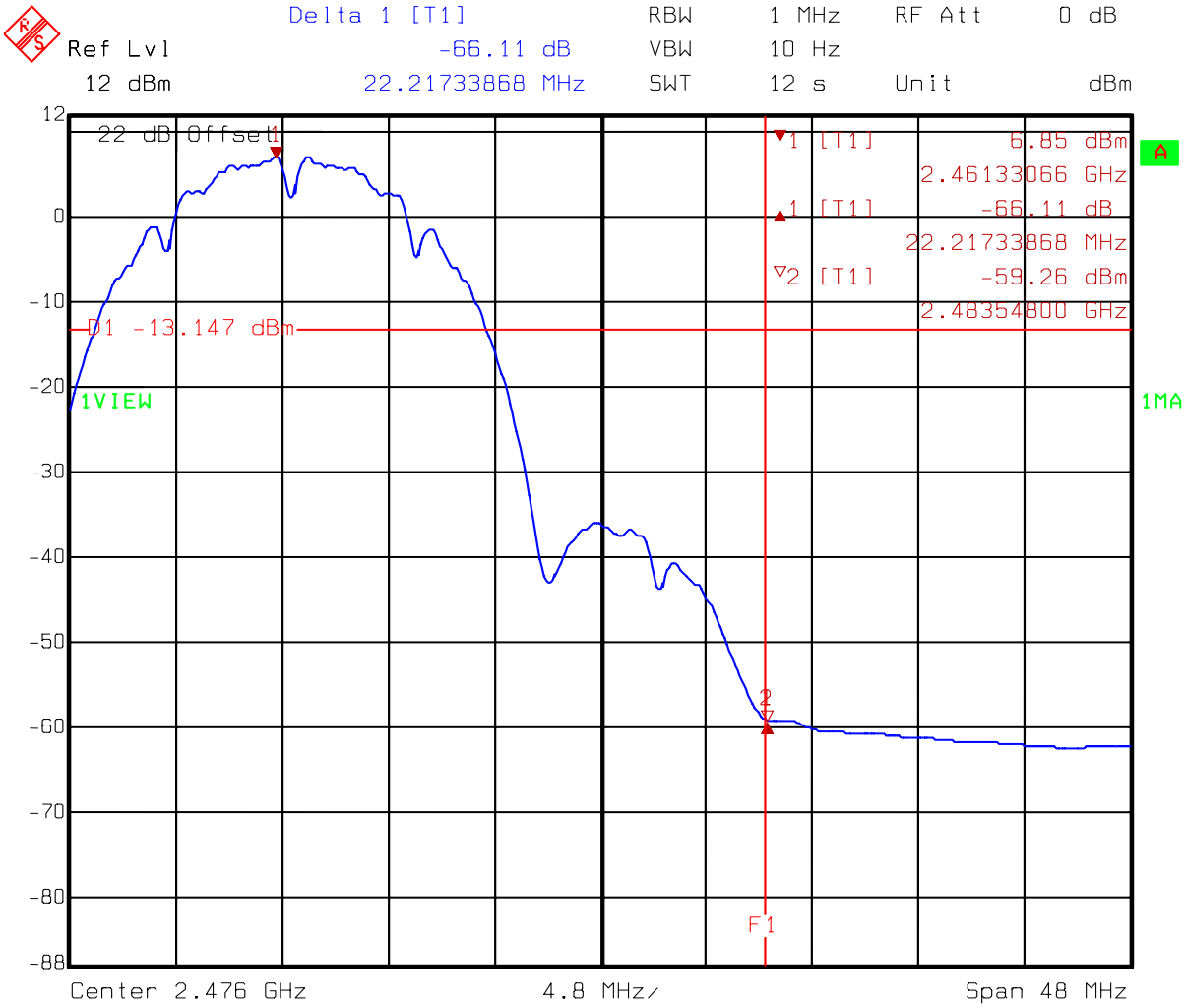
Title: Band Edge
Comment A: Channel 01 at 802.11b mode
F1=2390MHz F2=2400MHz (Peak Detect)
Date: 16.JUN.2006 09:22:38



Title: Band Edge
Comment A: Channel 01 at 802.11b mode
F1=2390MHz F2=2400MHz (Average Detect)
Date: 16.JUN.2006 09:23:40

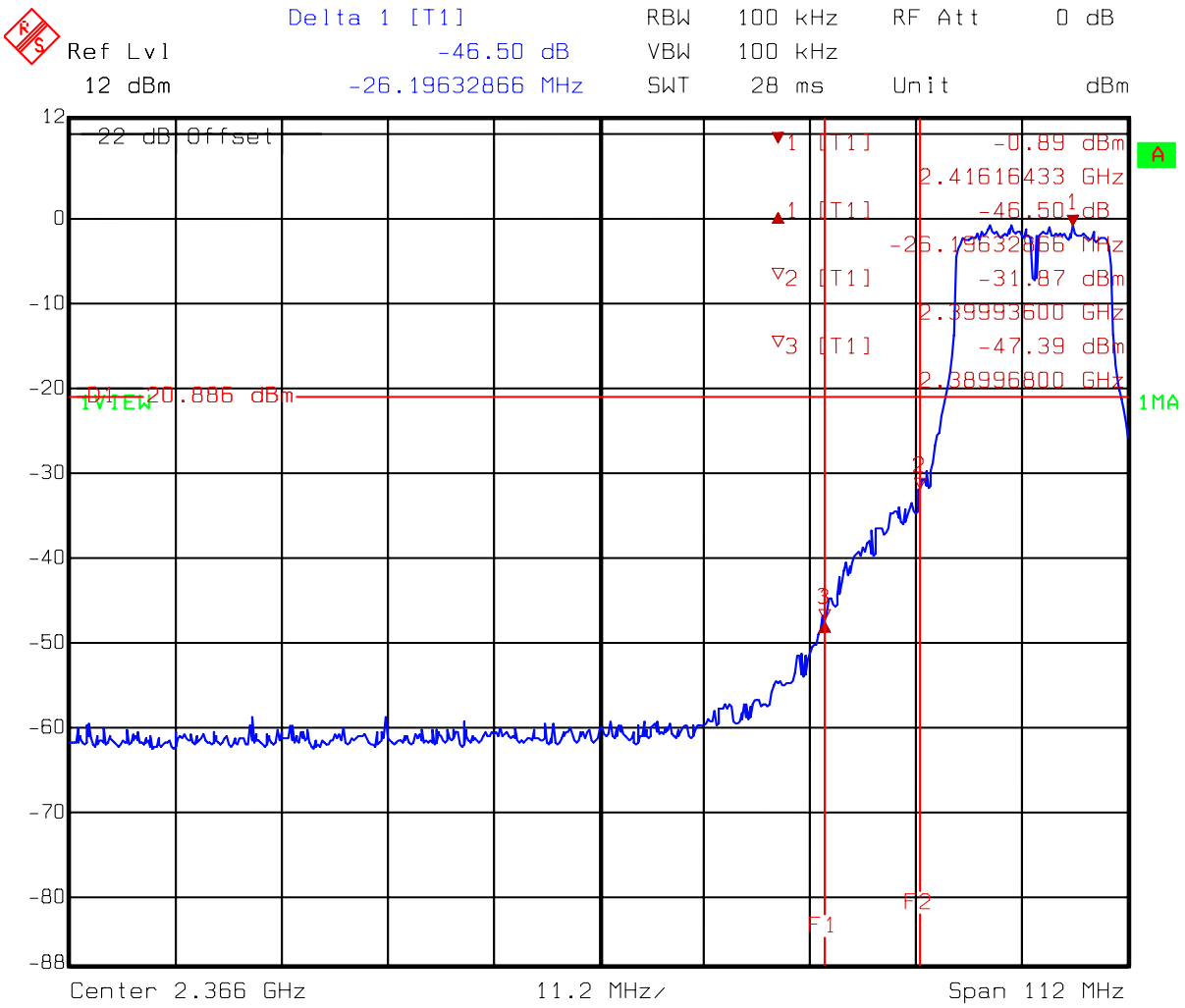


Title: Band Edge
Comment A: Channel 11 at 802.11b mode
F1=2483.5MHz (Peak Detect)
Date: 16.JUN.2006 09:34:49

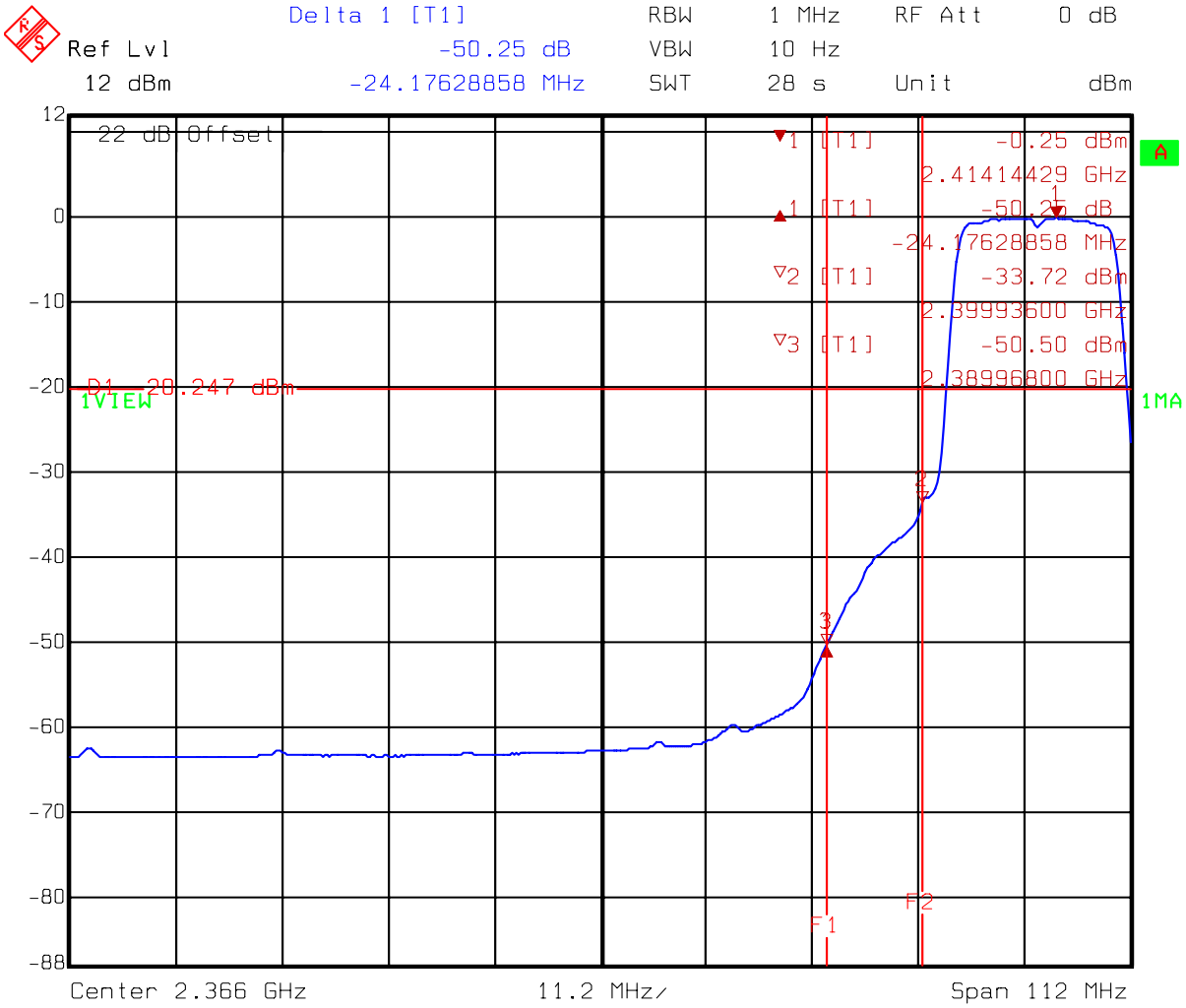


Title: Band Edge
Comment A: Channel 11 at 802.11b mode
F1=2483.5MHz (Average Detect)
Date: 16.JUN.2006 09:35:44

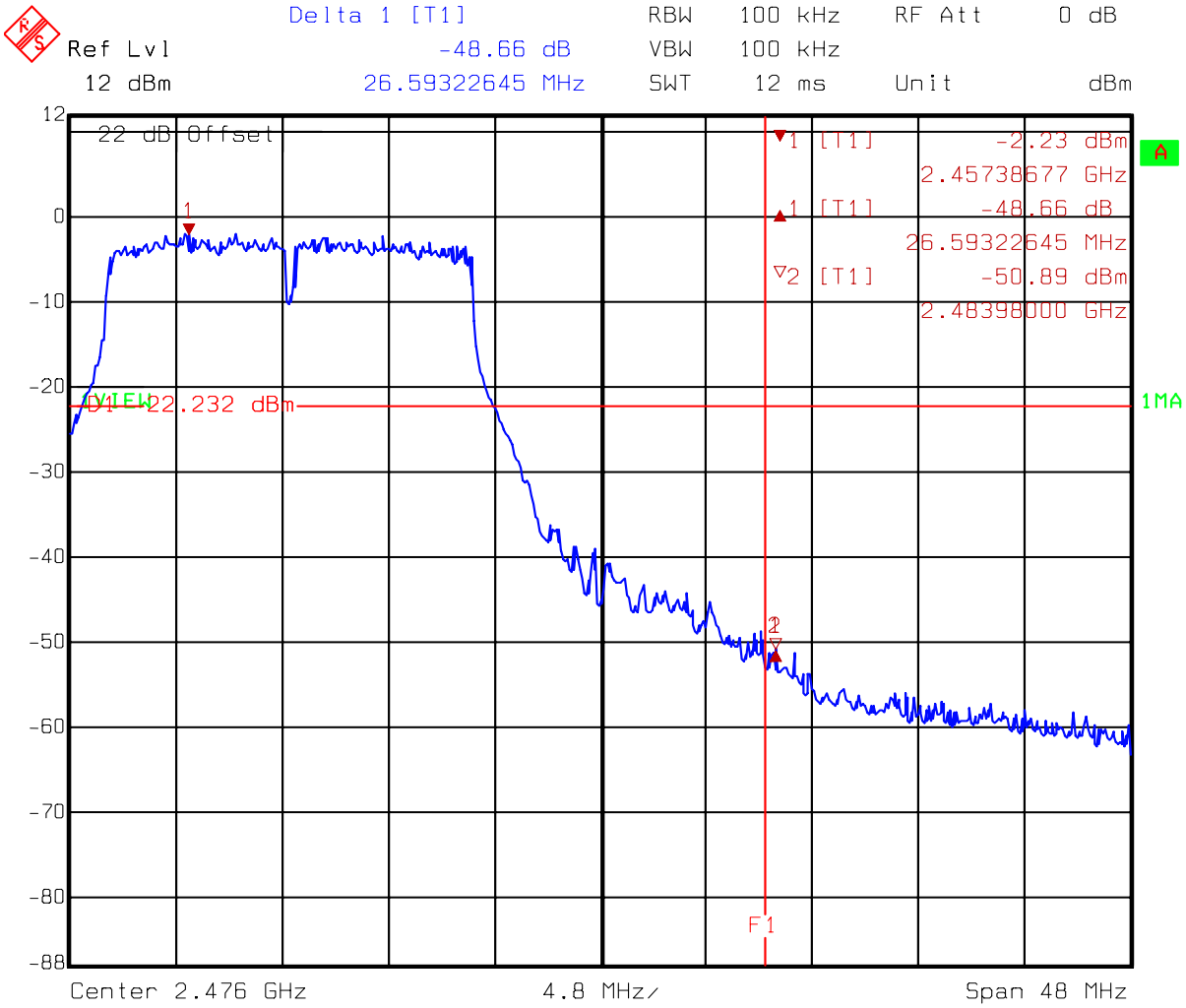
Test Mode: 802.11g(OFDM Modulation) operating mode



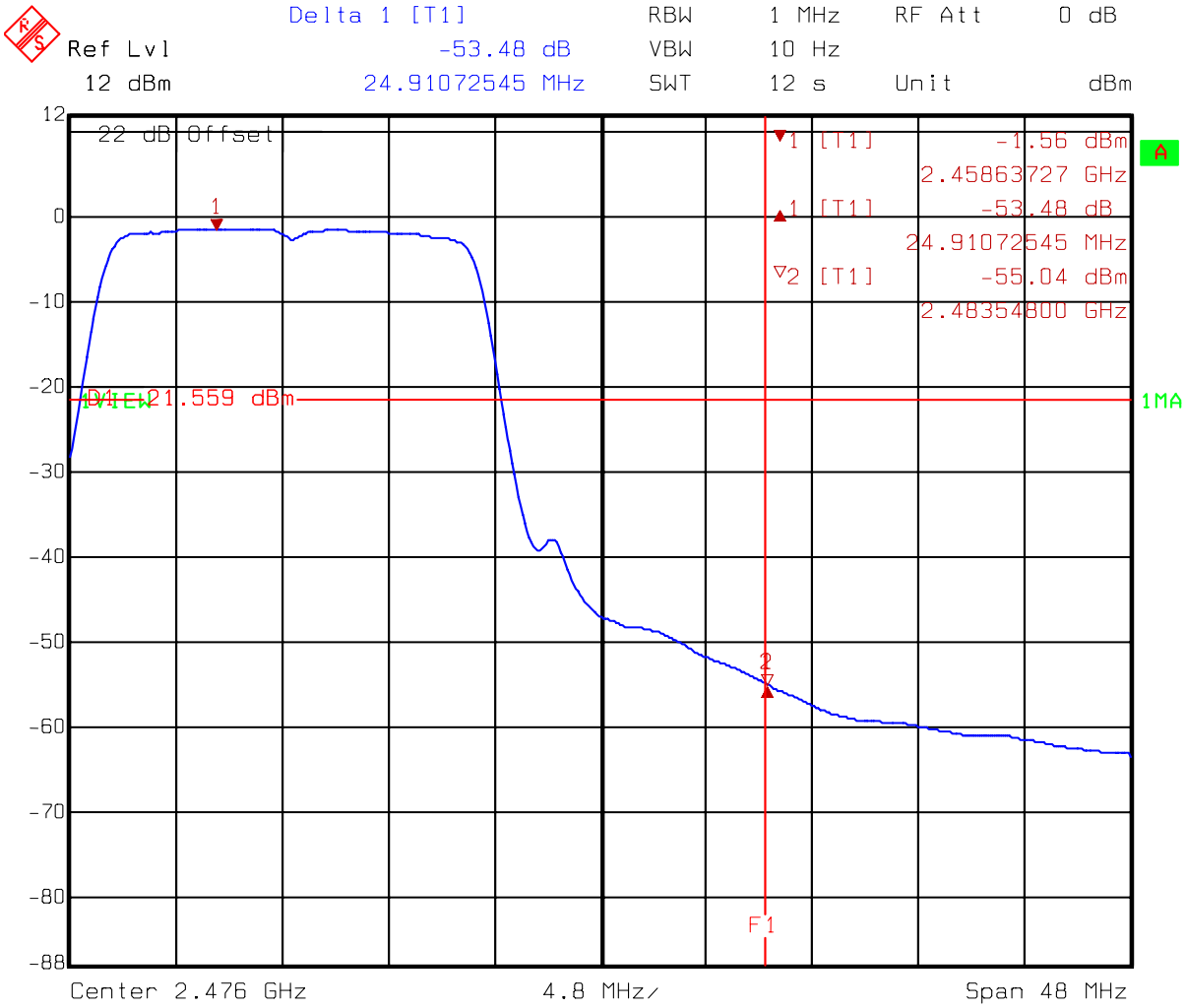
Title: Band Edge
Comment A: Channel 01 at 802.11g mode
F1=2390MHz F2=2400MHz (Peak Detect)
Date: 16.JUN.2006 09:40:55



Title: Band Edge
Comment A: Channel 01 at 802.11g mode
F1=2390MHz F2=2400MHz (Average Detect)
Date: 16.JUN.2006 09:41:54



Title: Band Edge
Comment A: Channel 11 at 802.11g mode
F1=2483.5MHz (Peak Detect)
Date: 16.JUN.2006 09:48:24



Title: Band Edge
Comment A: Channel 11 at 802.11g mode
F1=2483.5MHz (Average Detect)
Date: 16.JUN.2006 09:49:18

8.3.2 Radiated Method

Test Mode: 802.11b(DSSS Modulation) operating mode

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental @3m (dBuV/m)	Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc)			
		A	B	C	D	E
1 (lowest)	PK	114.25	61.64	52.61	74	-21.39
	AV	110.51	64.17	46.34	54	-7.66
11 (highest)	PK	112.88	63.9	48.98	74	-25.02
	AV	108.99	66.11	42.88	54	-11.12

Test Mode: 802.11g(OFDM Modulation) operating mode

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental @3m (dBuV/m)	Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc)			
		A	B	C	D	E
1 (lowest)	PK	112.17	46.5	65.67	74	-8.33
	AV	102.8	50.25	52.55	54	-1.45
11 (highest)	PK	110.04	48.66	61.38	74	-12.62
	AV	100.77	53.48	47.29	54	-6.71

Remark: 1. C = A – B
2. E = C – D

9. Peak Output Power test (FCC 15.407)

9.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1023	hPa

9.2 Test setup & procedure

The power output per FCC §15.407(a) was measured on the EUT using a 50 ohm SMA cable connected to power meter via power sensor. Power was read directly and cable loss correction (7.0dB) was added to the reading to obtain power at the EUT antenna terminals.

9.3 Limit

Operating Frequency (MHz)	Output power limit
5150~5250	< 50mW (17dBm) or 4dBm+10 log B
5250~5350, 5470~5725	< 250mW (24dBm) or 11dBm+10 log B
5725~5825	< 1W (30dBm) or 17dBm+10 log B

Remark: where B is the –26 dB emission bandwidth in MHz.

9.4 Measured data of Maximum Output Power test results

For Frequency band (5180MHz ~ 5240MHz)

Channel	Frequency (MHz)	Max. Output power (dBm)	Limit (dBm)
36	5180	16.67	17
40	5200	15.44	17
48	5240	16.52	17

For Frequency band (5260MHz ~ 5320MHz)

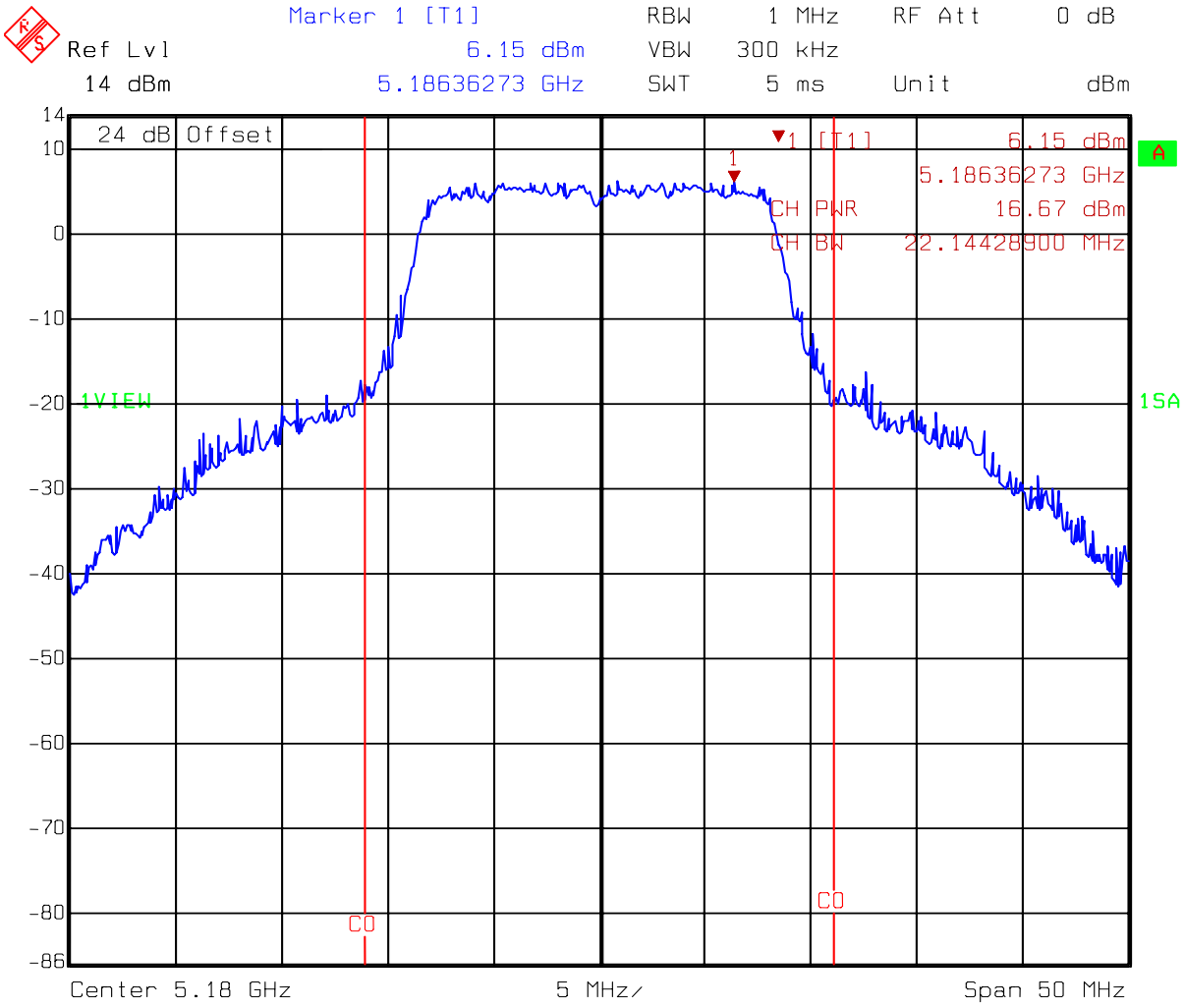
Channel	Frequency (MHz)	Max. Output power (dBm)	Limit (dBm)
52	5260	16.35	24
60	5300	17.57	24
64	5320	15.58	24

For Frequency band (5745MHz ~ 5825MHz)

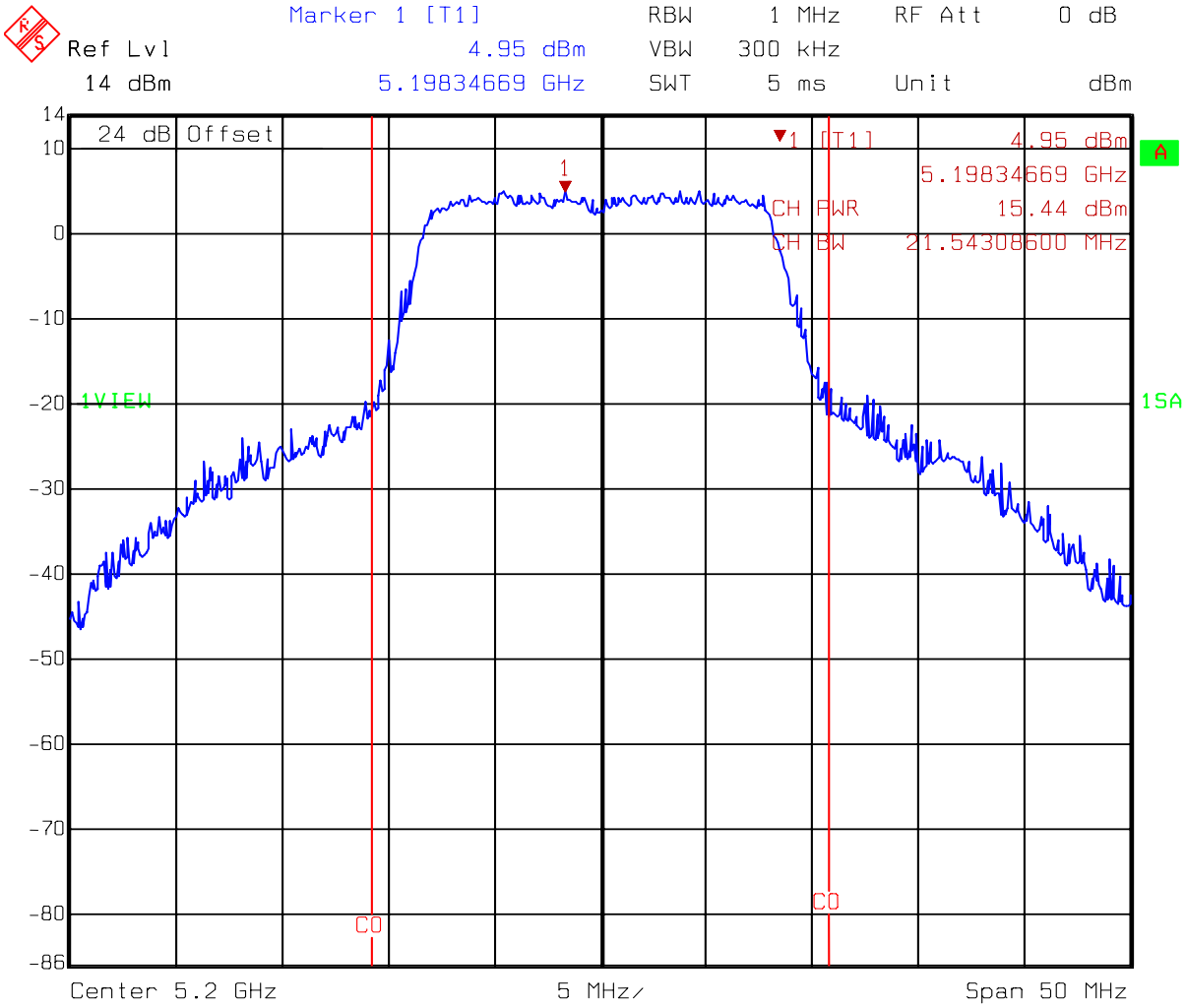
Channel	Frequency (MHz)	Max. Output power (dBm)	Limit (dBm)
149	5745	16.15	24
157	5785	16.03	24
161	5805	15.09	24

Please see the plot below.

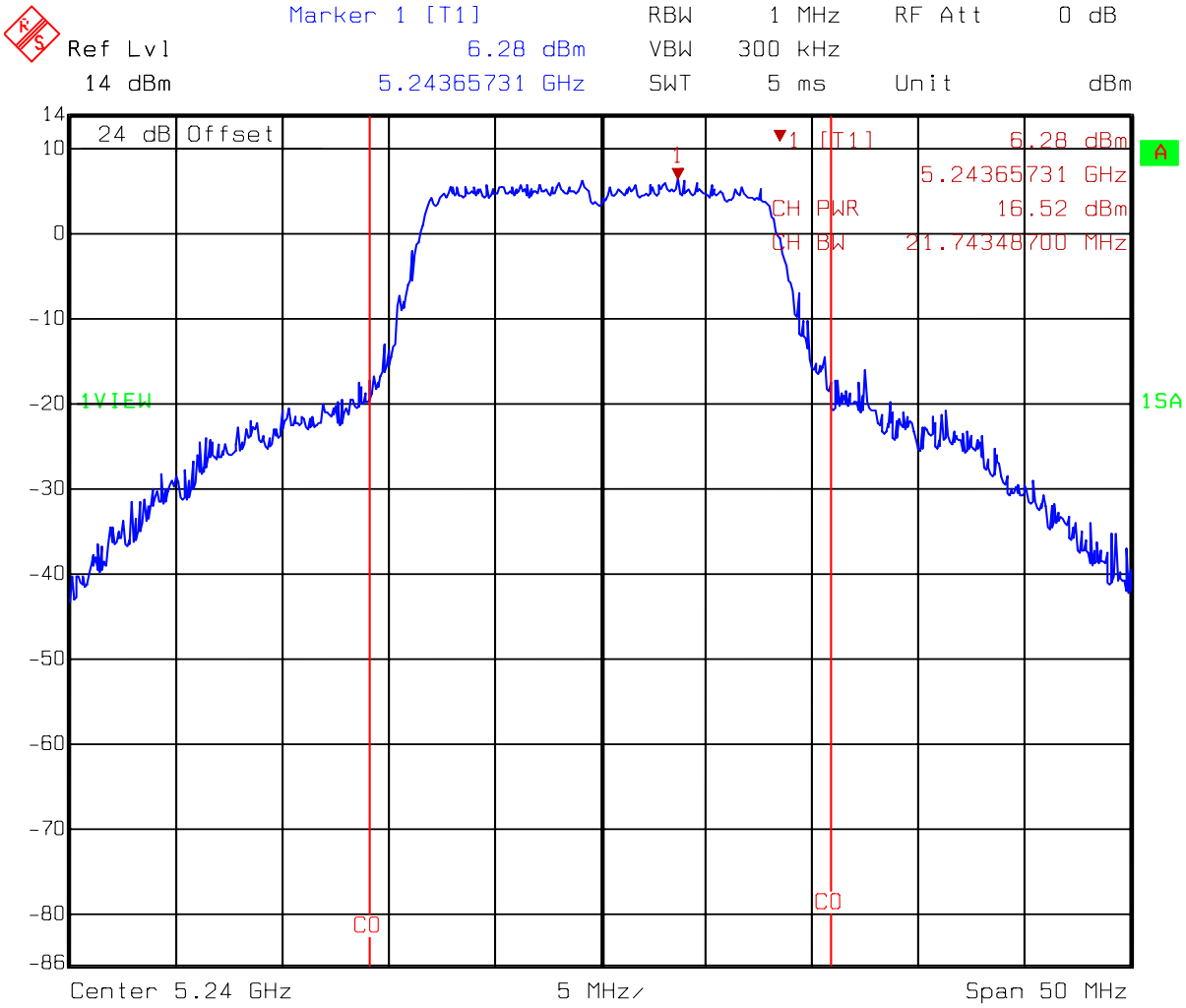
For Frequency band (5180MHz ~ 5240MHz)



Title: Channel Output Power
Comment A: 5180MHz at 802.11a mode (Limit 16.990 dBm)
Date: 16.JUN.2006 10:52:18

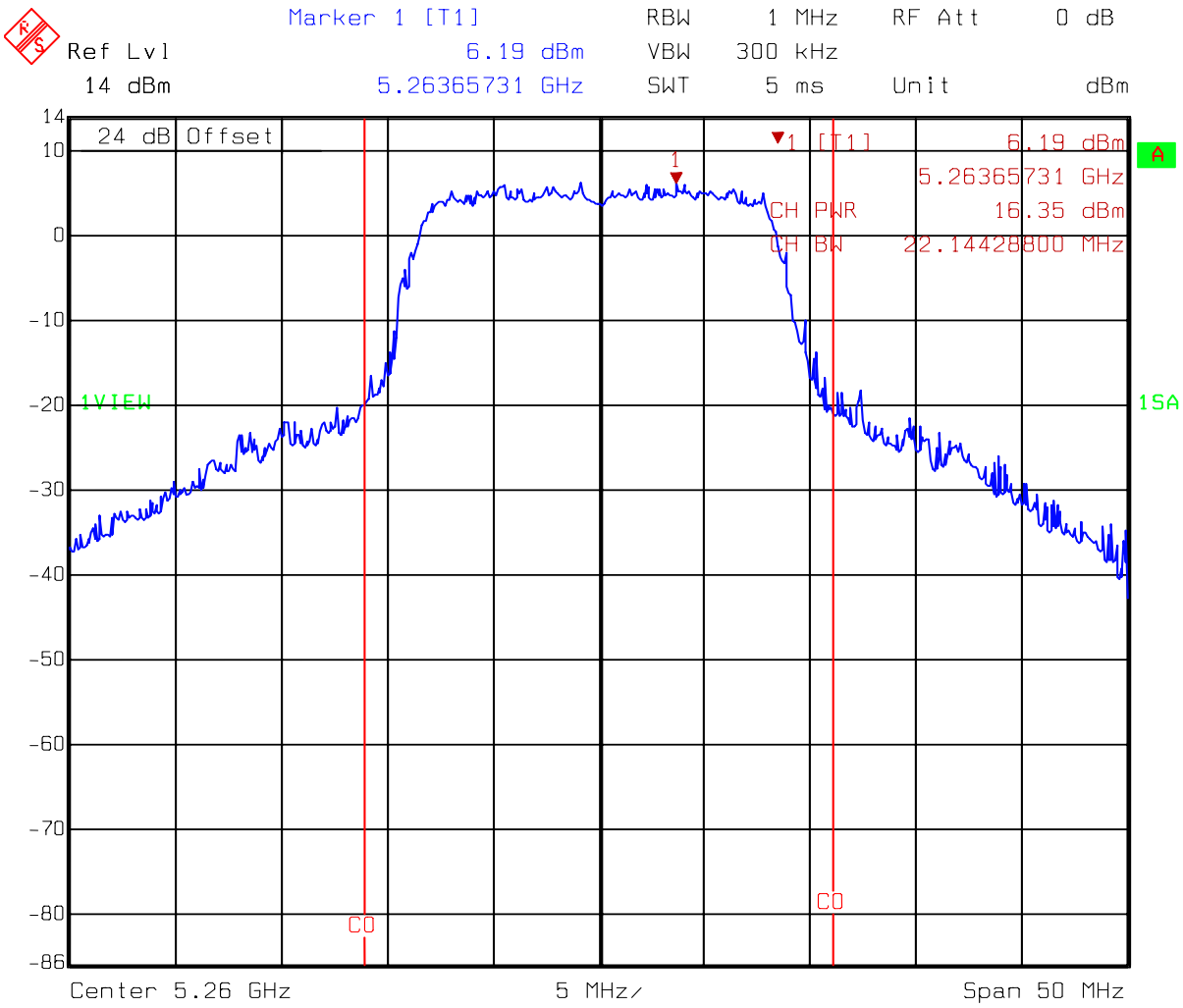


Title: Channel Output Power
Comment A: 5200MHz at 802.11a mode (Limit 17.000 dBm)
Date: 21.JUN.2006 21:12:29

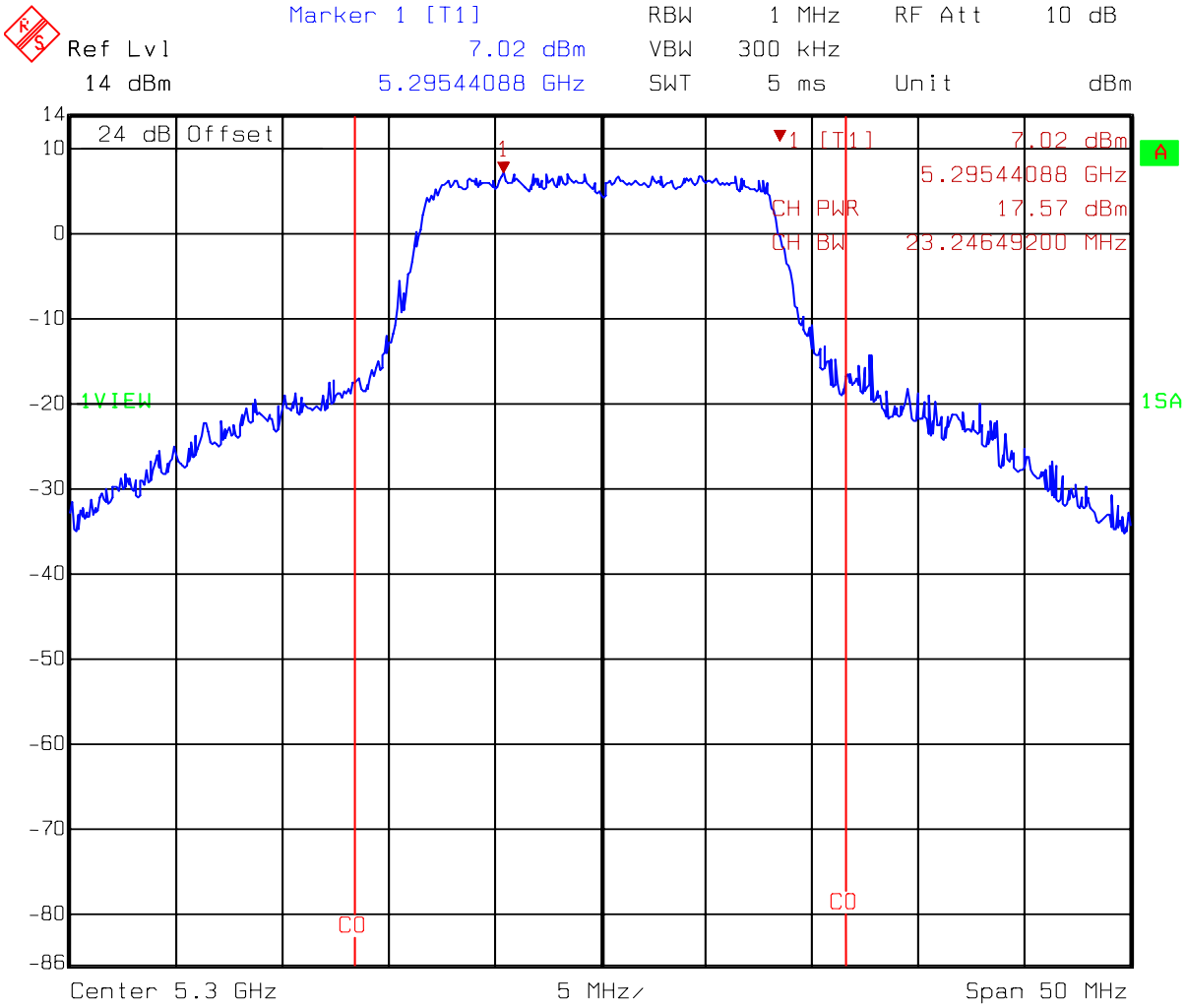


Title: Channel Output Power
Comment A: 5240MHz at 802.11a mode (Limit 17.000 dBm)
Date: 21.JUN.2006 21:03:19

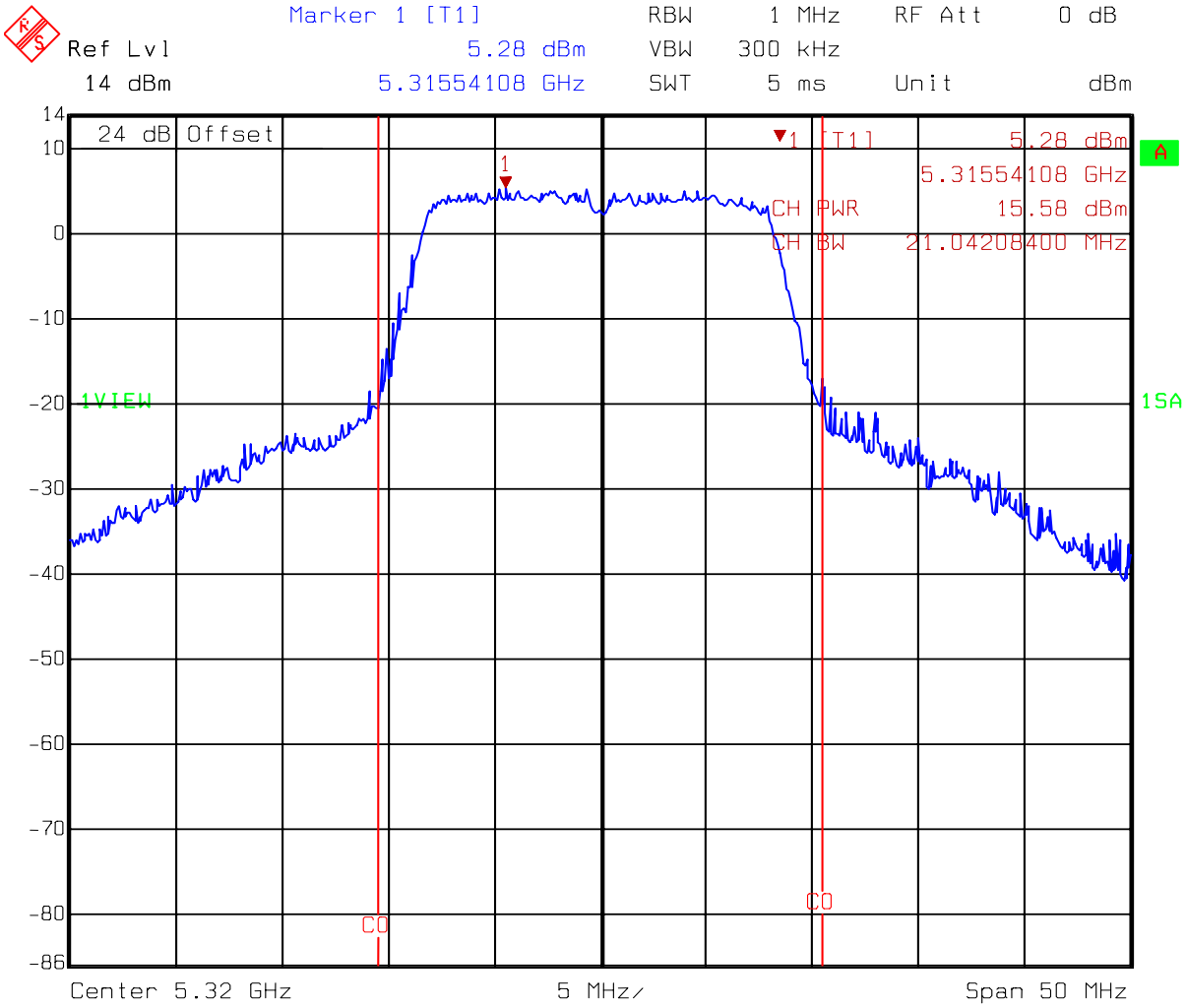
For Frequency band (5260MHz ~ 5320MHz)



Title: Channel Output Power
Comment A: 5260MHz at 802.11a mode (Limit 24.000 dBm)
Date: 16.JUN.2006 11:56:36

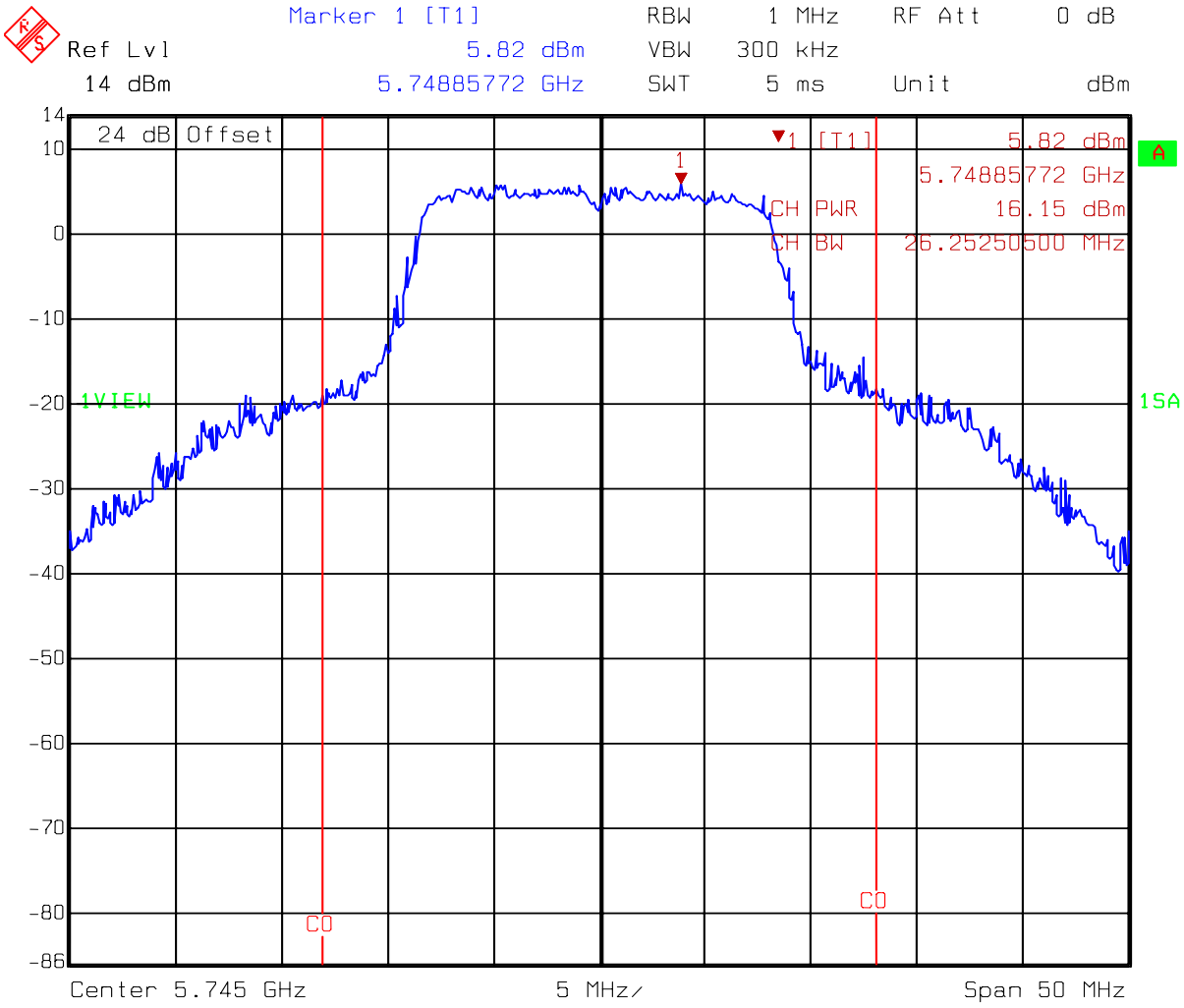


Title: Channel Output Power
Comment A: 5300MHz at 802.11a mode (Limit 24.000 dBm)
Date: 16.JUN.2006 12:00:52

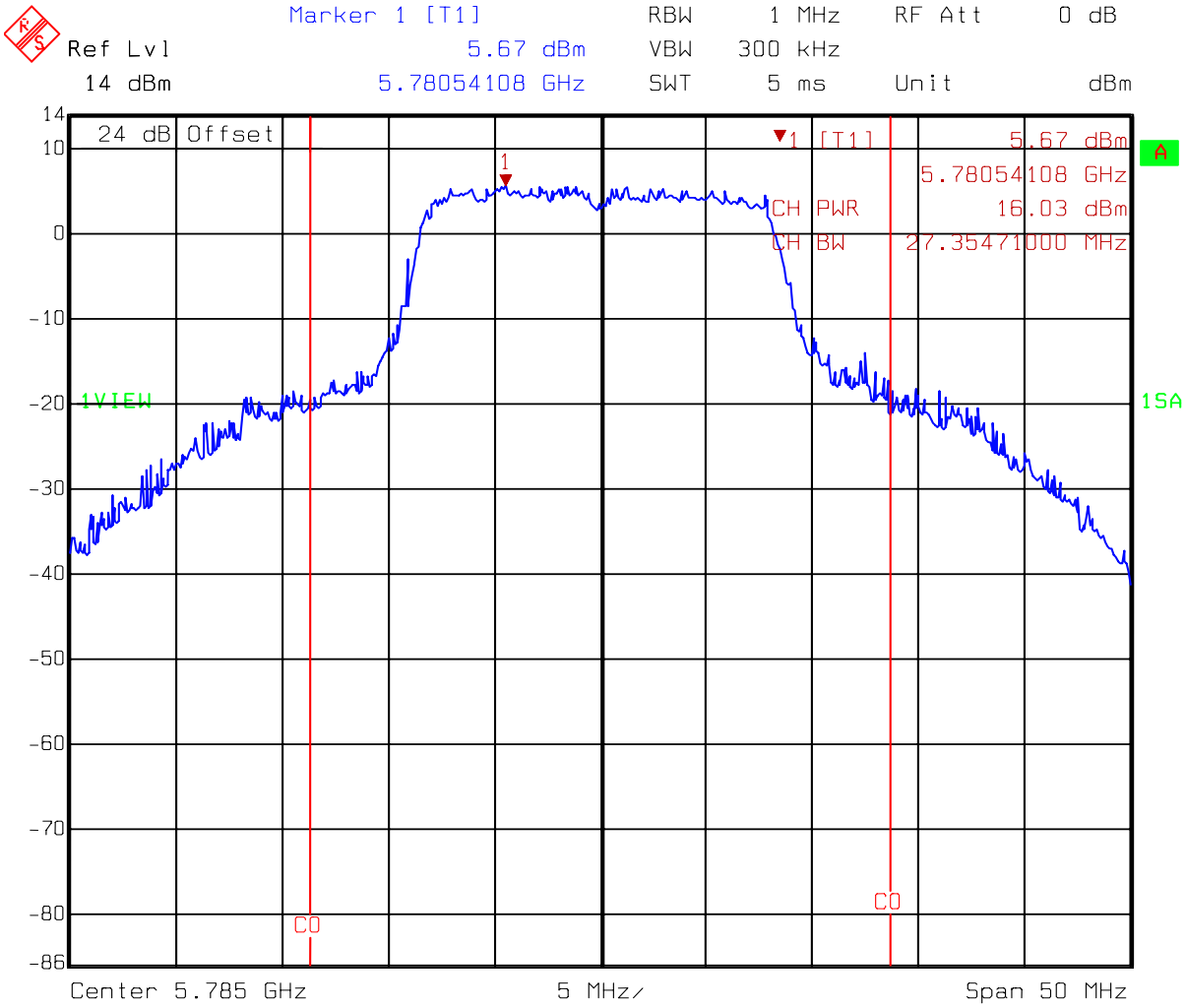


Title: Channel Output Power
Comment A: 5320MHz at 802.11a mode (Limit 24.000 dBm)
Date: 21.JUN.2006 20:51:19

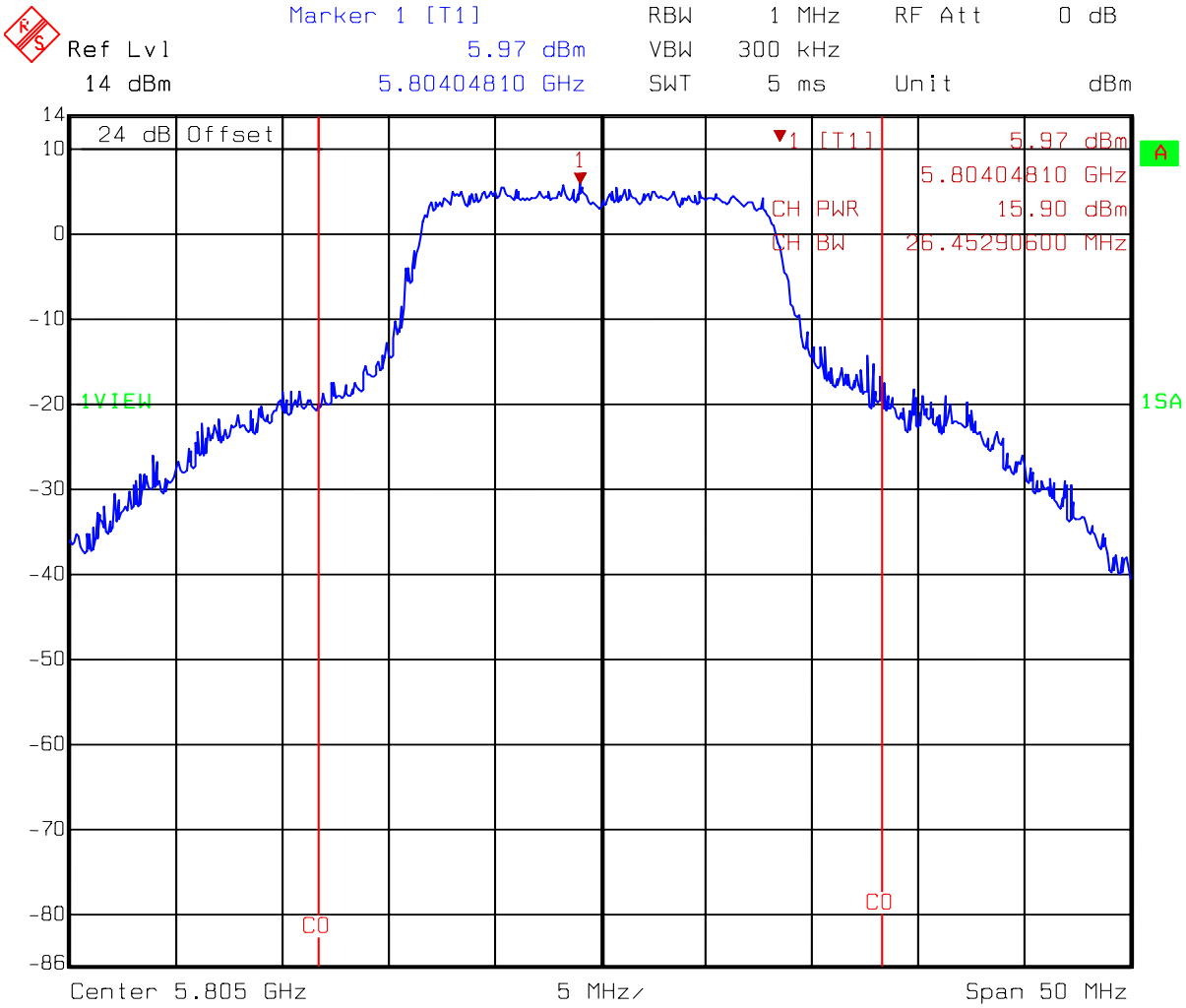
For Frequency band (5745MHz ~ 5825MHz)



Title: Channel Output Power
Comment A: 5745MHz at 802.11a mode (Limit 30.000 dBm)
Date: 16.JUN.2006 12:27:24



Title: Channel Output Power
Comment A: 5785MHz at 802.11a mode (Limit 30.000 dBm)
Date: 16.JUN.2006 12:30:21



Title: Channel Output Power
Comment A: 5805MHz at 802.11a mode (Limit 30.000 dBm)
Date: 16.JUN.2006 12:34:34

10. Power Spectrum Density test (FCC 15.407)

10.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1023	hPa

10.2 Test setup & procedure

The power spectrum density per FCC §15.407(a) was measured from the antenna port of the EUT using a 50ohm spectrum analyzer with the resolution bandwidth set at 1MHz, the video bandwidth set at 3MHz. Power spectrum density was read directly and cable loss (7.0dB)/external attenuator (20dB) correction was added to the reading to obtain power at the EUT antenna terminals.

Limit

Operating Frequency (MHz)	Power density limit
5150~5250	< 4dBm/MHz
5250~5350, 5470~5725	< 11dBm/MHz
5725~5825	< 17dBm/MHz

10.3 Measured data of Power Spectrum Density test results

For Frequency band (5180MHz ~ 5240MHz)

Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
36	5180	0.23	4
40	5200	0.35	4
48	5240	0.83	4

For Frequency band (5260MHz ~ 5320MHz)

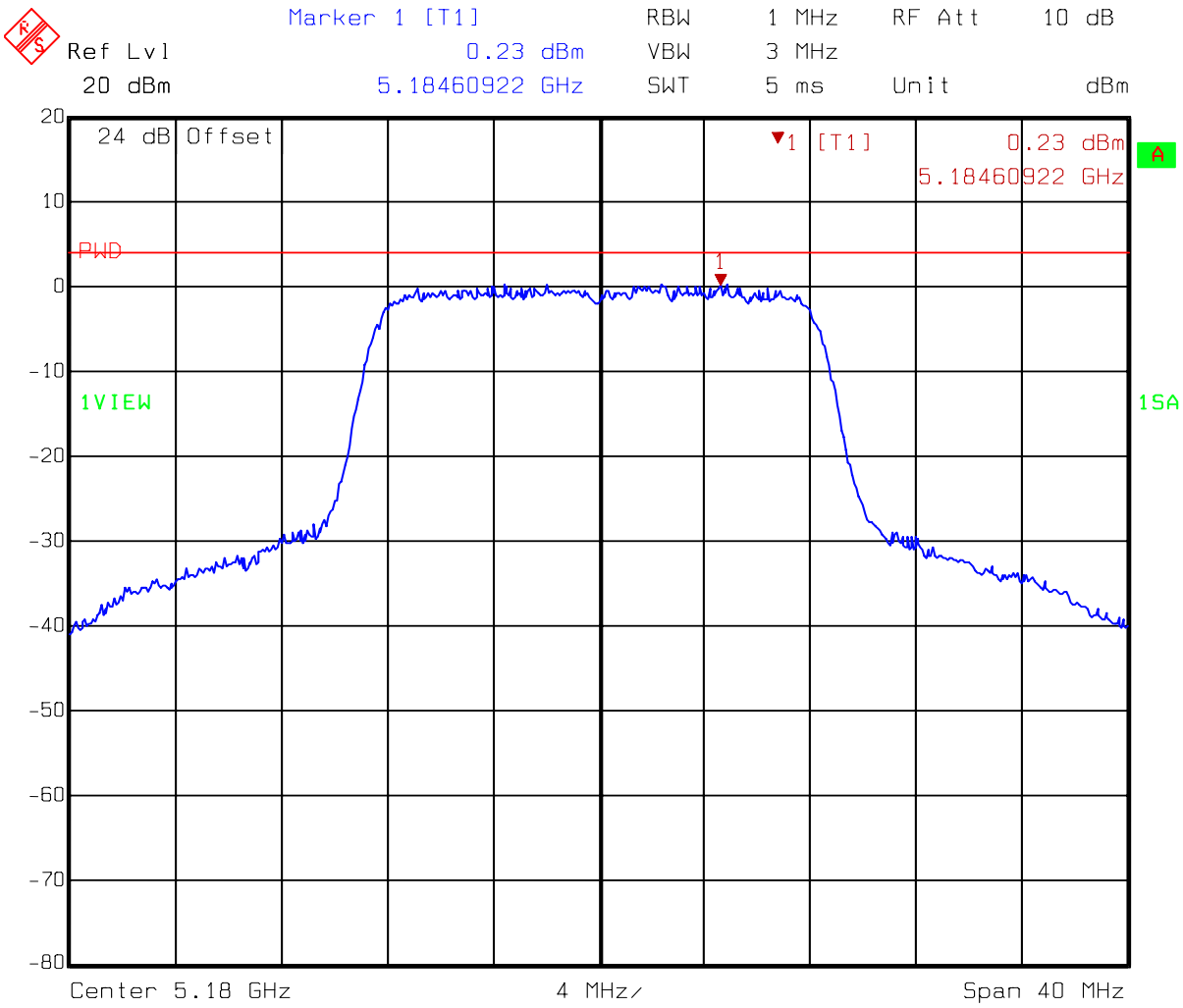
Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
52	5280	-0.56	11
60	5300	1.15	11
64	5320	-1.51	11

For Frequency band (5745MHz ~ 5825MHz)

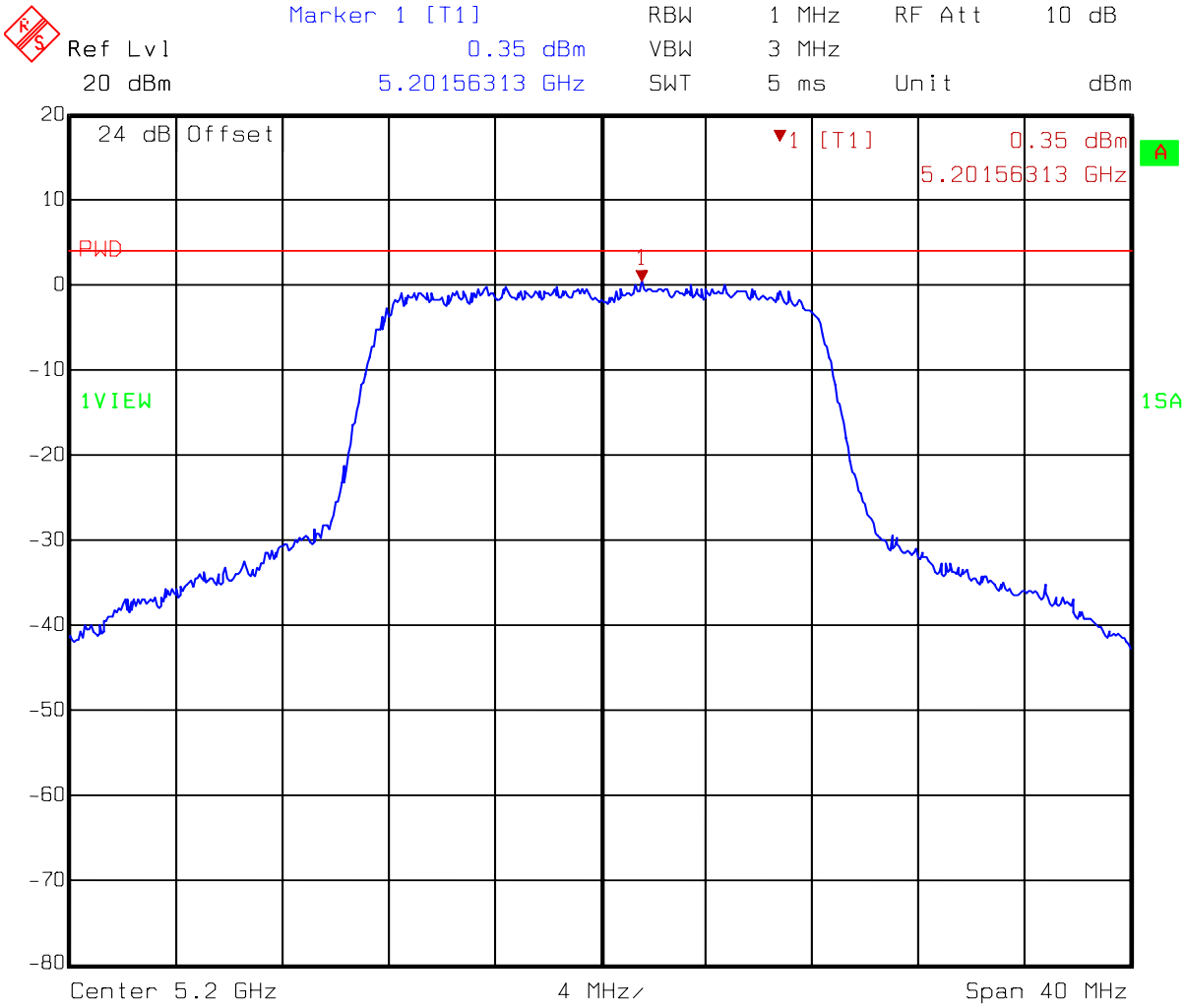
Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
149	5745	0.16	17
157	5785	-0.00	17
161	5805	-3.00	17

Please see the plot below.

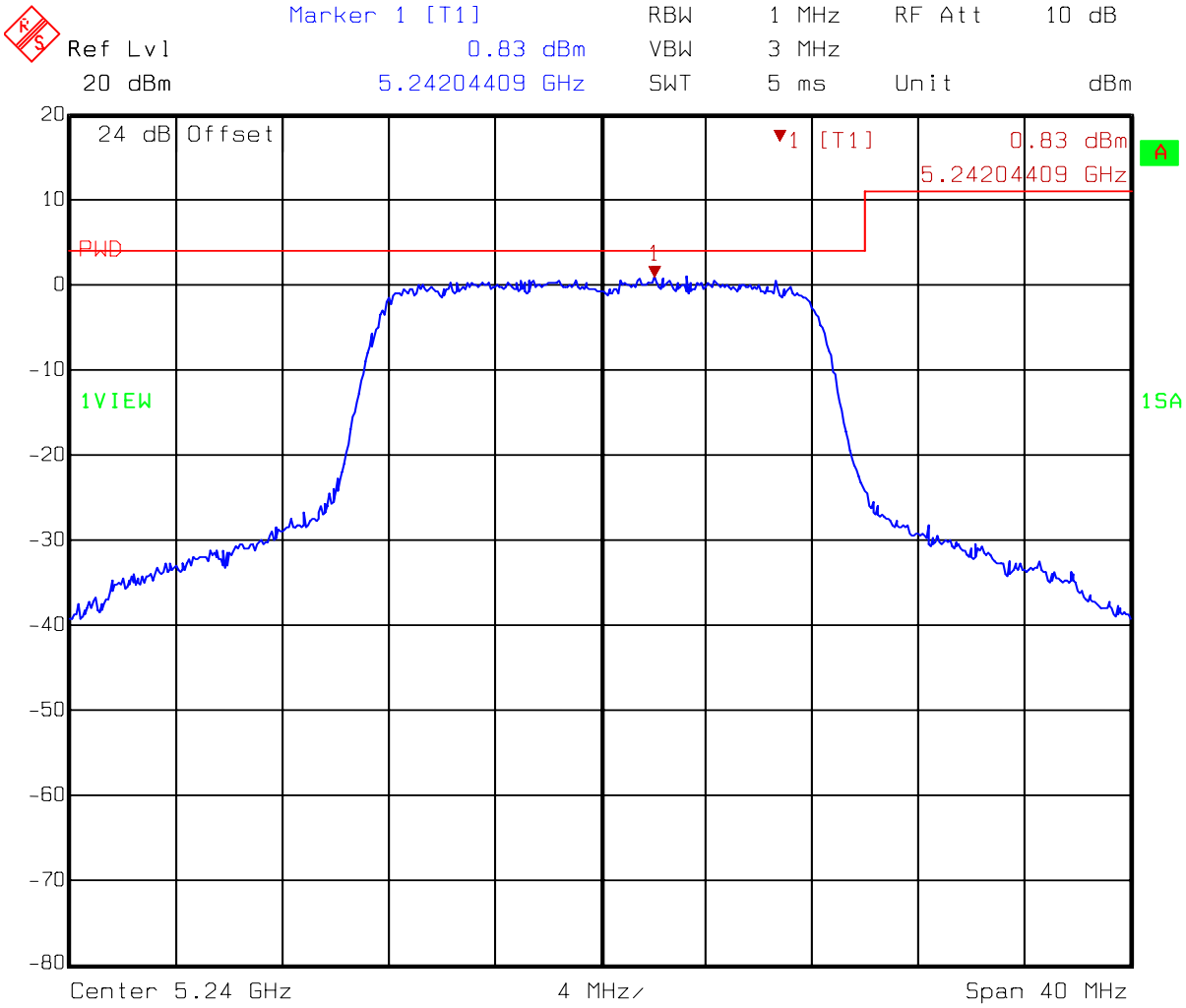
For Frequency band (5180MHz ~ 5240MHz)



Title: Power Density
Comment A: 5180MHz at 802.11a mode
Date: 16.JUN.2006 10:52:44

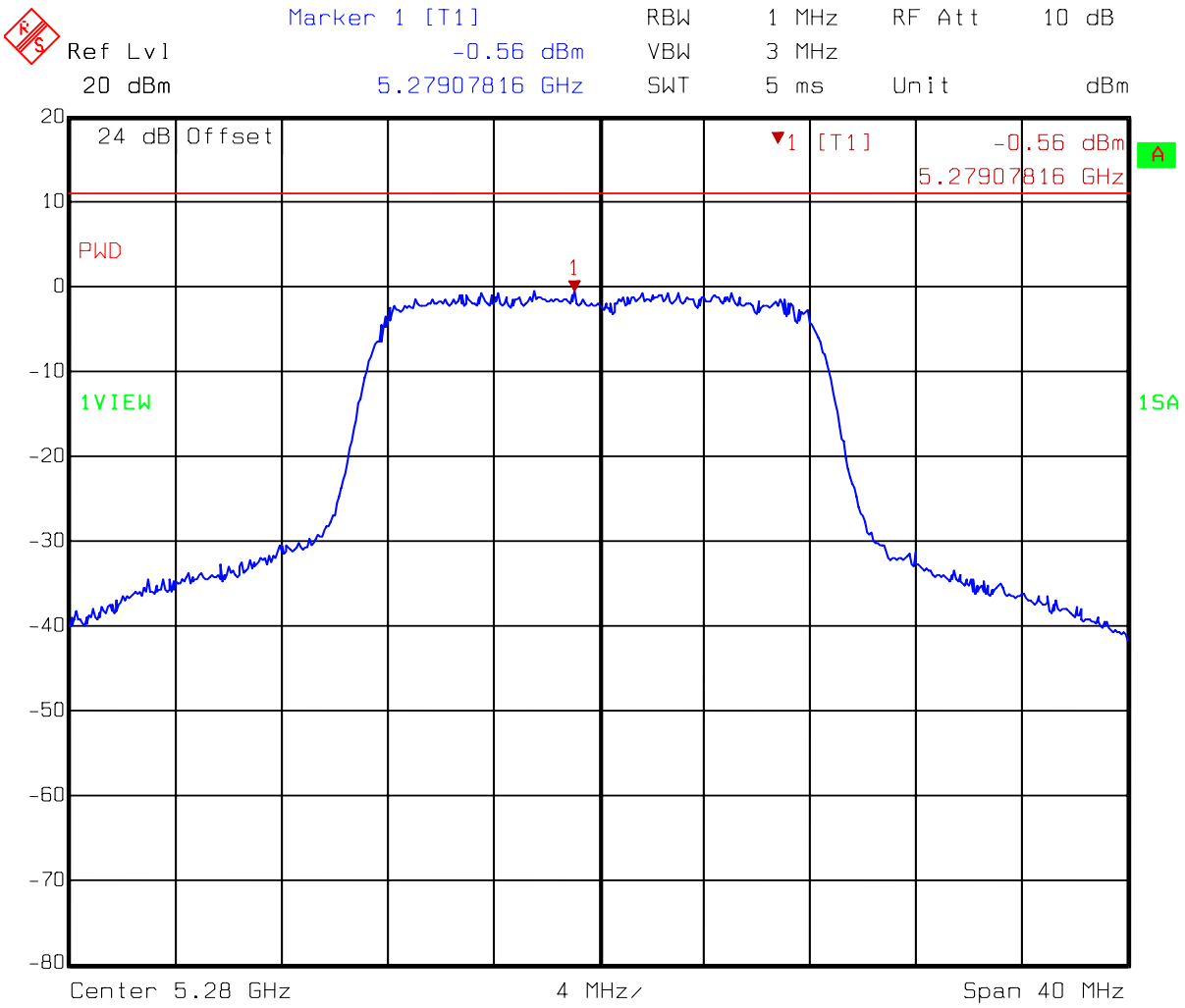


Title: Power Density
Comment A: 5200MHz at 802.11a mode
Date: 16.JUN.2006 11:46:15

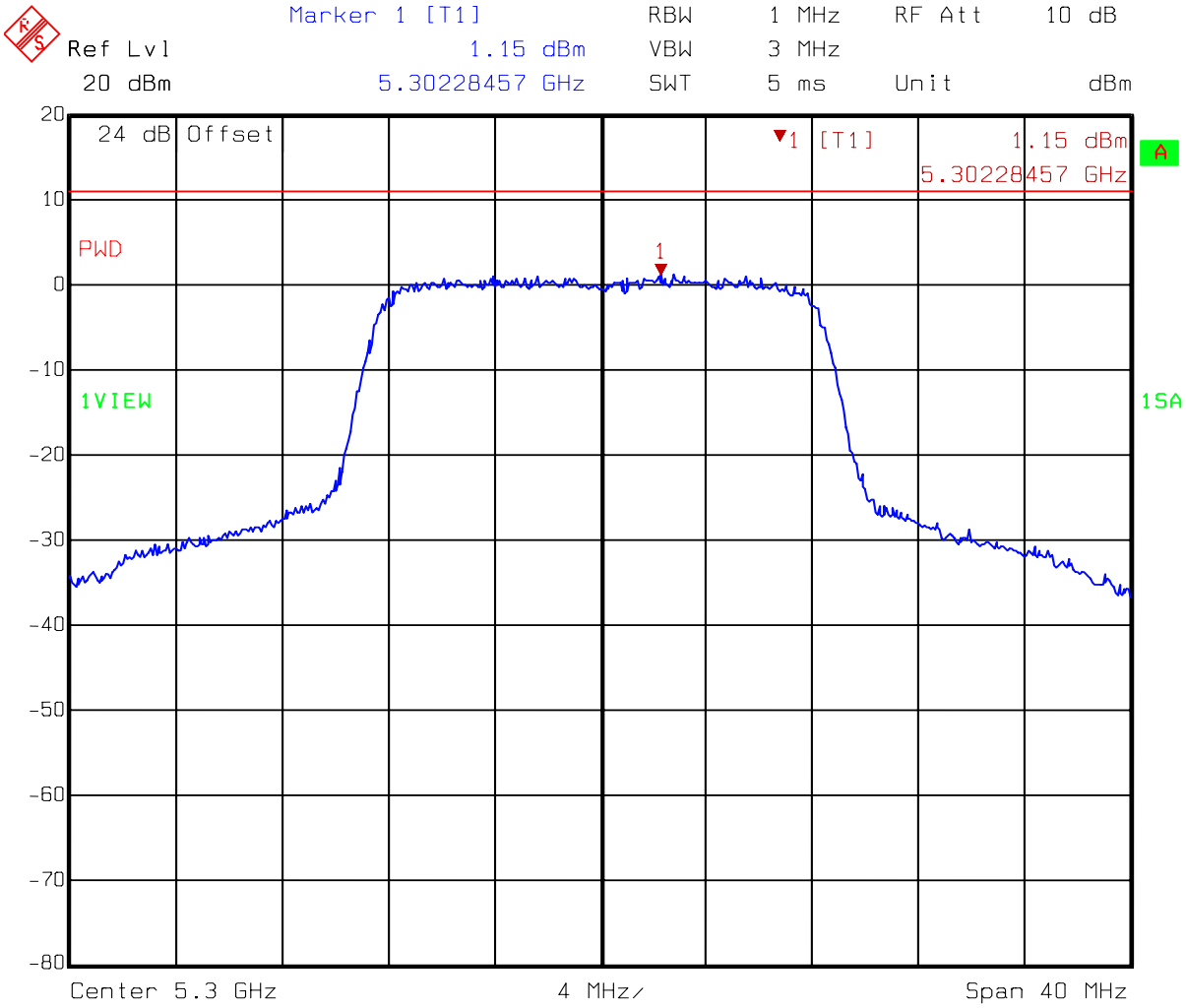


Title: Power Density
Comment A: 5240MHz at 802.11a mode
Date: 16.JUN.2006 11:48:57

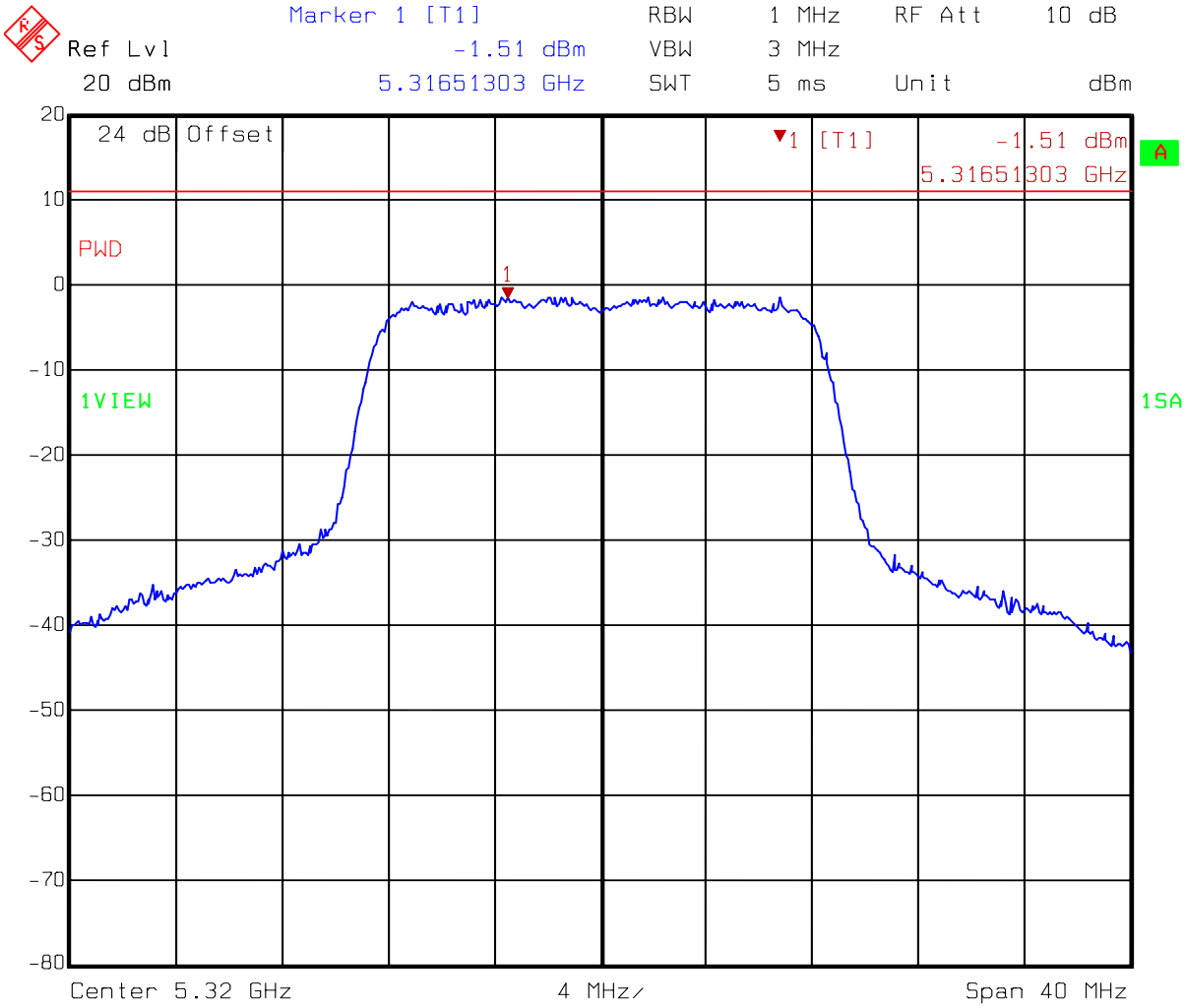
For Frequency band (5260MHz ~ 5320MHz)



Title: Power Density
Comment A: 5280MHz at 802.11a mode
Date: 21.JUN.2006 20:59:47

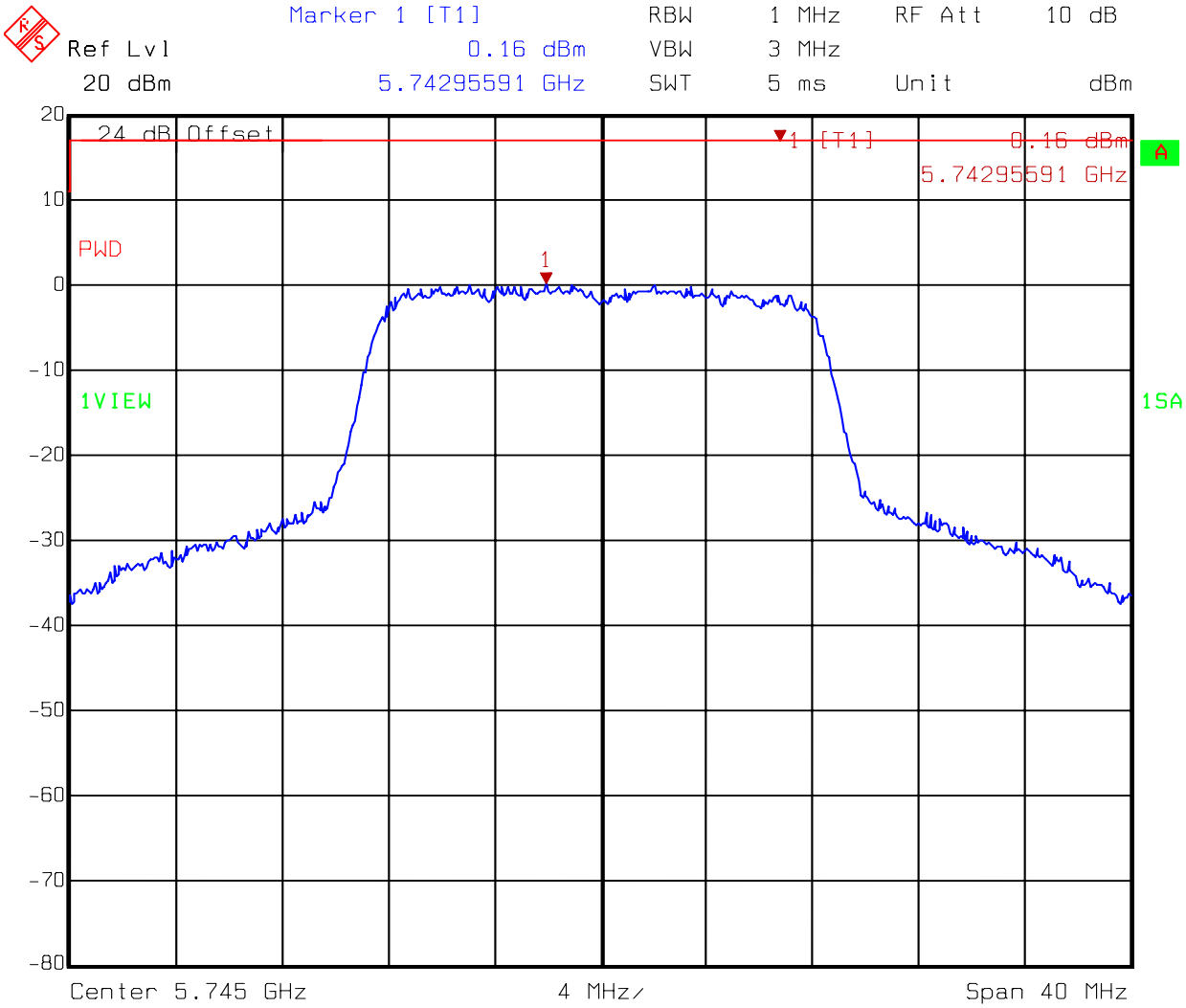


Title: Power Density
Comment A: 5300MHz at 802.11a mode
Date: 16.JUN.2006 12:01:19

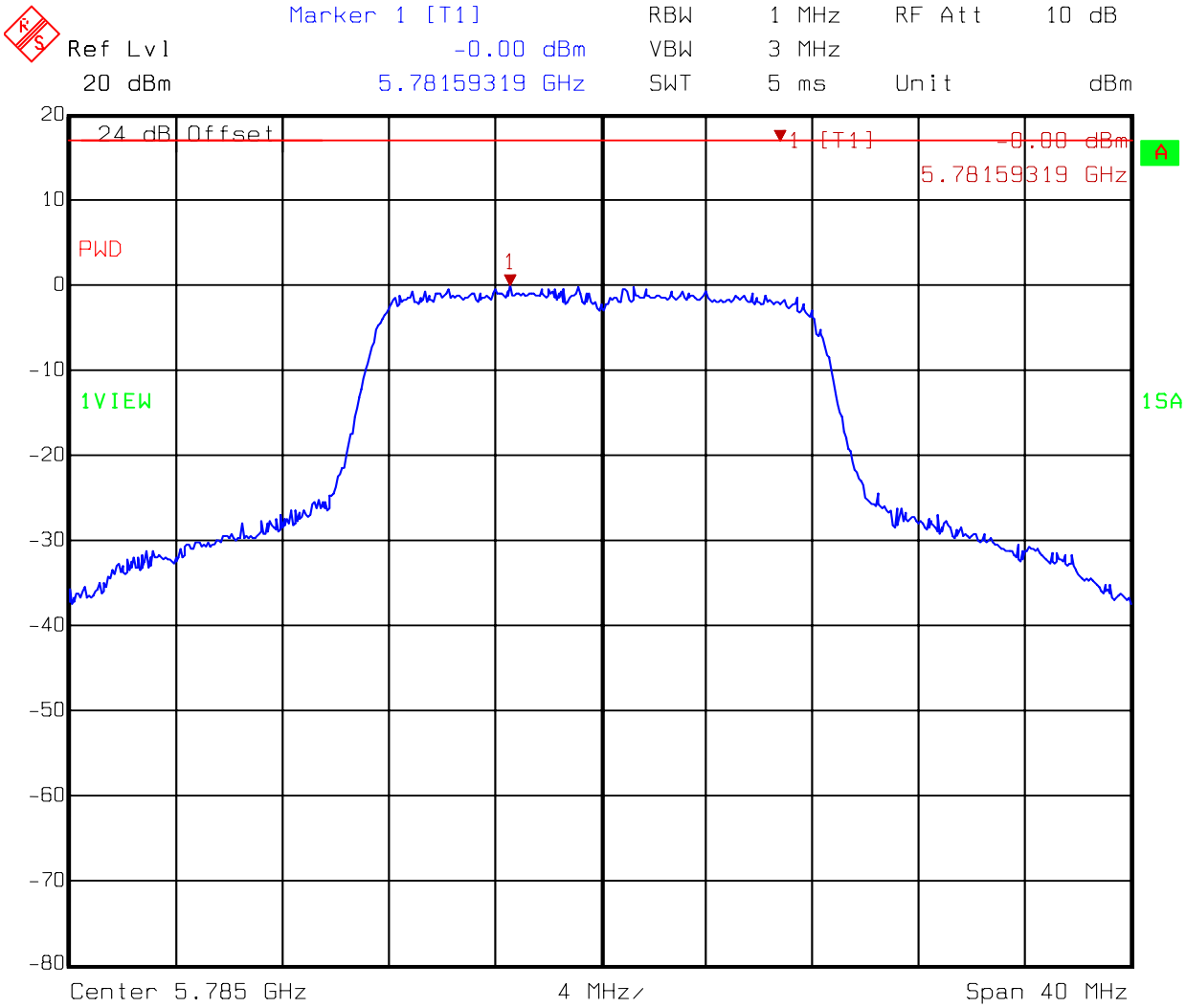


Title: Power Density
Comment A: 5320MHz at 802.11a mode
Date: 21.JUN.2006 20:51:46

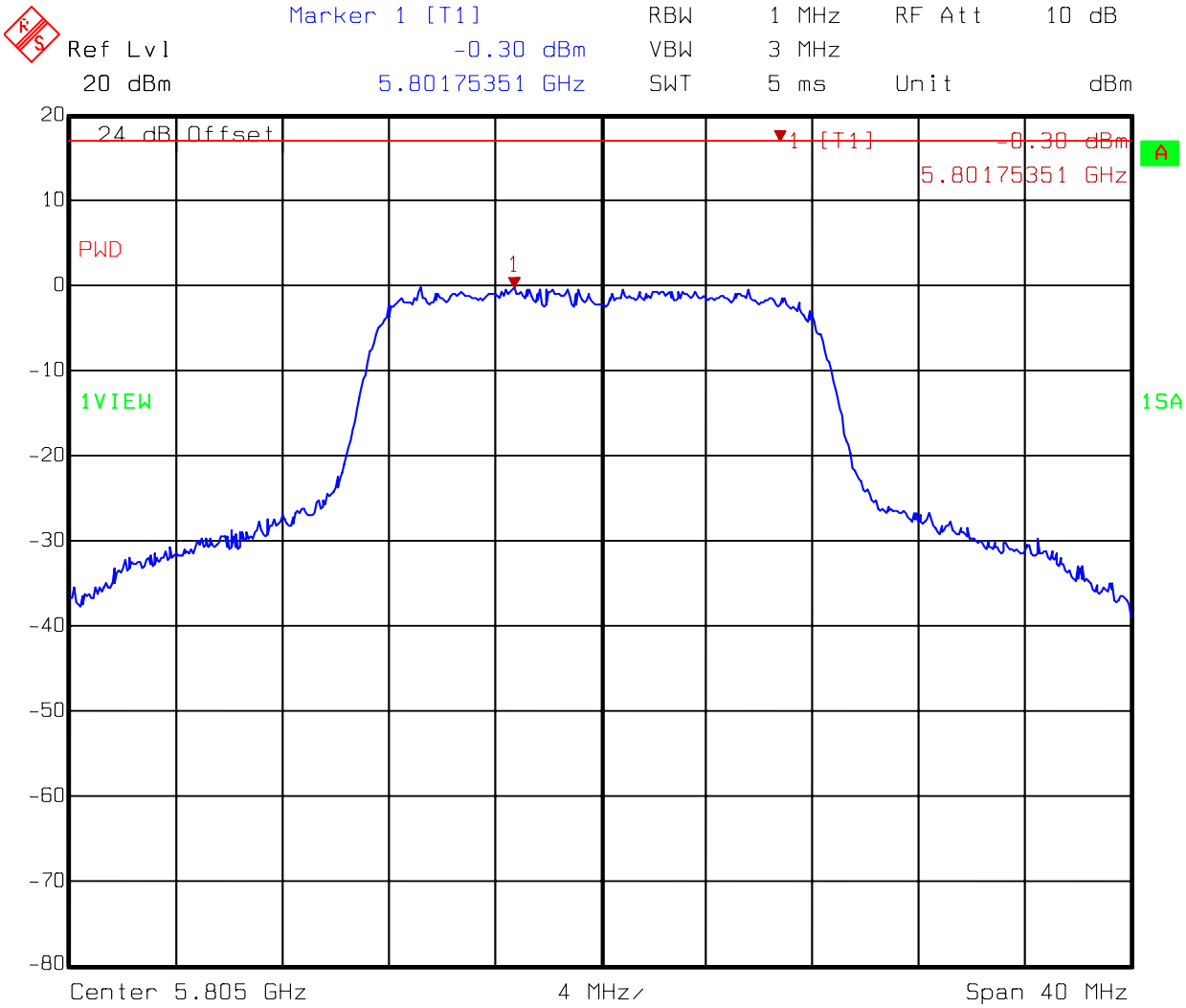
For Frequency band (5745MHz ~ 5825MHz)



Title: Power Density
Comment A: 5745MHz at 802.11a mode
Date: 16.JUN.2006 12:27:52



Title: Power Density
Comment A: 5785MHz at 802.11a mode
Date: 16.JUN.2006 12:30:48



Title: Power Density
Comment A: 5805MHz at 802.11a mode
Date: 16.JUN.2006 12:35:00

11. Peak excursion to average ratio test (FCC 15.407)

11.1 Operating environment

Temperature:	25	℃
Relative Humidity:	50	%
Atmospheric Pressure:	1023	hPa

11.2 Test setup & procedure

The power spectrum density per FCC §15.407(a)(6) was measured from the antenna port of the EUT. Using a 50ohm spectrum analyzer with the RBW=VBW=10MHz for peak measurement and RBW=1MHz, VBW=30kHz for average measurement. Peak excursion to average ratio was read directly.

Limit

Operating Frequency (MHz)	Peak excursion to average ratio limit
5150~5250	<13dB
5250~5350, 5470~5725	<13dB
5725~5825	<13dB

11.3 Measured data of Peak excursion to average ratio test results

For Frequency band (5180MHz ~ 5240MHz)

Channel	Frequency (MHz)	Measured peak excursion (dBm)	Limit (dB)
36	5180	8.96	13
40	5200	8.05	13
48	5240	8.85	13

For Frequency band (5260MHz ~ 5320MHz)

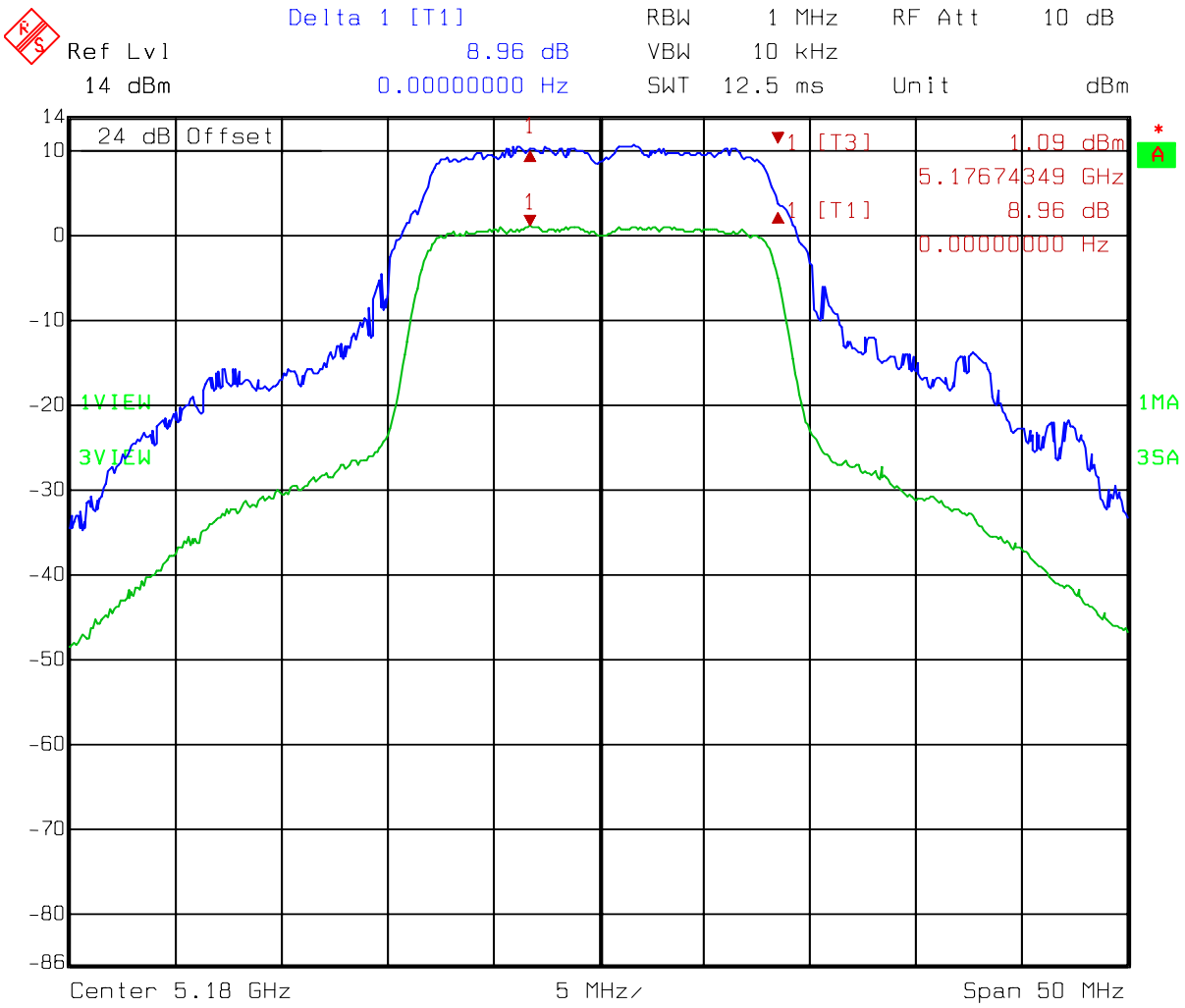
Channel	Frequency (MHz)	Measured peak excursion (dBm)	Limit (dB)
52	5260	9.11	13
60	5300	8.60	13
64	5320	8.63	13

For Frequency band (5745MHz ~ 5825MHz)

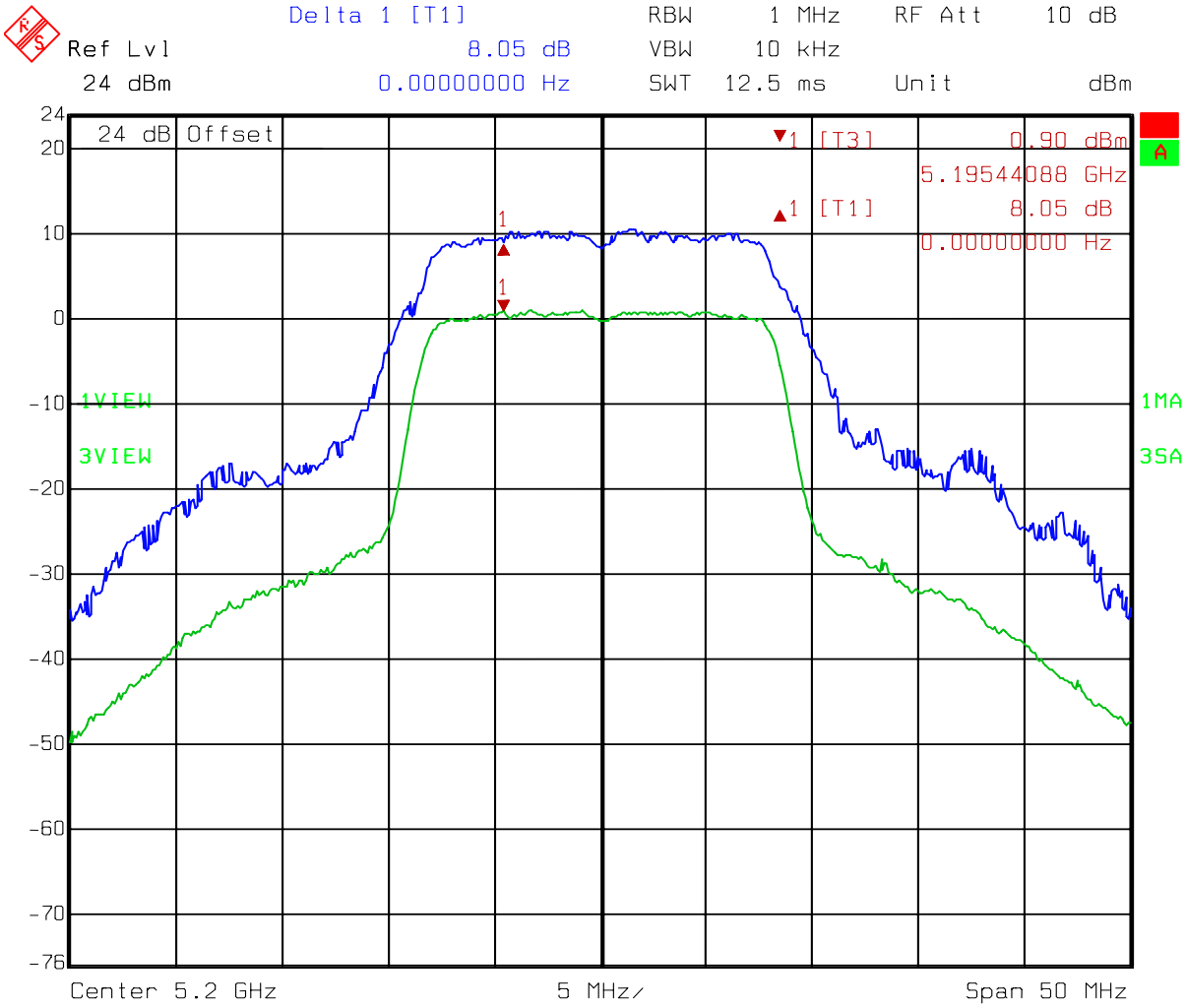
Channel	Frequency (MHz)	Measured peak excursion (dBm)	Limit (dB)
149	5745	8.97	13
157	5875	9.03	13
161	5805	9.18	13

Please see the plot below.

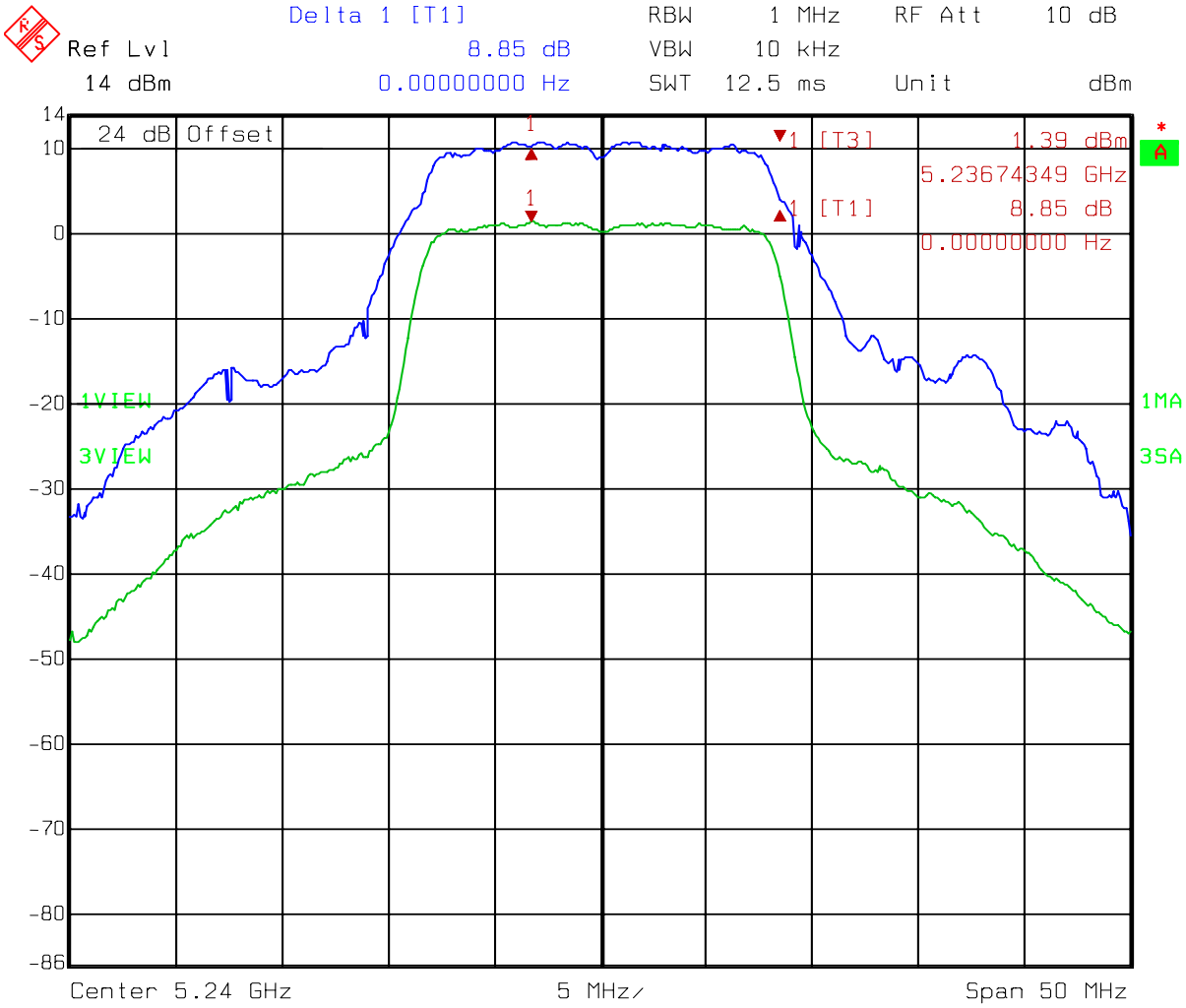
For Frequency band (5180MHz ~ 5240MHz)



Title: Peak to Excursion Avg. rate
Comment A: 5180MHz at 802.11a mode
Date: 16.JUN.2006 10:53:16

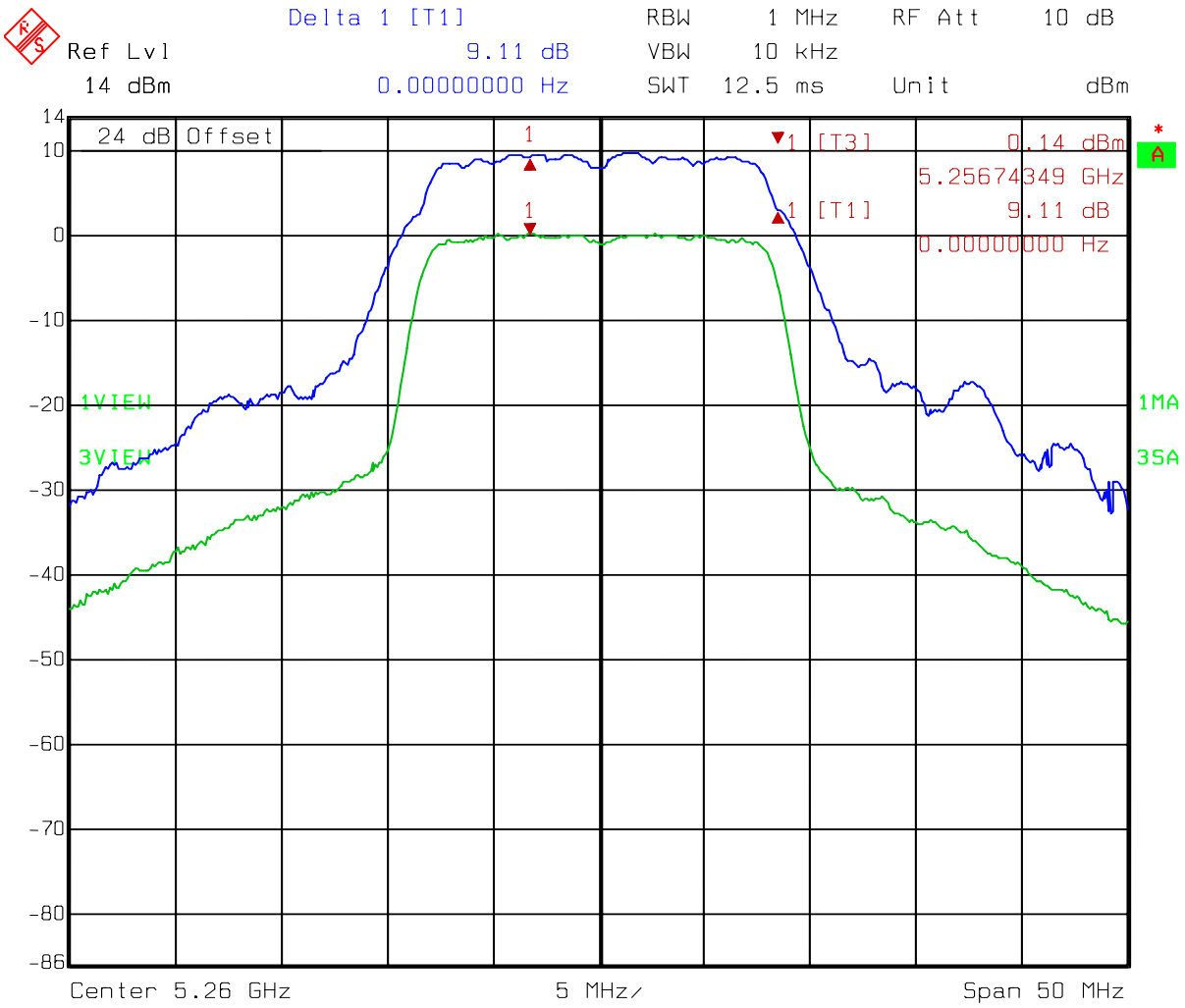


Title: Peak to Excursion Avg. rate
Comment A: 5200MHz at 802.11a mode
Date: 16.JUN.2006 11:46:53

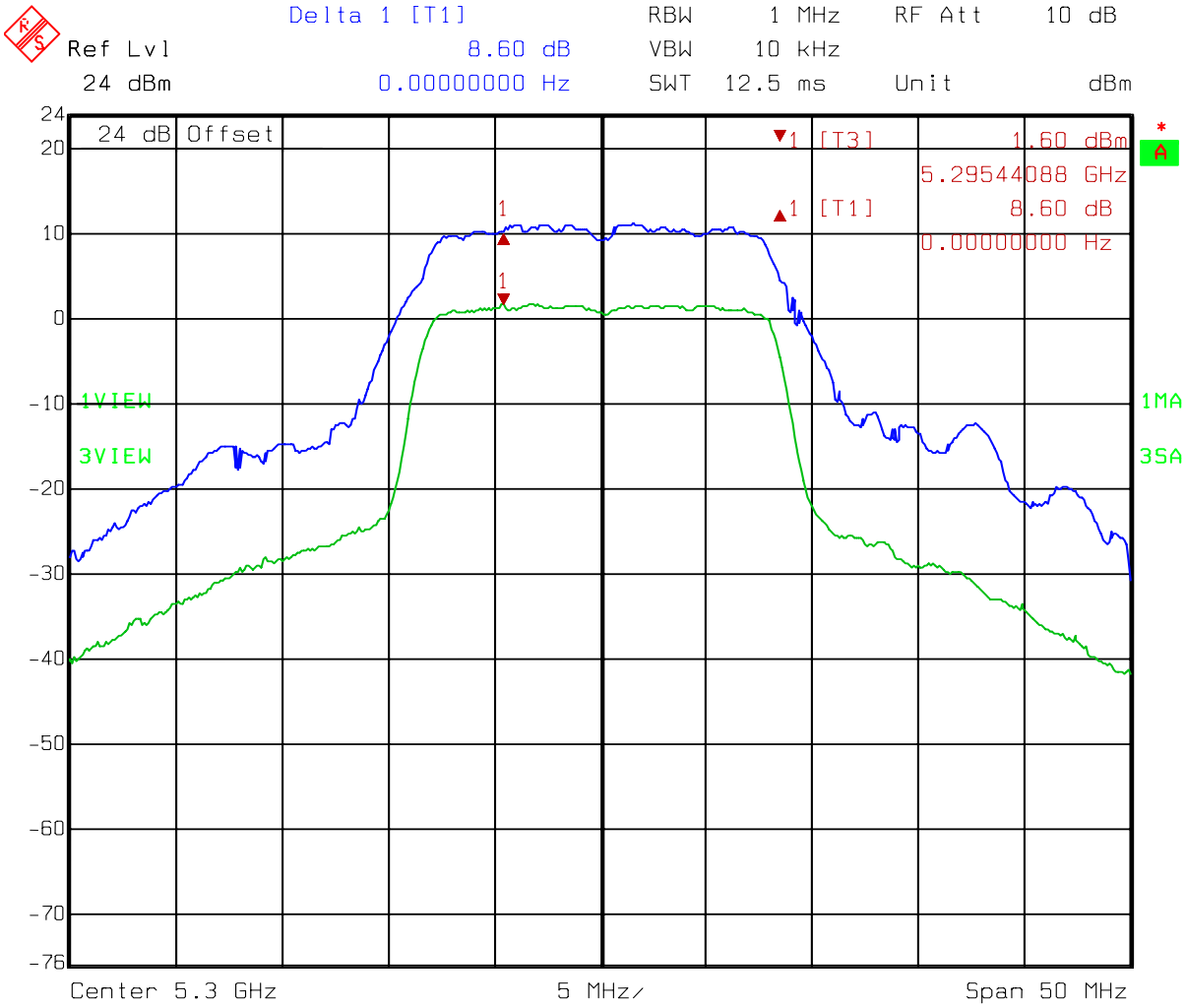


Title: Peak to Excursion Avg. rate
Comment A: 5240MHz at 802.11a mode
Date: 16.JUN.2006 11:49:31

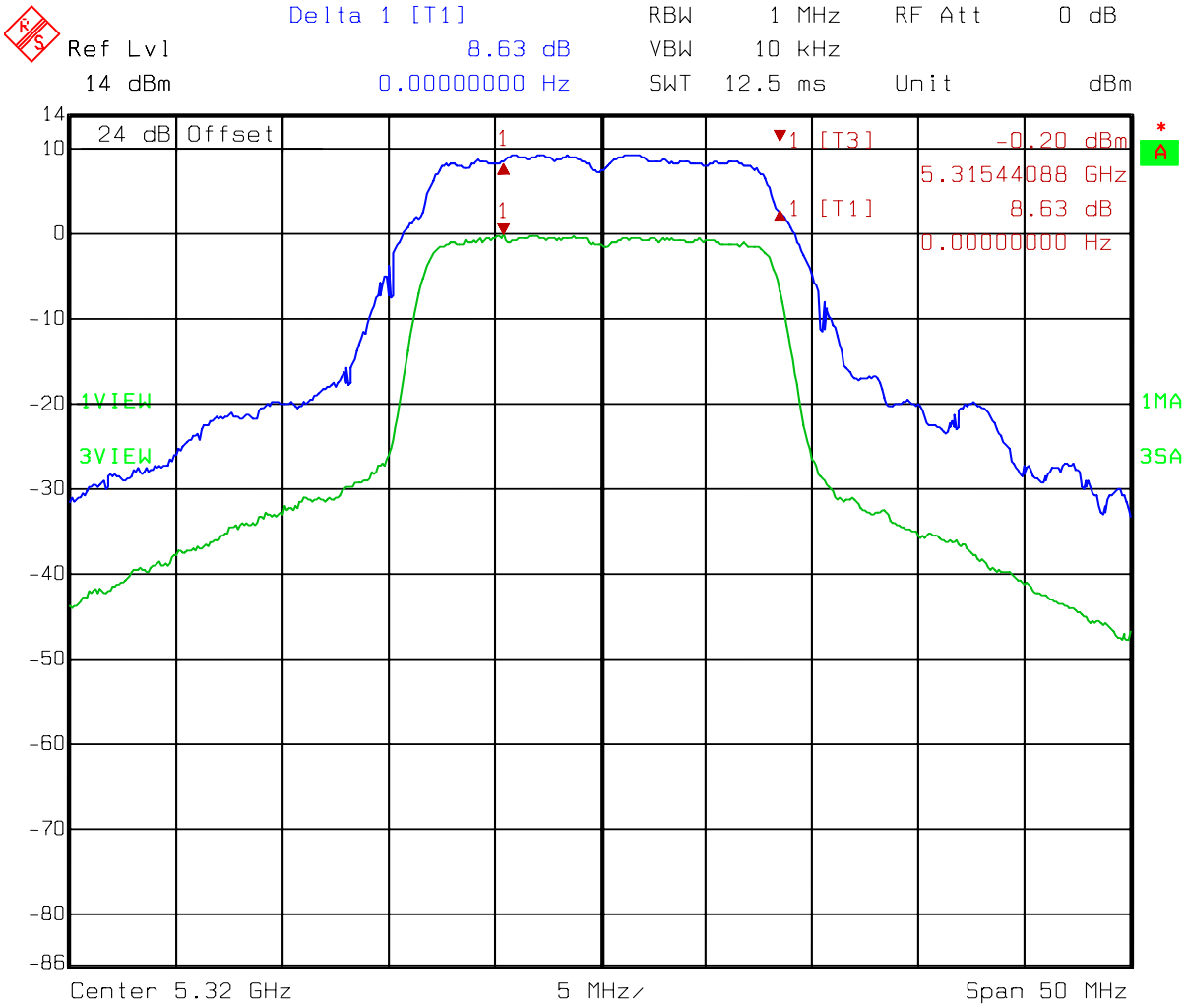
For Frequency band (5260MHz ~ 5320MHz)



Title: Peak to Excursion Avg. rate
Comment A: 5260MHz at 802.11a mode
Date: 16.JUN.2006 11:57:36

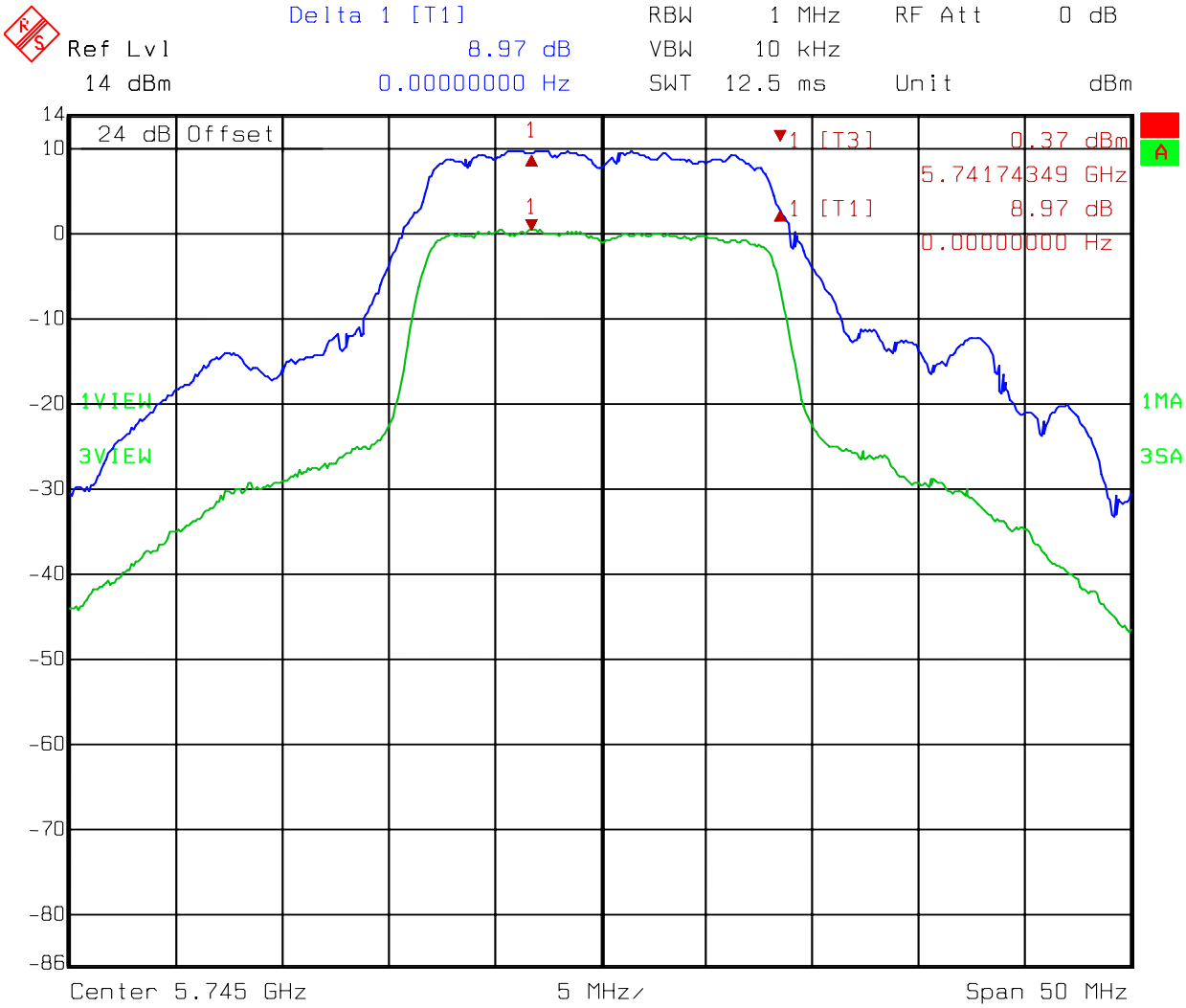


Title: Peak to Excursion Avg. rate
Comment A: 5300MHz at 802.11a mode
Date: 16.JUN.2006 12:01:52

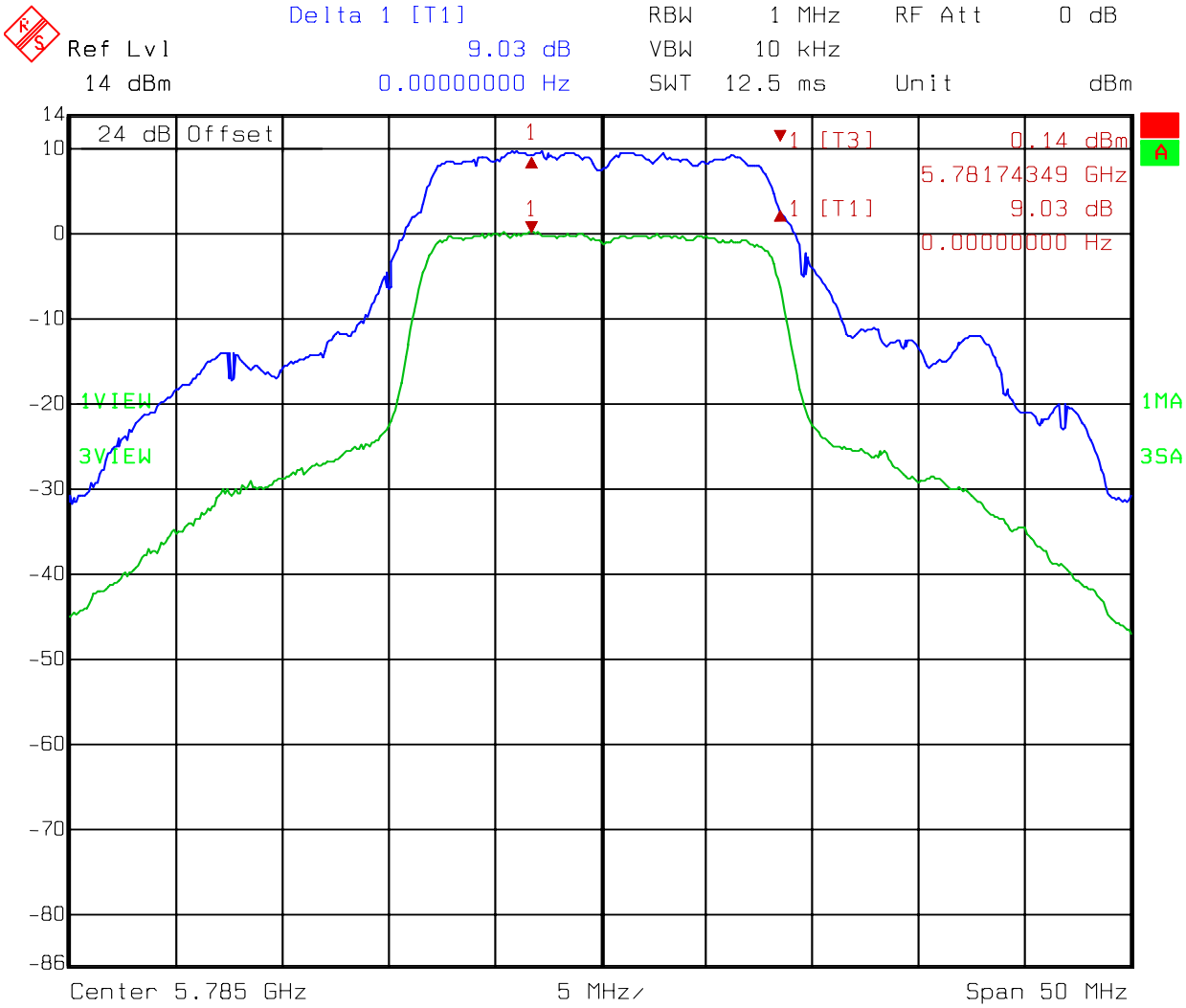


Title: Peak to Excursion Avg. rate
Comment A: 5320MHz at 802.11a mode
Date: 21.JUN.2006 20:52:18

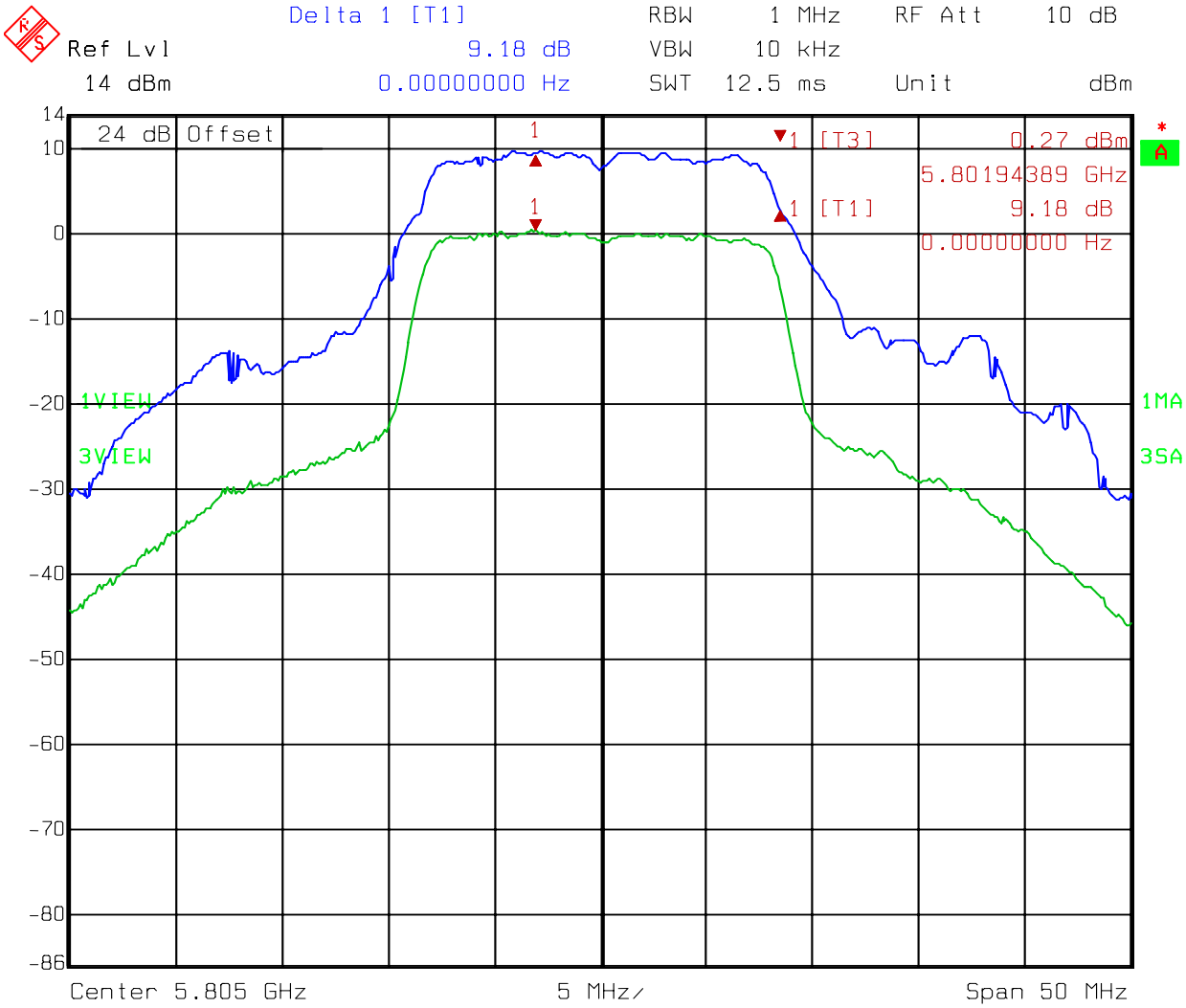
For Frequency band (5785MHz ~ 5825MHz)



Title: Peak to Excursion Avg. rate
Comment A: 5745MHz at 802.11a mode
Date: 16.JUN.2006 12:28:26



Title: Peak to Excursion Avg. rate
Comment A: 5785MHz at 802.11a mode
Date: 16.JUN.2006 12:31:20



Title: Peak to Excursion Avg. rate
Comment A: 5805MHz at 802.11a mode
Date: 16.JUN.2006 12:35:32

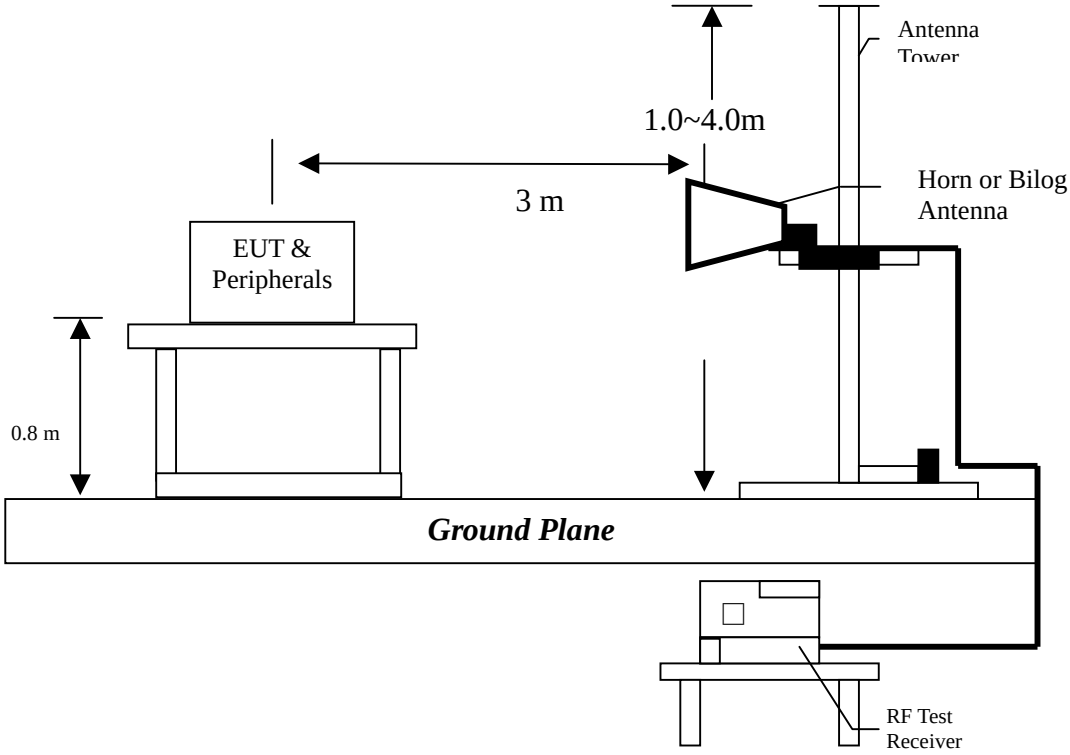
12. Radiated Emission test (FCC 15.205 & 15.209)

12.1 Operating environment

Temperature:	23	℃
Relative Humidity:	58	%
Atmospheric Pressure	1023	hPa

12.2 Test setup & procedure

The Diagram below shows the test setup, which is utilized to make these measurements.



Radiated emission measurements were performed from 30MHz to tenth harmonic or 40GHz. The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

12.3 Emission limits

The spurious Emission shall test through the 10th harmonic. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

Frequency (MHz)	Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:
1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Uncertainty was calculated in accordance with NAMAS NIS 81.
Expanded uncertainty (k=2) of radiated emission measurement is ±3.078 dB.
Expanded uncertainty (k=2) of conducted emission measurement is ±2.02 dB.

12.4 Radiated spurious emission test data

12.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under 802.11a, 802.11b and 802.11g continuously transmitting mode. Channel low, middle, high were verified. Detail data please see the page 39.

12.4.2 Measurement results: frequency above 1GHz

EUT : AG-320
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 36

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
6899.00	PK	V	36.58	42.96	42.27	48.65	54	-5.35
10360.00	PK	V	33.72	48.15	39.24	53.67	54	-0.33
7508.00	PK	H	36.59	45.41	39.21	48.03	54	-5.97
10360.00	PK	H	33.72	48.15	38.62	53.05	54	-0.95

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

The noise floor are listedas below :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 40

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
6920.00	PK	V	36.58	42.96	41.51	47.89	54	-6.11
10400.00	PK	V	33.72	48.15	39.09	53.52	54	-0.48
10400.00	PK	H	33.72	48.15	39.04	53.47	54	-0.53

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 48

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10480.00	PK	V	33.72	48.15	42.78	57.21	74	-16.79
10480.00	AV	V	33.72	48.15	30.04	44.47	54	-9.53
10480.00	PK	H	33.72	48.15	39.24	53.67	54	-0.33

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5260MHz ~ 5320MHz
Test Condition : 802.11a Tx at channel 52

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10520.00	PK	V	33.23	49.24	42.75	58.76	74	-15.24
10520.00	AV	V	33.23	49.24	30.25	46.26	54	-7.74
10520.00	PK	H	33.23	49.24	43.88	59.89	74	-14.11
10520.00	AV	H	33.23	49.24	30.71	46.72	54	-7.28

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

The noise floor are listedas below :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5260MHz ~ 5320MHz
Test Condition : 802.11a Tx at channel 60

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10600.00	PK	V	33.23	49.24	45	61.01	74	-12.99
10600.00	AV	V	33.23	49.24	32.73	48.74	54	-5.26
10600.00	PK	H	33.23	49.24	46.94	62.95	74	-11.05
10600.00	AV	H	33.23	49.24	34.36	50.37	54	-3.63

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5260MHz ~ 5320MHz
Test Condition : 802.11a Tx at channel 64

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
10640.00	PK	V	33.23	49.24	45.84	61.85	74	-12.15
10640.00	AV	V	33.23	49.24	33.76	49.77	54	-4.23
10640.00	PK	H	33.23	49.24	44.41	60.42	74	-13.58
10640.00	AV	H	33.23	49.24	31.69	47.70	54	-6.30

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5745MHz ~ 5825MHz
Test Condition : 802.11a Tx at channel 149

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11490.00	PK	V	33.53	49.96	47.03	63.46	74	-10.54
11490.00	AV	V	33.53	49.96	32.68	49.11	54	-4.89
11490.00	PK	H	33.53	49.96	46.58	63.01	74	-10.99
11490.00	AV	H	33.53	49.96	32.97	49.4	54	-4.6

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5745MHz ~ 5825MHz
Test Condition : 802.11a Tx at channel 157

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11570.00	PK	V	34.55	50.03	41.16	56.64	74	-17.36
11570.00	AV	V	34.55	50.03	26.73	42.21	54	-11.79
11570.00	PK	H	34.55	50.03	45.61	61.09	74	-12.91
11570.00	AV	H	34.55	50.03	31.7	47.18	54	-6.82

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

EUT : AG-320
Frequency band : 5745MHz ~ 5825MHz
Test Condition : 802.11a Tx at channel 161

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Preamp (dB)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
11610.00	PK	V	34.55	50.03	41.42	56.9	74	-17.1
11610.00	AV	V	34.55	50.03	29.26	44.74	54	-9.26
11610.00	PK	H	34.55	50.03	42.94	58.42	74	-15.58
11610.00	AV	H	34.55	50.03	30.03	45.51	54	-8.49

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 40GHz.The data value listed above which is higher than the noise floor, the others please refer to noise floor level.

Noise floor level is :

For PK:
1GHz-3GHz: 20dBuV
3GHz-14GHz: 27dBuV
14GHz-26.5GHz: 39dBuV
26.5GHz-40GHz: 42dBuV

For AV:
1GHz-3GHz: 10dBuV
3GHz-14GHz: 16dBuV
14GHz-26.5GHz: 28dBuV
26.5GHz-40GHz: 29dBuV

13. Emission on the band edge §FCC 15.205

The measurement was made to the average and peak field strength of the fundamental frequency. And the spurious emission in the restrict band must also comply with the FCC subpart C 15.209.

13.1 Operating environment

Temperature:	22	℃
Relative Humidity:	56	%
Atmospheric Pressure	1023	hPa

13.2 Test setup & procedure

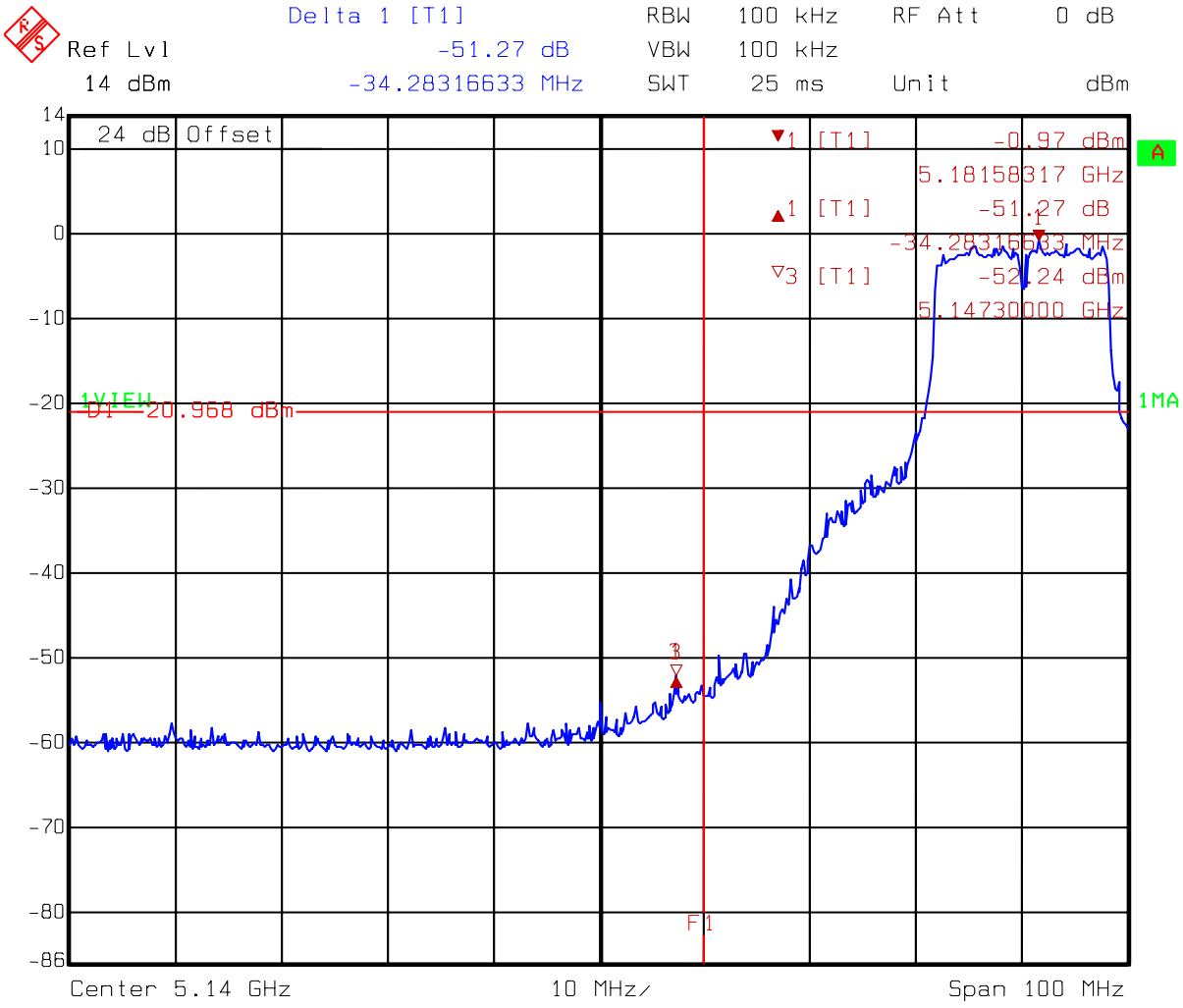
The output of EUT was connected to spectrum analyzer via a 50ohm cable.

The setting of spectrum analyzer is:

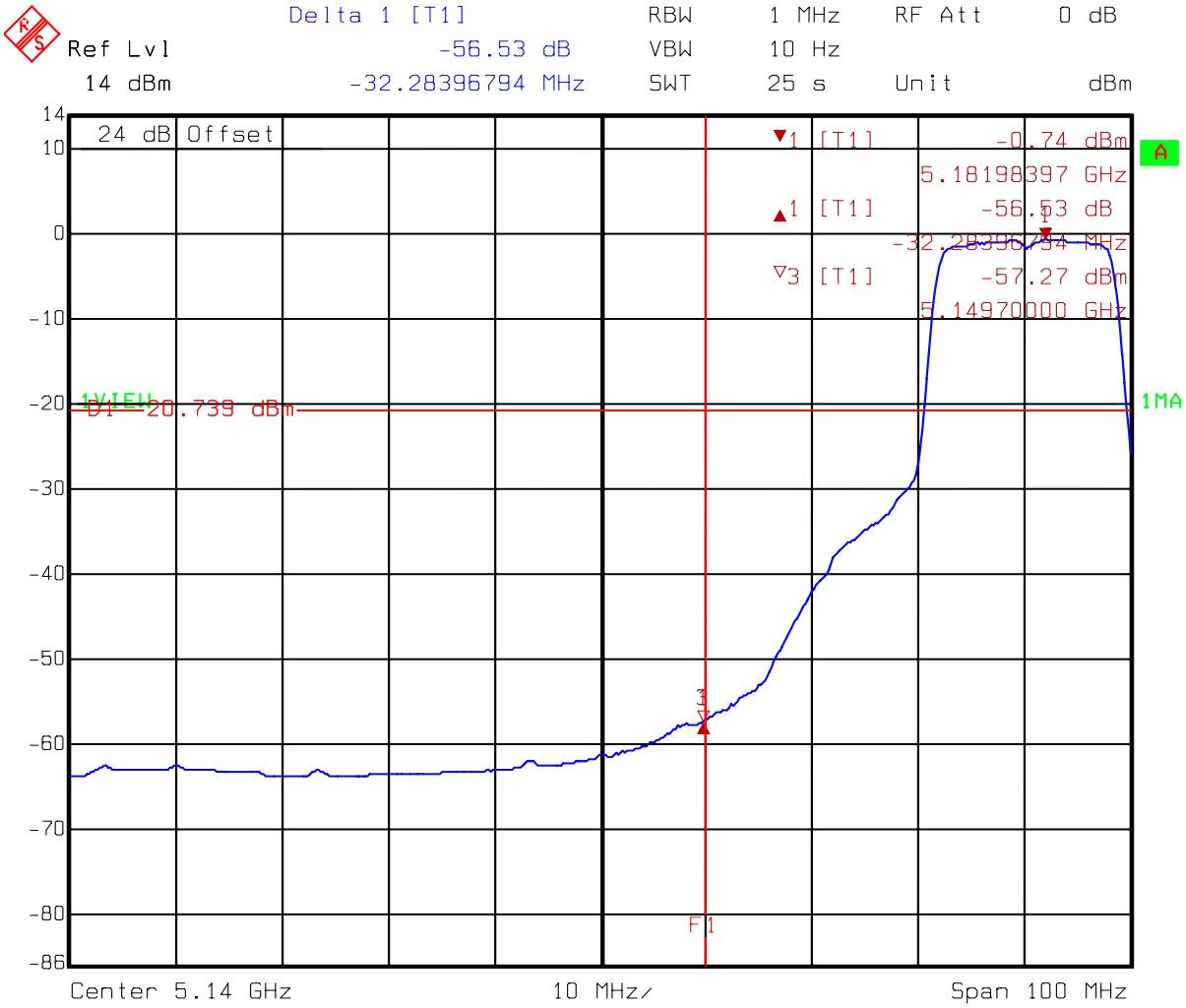
Peak:	RBW = 100kHz ;	VBW = 100kHz
Average:	RBW = 1MHz ;	VBW = 10Hz

13.3 Test Result

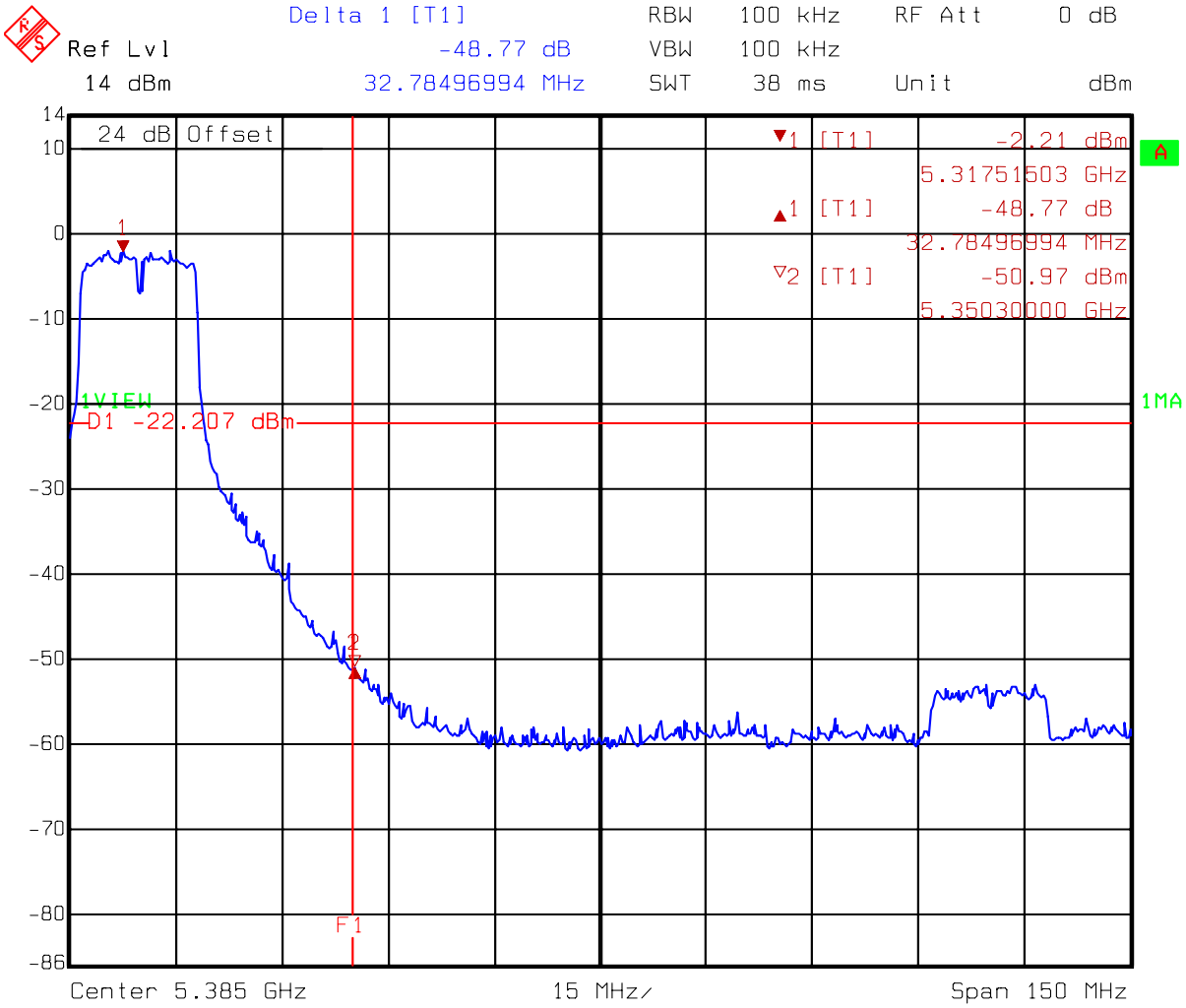
13.3.1 Conducted Method



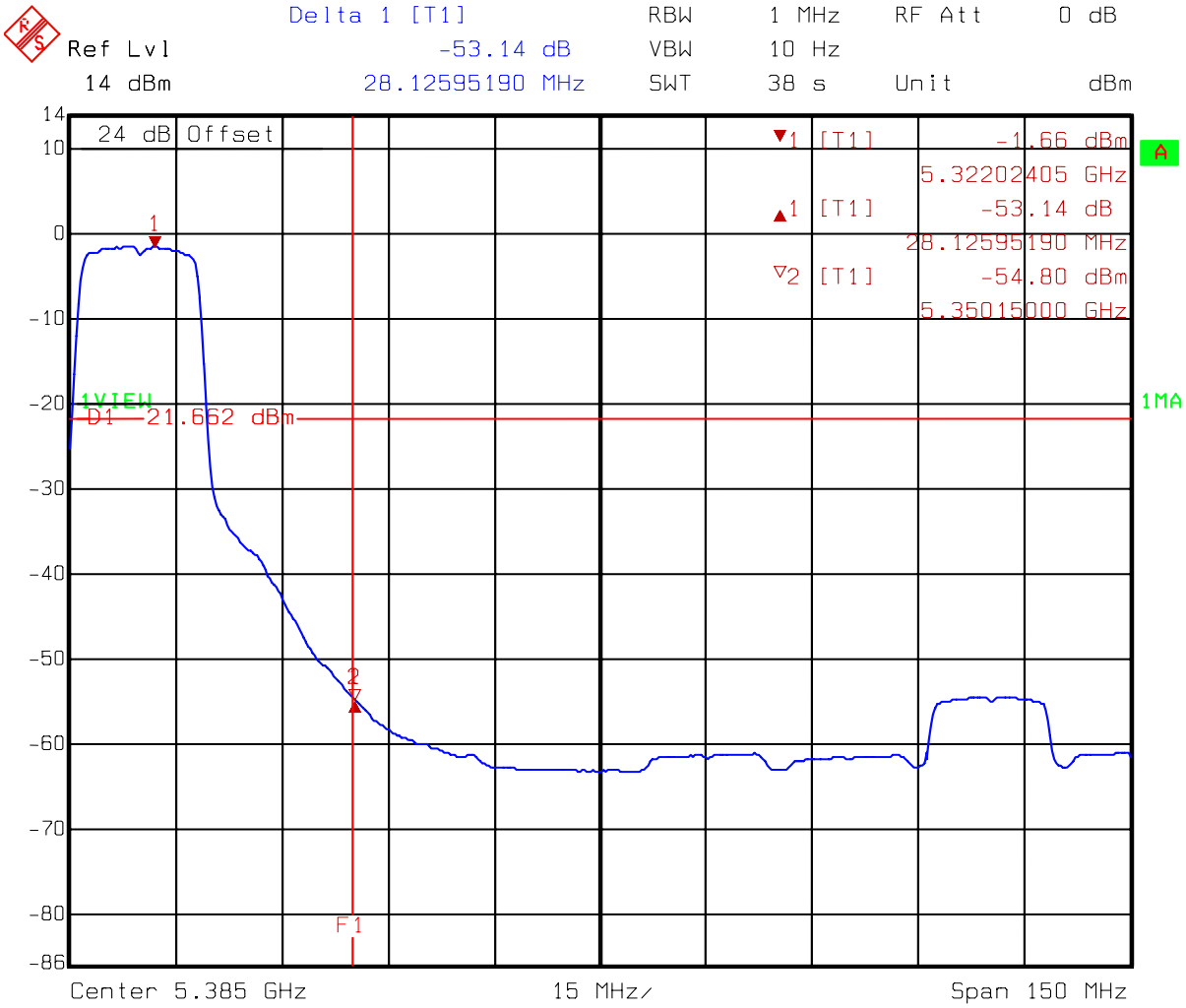
Title: Band Edge
Comment A: Channel 036 at 802.11a mode
F1=5150MHz (Peak Detect)
Date: 16.JUN.2006 13:40:32



Title: Band Edge
Comment A: Channel 036 at 802.11a mode
F1=5150MHz (Average Detect)
Date: 16.JUN.2006 13:41:22



Title: Band Edge
Comment A: Channel 064 at 802.11a mode
F1=5350MHz (Peak Detect)
Date: 21.JUN.2006 20:42:50



Title: Band Edge
Comment A: Channel 064 at 802.11a mode
F1=5350MHz (Average Detect)
Date: 21.JUN.2006 20:43:55

12.3.2 Radiated Method

Test Mode: 802.11a (OFDM Modulation) operating mode

Channel	Detector	Radiated Method	Conducted Method	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
		Max. Field Strength of Fundamental @3m (dBuV/m)	Between Carrier Max. Power and Local Max. Emission in Restrict Band (dBc)			
		A	B	C	D	E
36 (5180MHz)	PK	115.99	51.27	64.72	74	-9.28
	AV	106.22	56.53	49.69	54	-4.31
64 (5320MHz)	PK	114.77	48.77	66.00	74	-8.00
	AV	105.20	53.14	52.06	54	-1.94

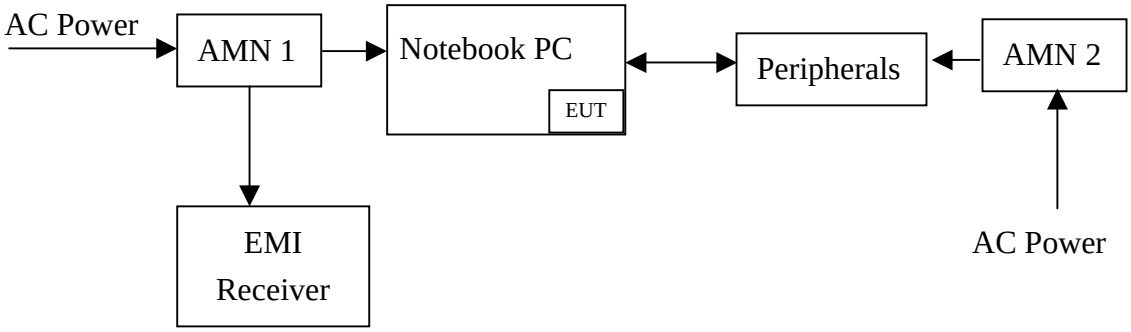
Remark: 1. C = A – B
2. E = C – D

14. Power Line Conducted Emission test §FCC 15.207

14.1 Operating environment

Temperature:	23	℃
Relative Humidity:	58	%
Atmospheric Pressure	1023	hPa

14.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.
The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

The EUT configuration please refer to the “Conducted set-up photo.pdf”.

14.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

14.4 Uncertainty of Conducted Emission

Expanded uncertainty (k=2) of conducted emission measurement is ±2.6 dB.

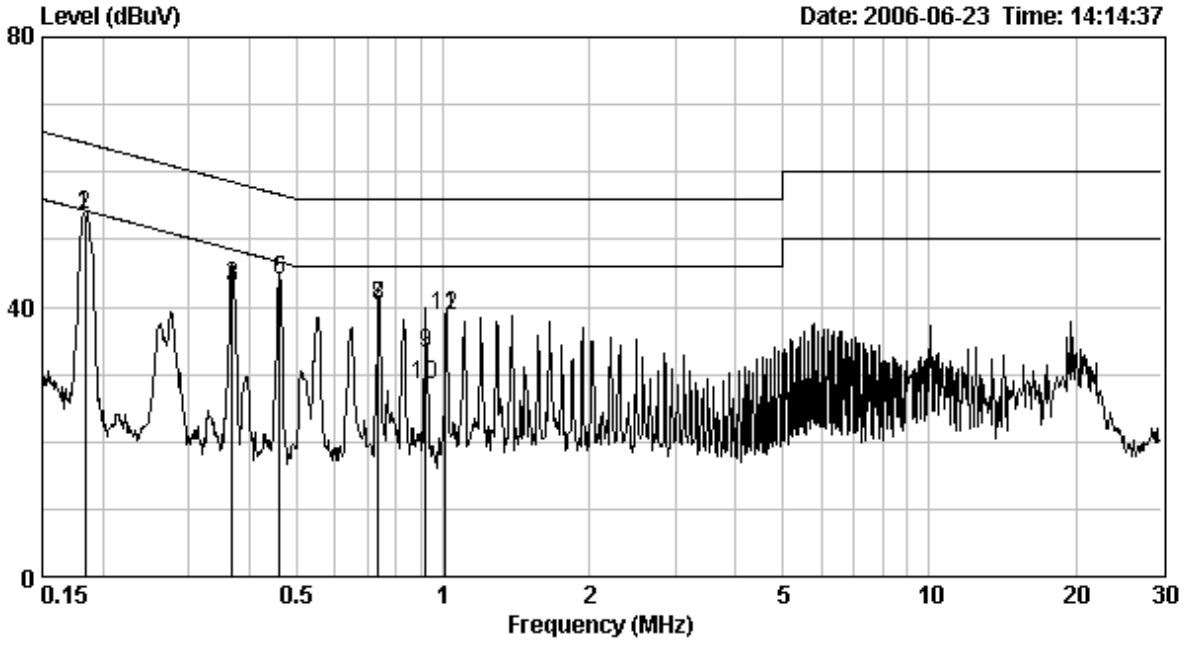
14.5 Power Line Conducted Emission test data

The test was performed on EUT under 802.11a, 802.11b and 802.11g continuously transmitting mode. Channel low, middle, high were verified. The worst case occurred at 802.11g Tx at channel high.

Phase:	Line
Model No.:	AG-320
Worst Case:	802.11g Tx at channel high

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.184	0.10	53.66	64.32	53.56	54.32	-10.66	-0.76
0.368	0.10	43.16	58.55	42.52	48.55	-15.39	-6.03
0.460	0.10	44.00	56.69	43.95	46.69	-12.69	-2.74
0.738	0.10	40.03	56.00	40.01	46.00	-15.97	-5.99
0.921	0.10	33.23	56.00	28.39	46.00	-22.77	-17.61
1.013	0.10	38.59	56.00	38.57	46.00	-17.41	-7.43

Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)



Phase: Neutral
Model No.: AG-320
Worst Case: 802.11g Tx at channel high

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level AV (dBuV)	Limit Av (dBuV)	Margin (dB) Qp	Margin (dB) Av
0.185	0.10	44.23	64.28	44.19	54.28	-20.05	-10.09
0.368	0.10	36.02	58.55	33.76	48.55	-22.53	-14.79
0.460	0.10	36.83	56.70	36.78	46.70	-19.87	-9.92
1.196	0.10	32.60	56.00	28.11	46.00	-23.40	-17.89
1.471	0.11	30.71	56.00	25.14	46.00	-25.29	-20.86
3.313	0.19	30.77	56.00	28.29	46.00	-25.23	-17.71

Remark:
1. Corr. Factor (dB)= LISN Factor (dB) + Cable Loss (dB)
2. Margin (dB) = Level (dBuV) – Limit (dBuV)