EMC
TEST REPORT

Report No. : EME-061198/01
Model No. : NWD-670SU
Issued Date : Mar. 30, 2007

Applicant : ZyXEL Communications Corporation
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Hsin-Chu, Taiwan

Test By : Intertek Testing Services Taiwan Ltd.
No. 11, Lane 275, Ko-Nan 1 Street, Chia-Tung Li,
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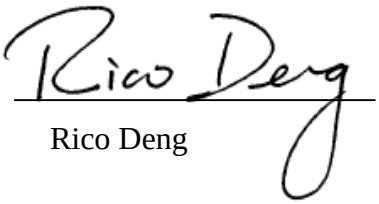
Project Engineer



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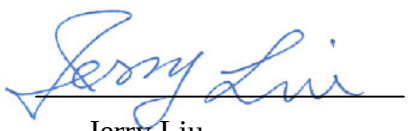

Jerry Liu

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Summary of Tests

802.11a/g Wireless Super AG Mini-PCI Card
FCC ID: I88NWD670SU

1. 802.11b+g +a (2412-2462MHz, 5745-5825MHz)

Test	Reference	Results
Maximum Output Power test	15.247(b)	Pass
Radiated Spurious Emission test	15.205, 15.209	Pass
Emission on the Band Edge test	15.247(d)	Pass

2. 802.11a (5180-5240MHz)

Test	Reference	Results
Peak output power test	15.407 (a)(1)/(2)/(3)	Pass
Radiated spurious emission test	15.407(b)(1)/(2)/(3), 15.209	Pass

1. General information

1.1 Identification of the EUT

Applicant	: ZyXEL Communications Corporation
Product	: 802.11a/g Wireless Super AG Mini-PCI Card
Model No.	: NWD-670SU
FCC ID.	: I88NWD670SU
Frequency Range	: 1. 2412 MHz ~ 2462 MHz 2. 5180 MHz ~ 5240 MHz 3. 5745 MHz ~ 5825 MHz
Channel Number (802.11 a+b+g)	: 1. 11Channels for 2412 MHz ~ 2462 MHz 2. 4Channels for 5180 MHz ~ 5240 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=0~3 3. 5745 MHz + 20k MHz, k=0~4
Type of Modulation	: DSSS, OFDM
Rated Power	: 3.3Vdc from Notebook
Power Cord	: N/A
Sample Received	: Jan. 18, 2007
Test Date(s)	: Mar. 27, 2007 ~ Mar. 29, 2007

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 Super AG Mini-PCI Card, and was defined as information technology equipment.

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 No.	: 32-500-000002B
Antenna Gain	: 1. 1.8dBi (2.4GHz ~ 2.5GHz) 2. 1.8dBi (5.15GHz ~ 5.85GHz)
Antenna Type	: PIFA antenna.
Connector Type	: Hirose connector

1.4 Peripherals equipment

Peripherals	Manufacturer	Product No.	Serial No.	FCC ID
Notebook PC	DELL	Latitude D610	FXWZK1S	FCC DoC Approved
PRINTER	HP	DeskJet 400	TH86K1N2ZB	FCC DoC Approved
MODEM	Dynalink	V1456VQE	00V230A00051494	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 mini-PCI extension card. Power on the notebook then run the test program“ART”.

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.

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	08/06/2007
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	EC353	07/23/2007
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	EC365	11/01/2007
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	11/10/2007
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	01/13/2008

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

3. Maximum Output Power test (FCC 15.247)

3.1 Operating environment

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

3.2 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).

3.3 Measured data of Maximum Output Power test results

Test Mode: 802.11b

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	2	17.13	19.13	81.85	30
6 (middle)	2437	2	17.20	19.20	83.18	30
11 (highest)	2462	2	17.12	19.12	81.66	30

Test Mode: 802.11g normal mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
1 (lowest)	2412	2	20.24	22.24	167.49	30
6 (middle)	2437	2	20.04	23.04	201.37	30
11 (highest)	2462	2	20.21	22.21	166.34	30

Test Mode: 802.11g Turbo mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
6 (middle)	2437	2	21.00	23	199.53	30

Test Mode: 802.11a normal mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
149 (lowest)	5745	2	19.95	21.95	156.68	30
157 (middle)	5785	2	19.75	21.75	149.62	30
165 (highest)	5825	2	19.27	21.27	133.97	30

Test Mode: 802.11a Turbo mode

Channel	Freq. (MHz)	C.L. (dB)	Reading (dBm)	Conducted Peak Output Power		Limit (dBm)
				(dBm)	(mW)	
153 (middle)	5765	2	19.85	21.85	153.11	30

Remark: Conducted Peak Output Power = Reading + C.L.

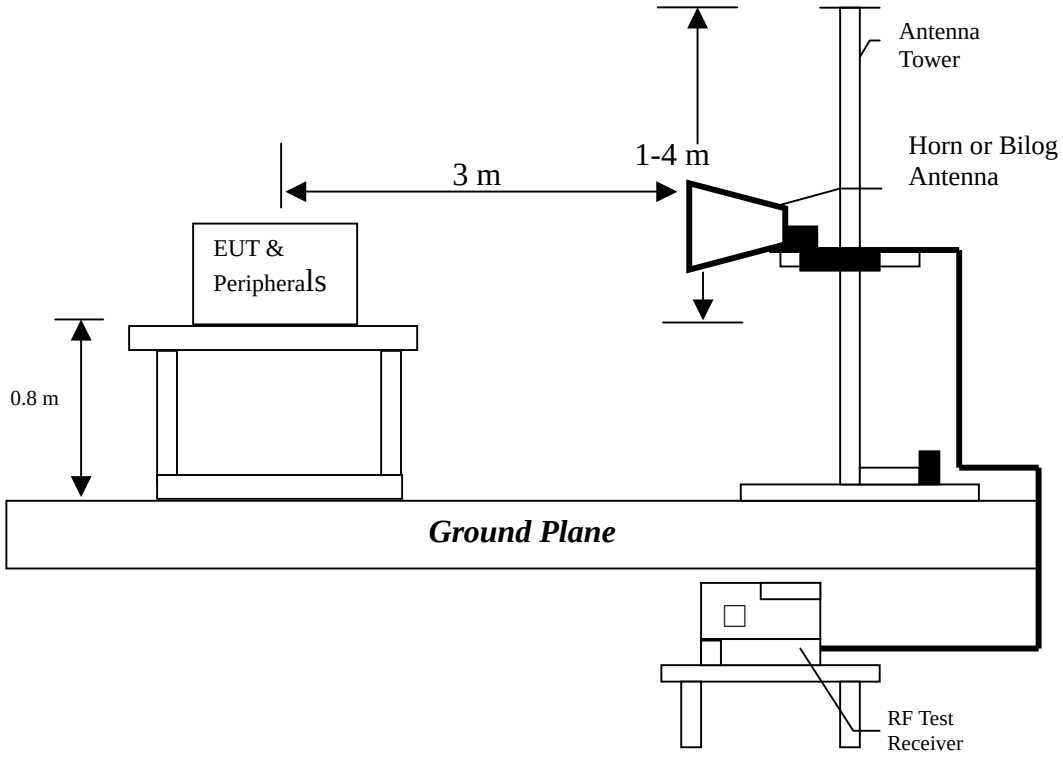
4. Radiated Emission test (FCC 15.247)

4.1 Operating environment

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

4.2 Test setup & procedure

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



The frequency range from 30MHz to 1000MHz using Bilog Antenna.
The frequency range over 1GHz using Horn Antenna.

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”.

4.3 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.

4.4 Radiated spurious emission test data

4.4.1 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 : NWD-670SU
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	99.840	QP	7.38	24.77	36.37	43.50	-7.13
V	165.800	QP	15.70	22.37	42.94	43.50	-0.56
V	191.020	QP	12.00	20.45	38.66	43.50	-4.84
V	210.420	QP	11.65	16.88	33.82	43.50	-9.68
V	798.240	QP	23.19	10.13	35.48	46.00	-10.52
V	932.100	QP	25.13	8.87	35.92	46.00	-10.08
H	173.560	QP	13.48	28.04	29.59	43.50	-13.91
H	191.020	QP	11.27	22.94	29.17	43.50	-14.33
H	364.650	QP	15.48	17.00	34.05	46.00	-11.95
H	399.570	QP	16.74	16.03	32.15	46.00	-13.85
H	532.460	QP	19.65	10.80	30.84	46.00	-15.16
H	796.300	QP	23.52	11.60	33.16	46.00	-12.84

Remark:

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

4.4.2 Measurement results: frequency above 1GHz

EUT : NWD-670SU
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)
3210.00	PK	V	35.54	34.62	46.97	46.05	54	-7.95

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 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 : NWD-670SU
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)
3240.00	PK	V	35.54	34.62	46.14	45.22	54	-8.78
4860.00	PK	V	36.07	37.77	47.76	49.46	54	-4.54
3240.00	PK	H	35.54	34.62	43.66	42.74	54	-11.26
4860.00	PK	H	36.07	37.77	43.21	44.91	54	-9.09

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 : NWD-670SU
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)
3270.00	PK	V	35.54	34.62	46.12	45.2	54	-8.80
4920.00	PK	V	36.07	37.77	51.8	53.5	54	-0.50
4920.00	PK	H	36.07	37.77	46.86	48.56	54	-5.44

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 : NWD-670SU
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)
3210.00	PK	V	35.54	34.62	47.16	46.24	54	-7.76

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 : NWD-670SU
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)
3240.00	PK	V	35.54	34.62	46.18	45.26	54	-8.74

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 : NWD-670SU
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)
3270.00	PK	V	35.54	34.62	45.57	44.65	54	-9.35
4920.00	PK	V	36.07	37.77	46.00	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 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 : NWD-670SU
Test Condition : 802.11g (Turbo) 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)
3240.00	PK	V	35.54	34.62	46.15	45.23	54	-8.77

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 : NWD-670SU
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	46.11	62.54	74	-11.46
11490.00	AV	V	33.53	49.96	34.43	50.86	54	-3.14

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 : NWD-670SU
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	48.05	63.53	74	-10.47
11570.00	AV	V	34.55	50.03	36.16	51.64	54	-2.36

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 : NWD-670SU
Frequency band : 5745MHz ~ 5825MHz
Test Condition : 802.11a Tx at channel 165

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)
11650.00	PK	V	34.55	50.03	51.65	67.13	74	-6.87
11650.00	AV	V	34.55	50.03	37.85	53.33	54	-0.67

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 : NWD-670SU
Frequency band : 5745MHz ~ 5825MHz
Test Condition : 802.11a Tx at channel 153 (Turbo)

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)
11530.00	PK	V	34.55	50.03	44.53	60.01	74	-13.99
11530.00	AV	V	34.55	50.03	35.23	50.71	54	-3.29

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 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

5. 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.

5.1 Operating environment

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

5.2 Test setup & procedure

Same as radiated emission test (See clause 4.2 of this report)

5.3 Test Result

5.3.1 Radiated Method

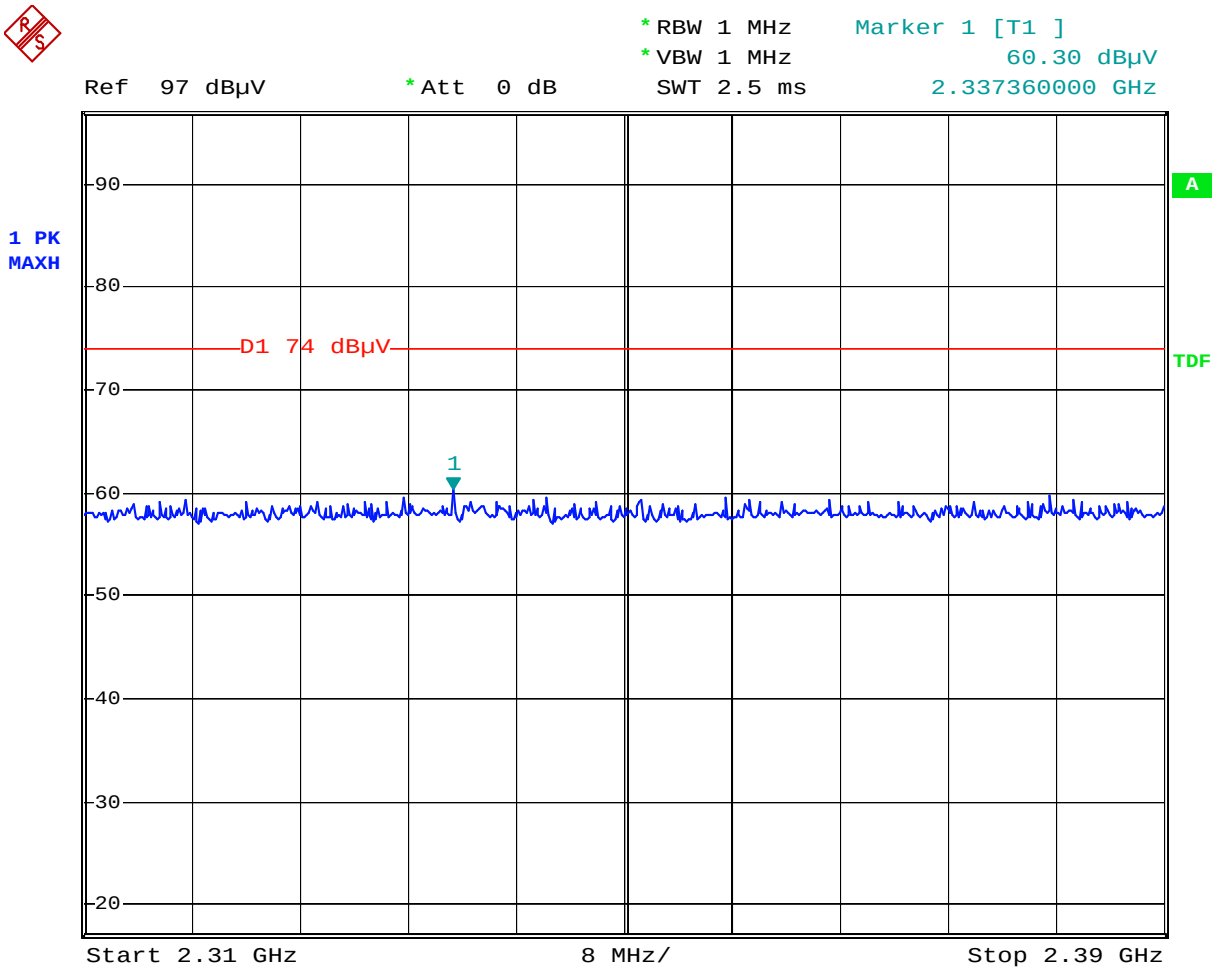
Test Mode: 802.11b mode

Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	60.30	74	-13.70
		AV	47.34	54	-6.66
11 (highest)	2483.5-2500	PK	62.54	74	-11.46
		AV	51.65	54	-2.35

Test Mode: 802.11g mode

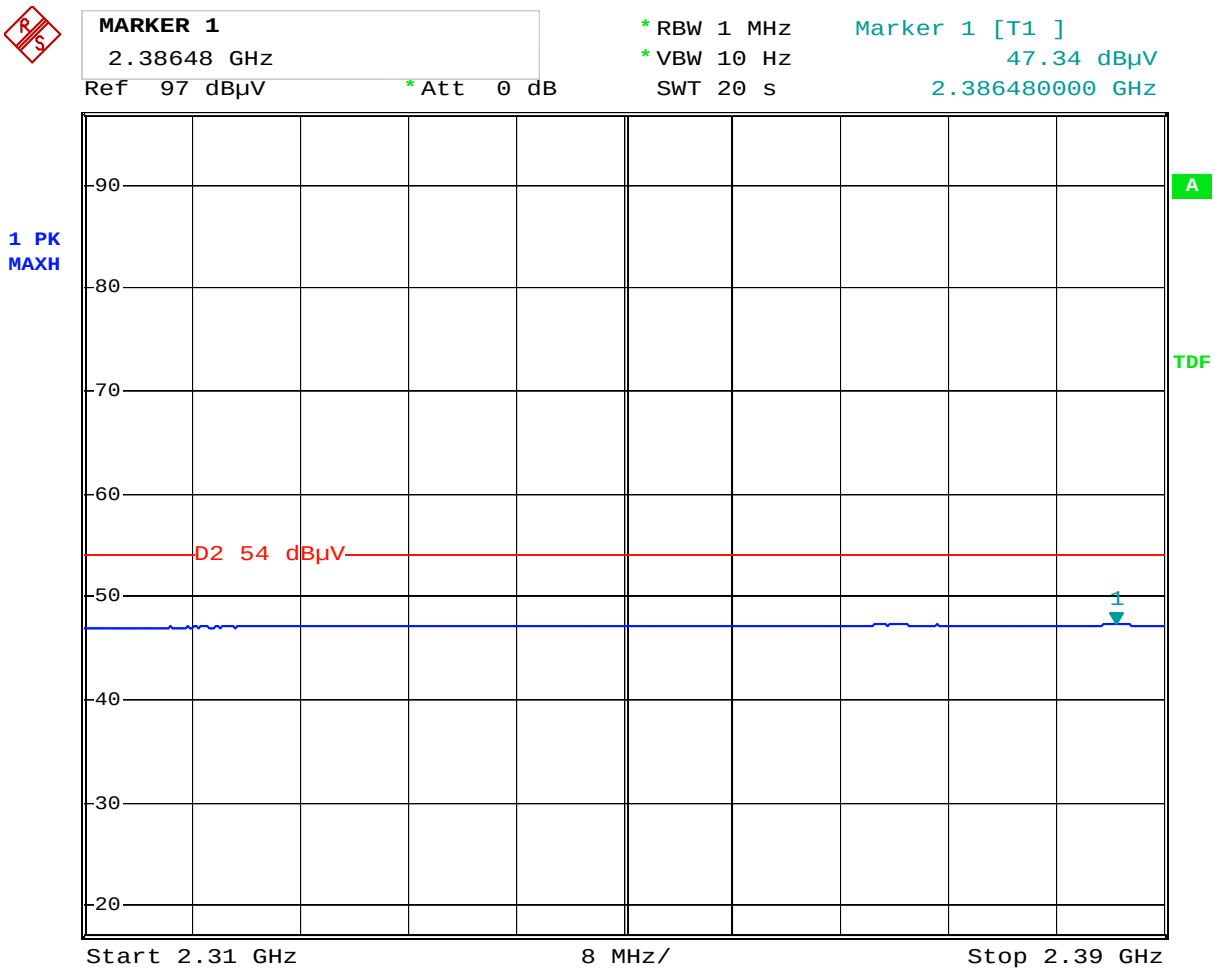
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
1 (lowest)	2310-2390	PK	59.81	74	-14.19
		AV	47.11	54	-6.89
11 (highest)	2483.5-2500	PK	66.27	74	-7.73
		AV	50.19	54	-3.81

Test Mode: 802.11b mode ch1 (PK)



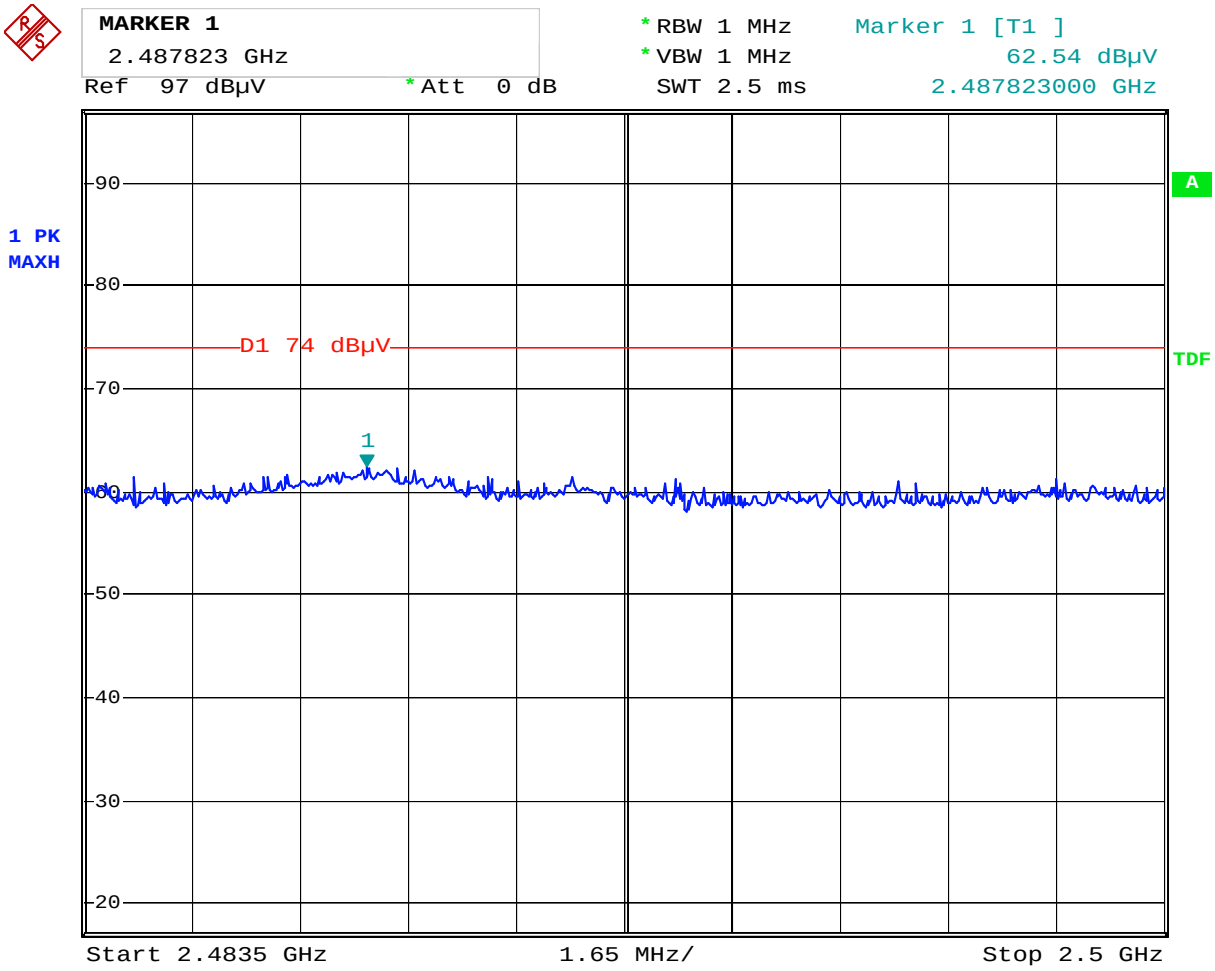
Comment: 11B CH1 PK
Date: 29.MAR.2007 19:54:42

Test Mode: 802.11b mode ch1 (AV)



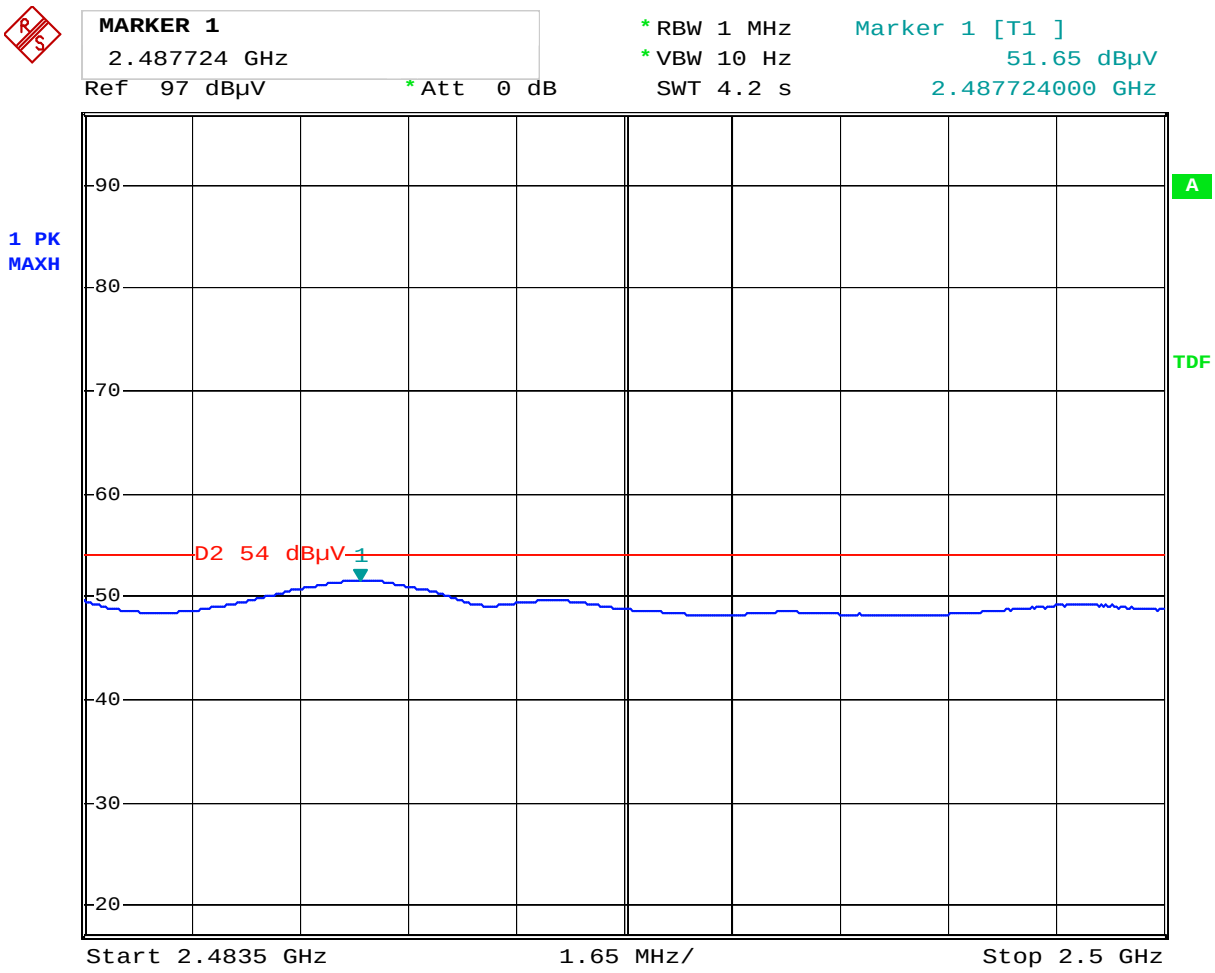
Comment: 11B CH1 AV
Date: 29.MAR.2007 19:53:16

Test Mode: 802.11b mode ch11 (PK)



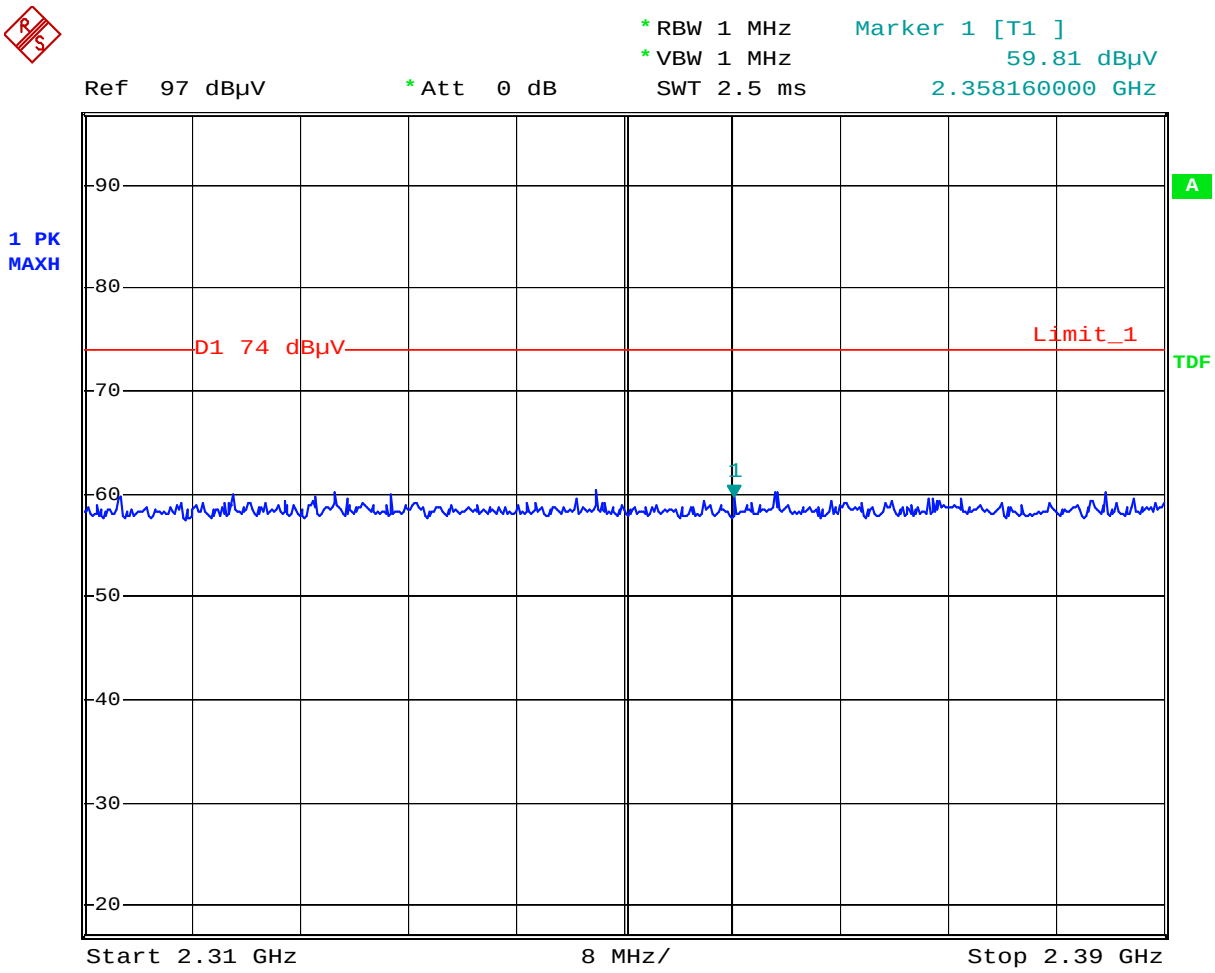
Comment: 11B CH11 PK
Date: 29.MAR.2007 19:45:33

Test Mode: 802.11b mode ch11 (AV)



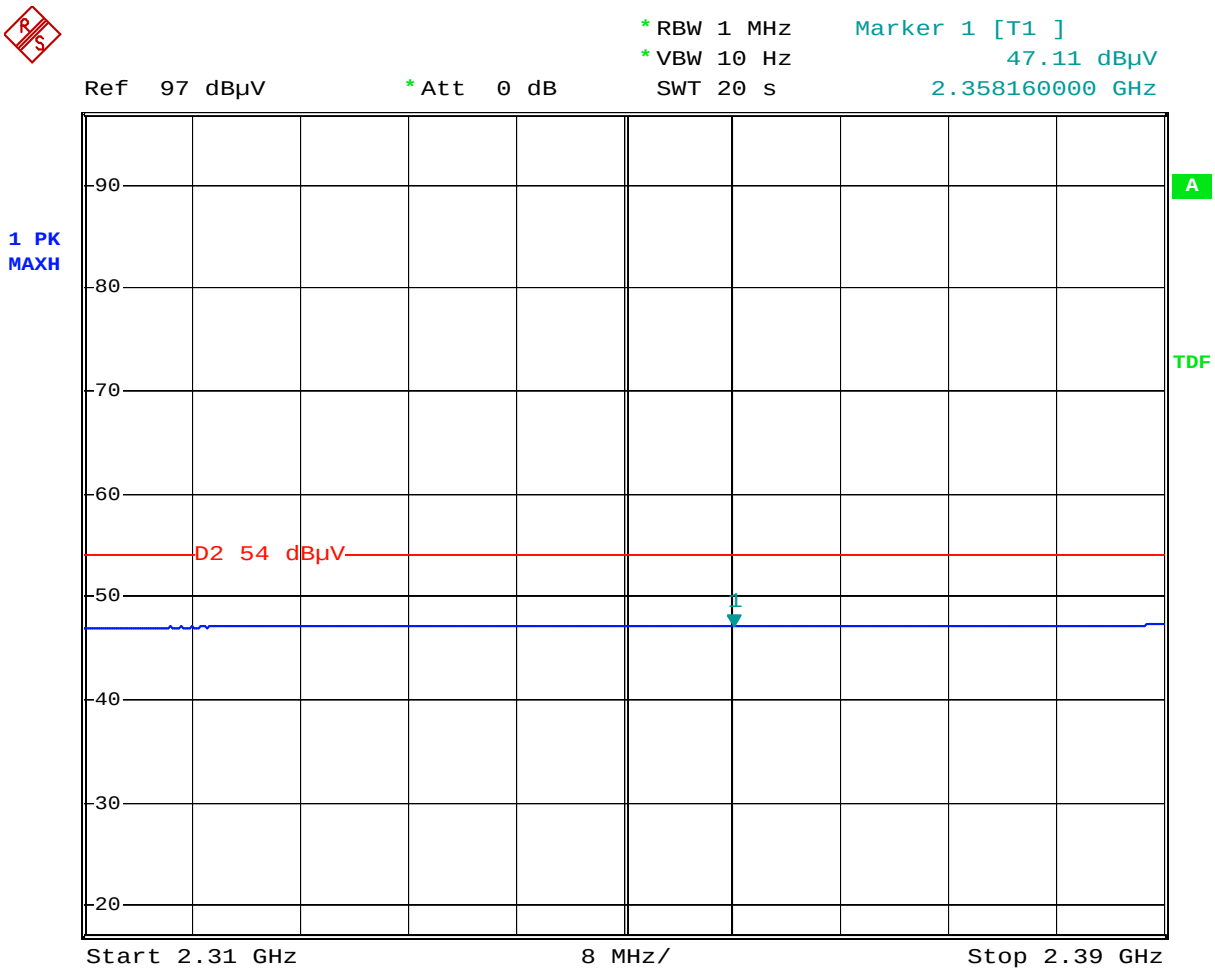
Comment: 11B CH11
Date: 29.MAR.2007 19:46:36

Test Mode: 802.11g mode ch1 (PK)



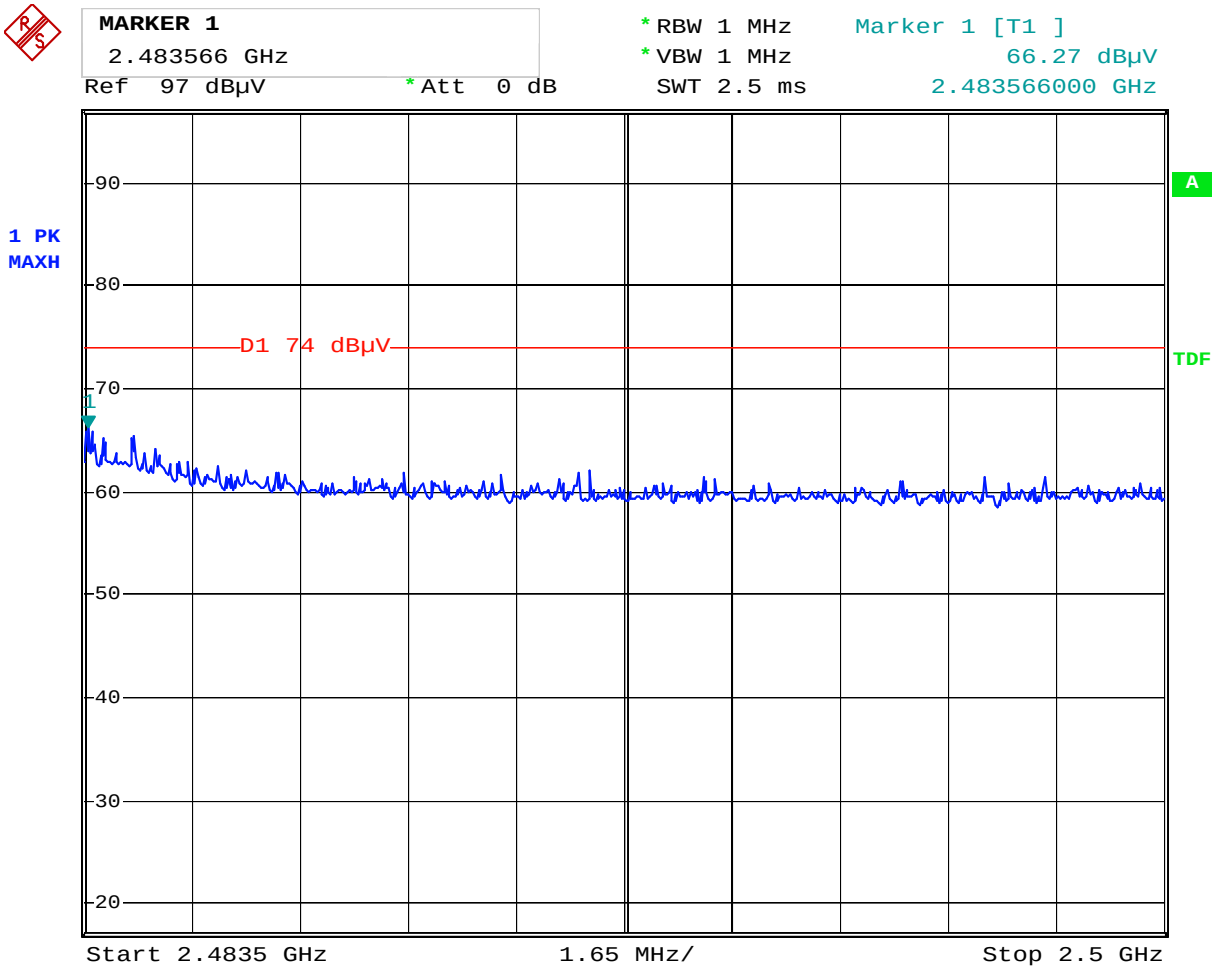
Comment: 11G CH1 PK
Date: 29.MAR.2007 19:28:46

Test Mode: 802.11g mode ch1 (AV)



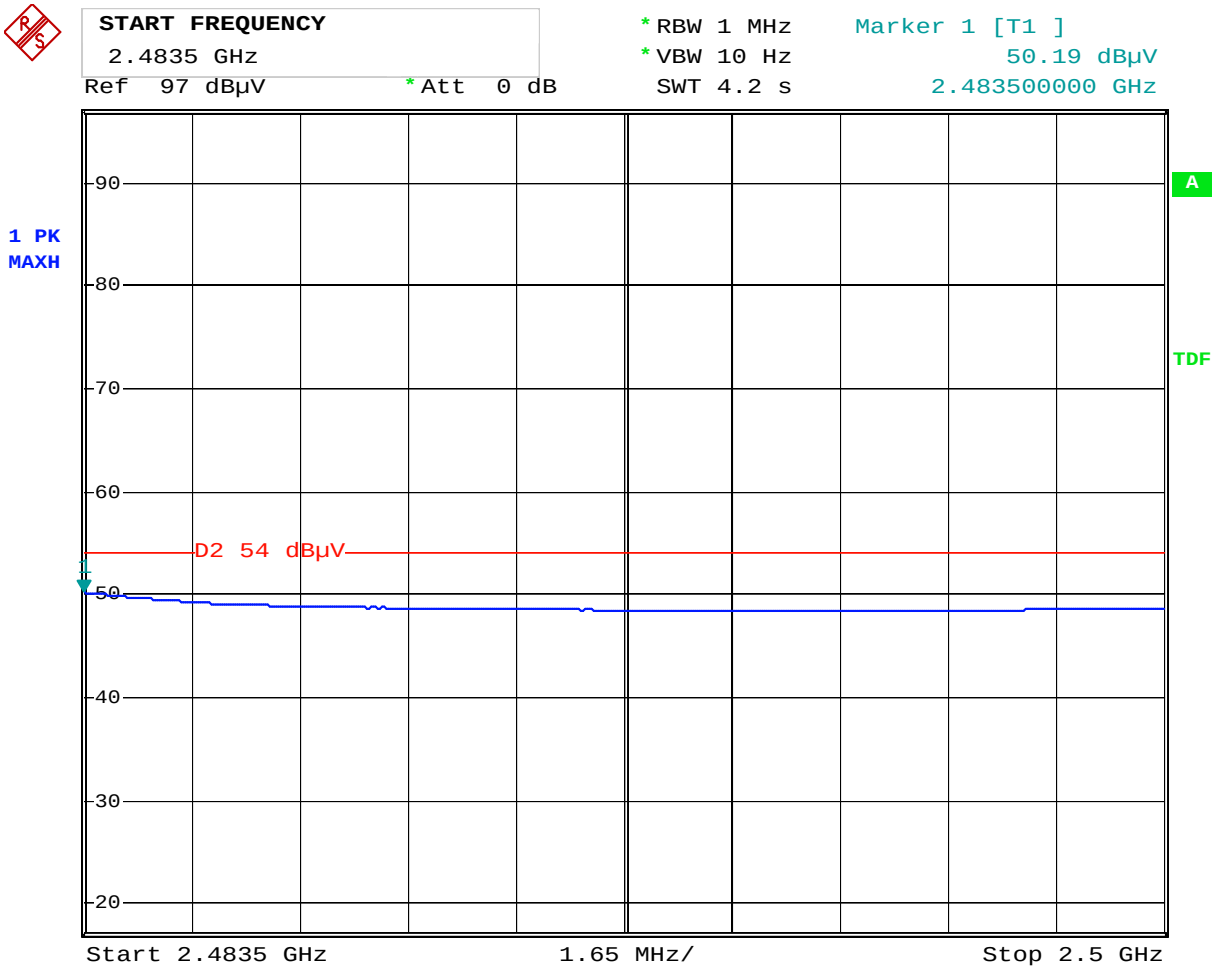
Comment: 11G CH1 AV
Date: 29.MAR.2007 19:30:53

Test Mode: 802.11g mode ch11 (PK)



Comment: 11G CH11 PK
Date: 29.MAR.2007 19:38:43

Test Mode: 802.11g mode ch11 (AV)



Comment: 11G CH11 AV
Date: 29.MAR.2007 19:37:10

6. Peak Output Power test (FCC 15.407)

6.1 Operating environment

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

6.2 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.

6.3 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.

6.4 Measured data of Maximum Output Power test results

For Frequency band (5180MHz ~ 5240MHz)

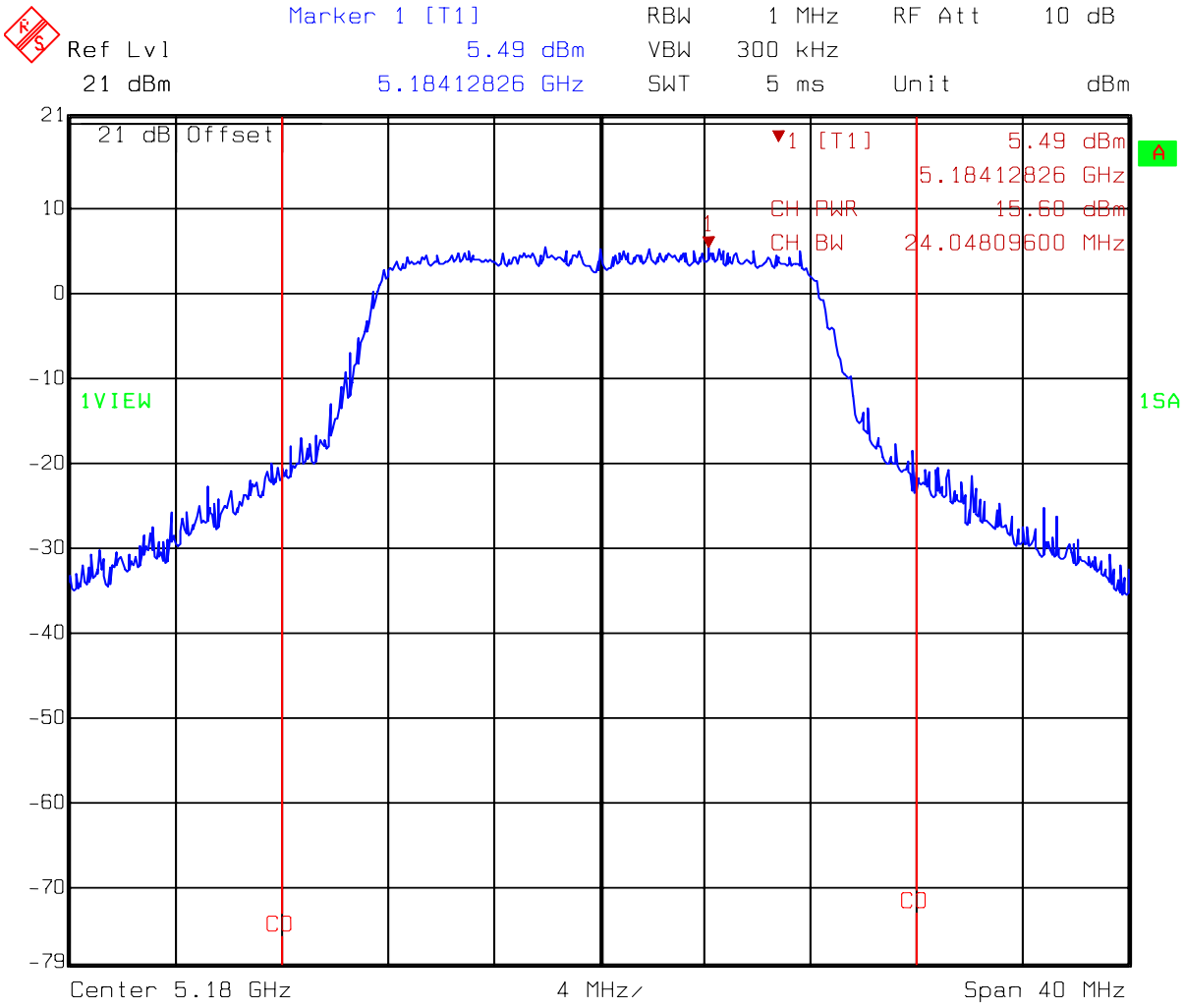
Channel	Frequency (MHz)	Max. Output power (dBm)	Limit (dBm)
36	5180	15.60	17
40	5200	15.44	17
48	5240	15.66	17

For Frequency band (5180MHz ~ 5240MHz)-Turbo

Channel	Frequency (MHz)	Max. Output power (dBm)	Limit (dBm)
40	5200	15.40	17

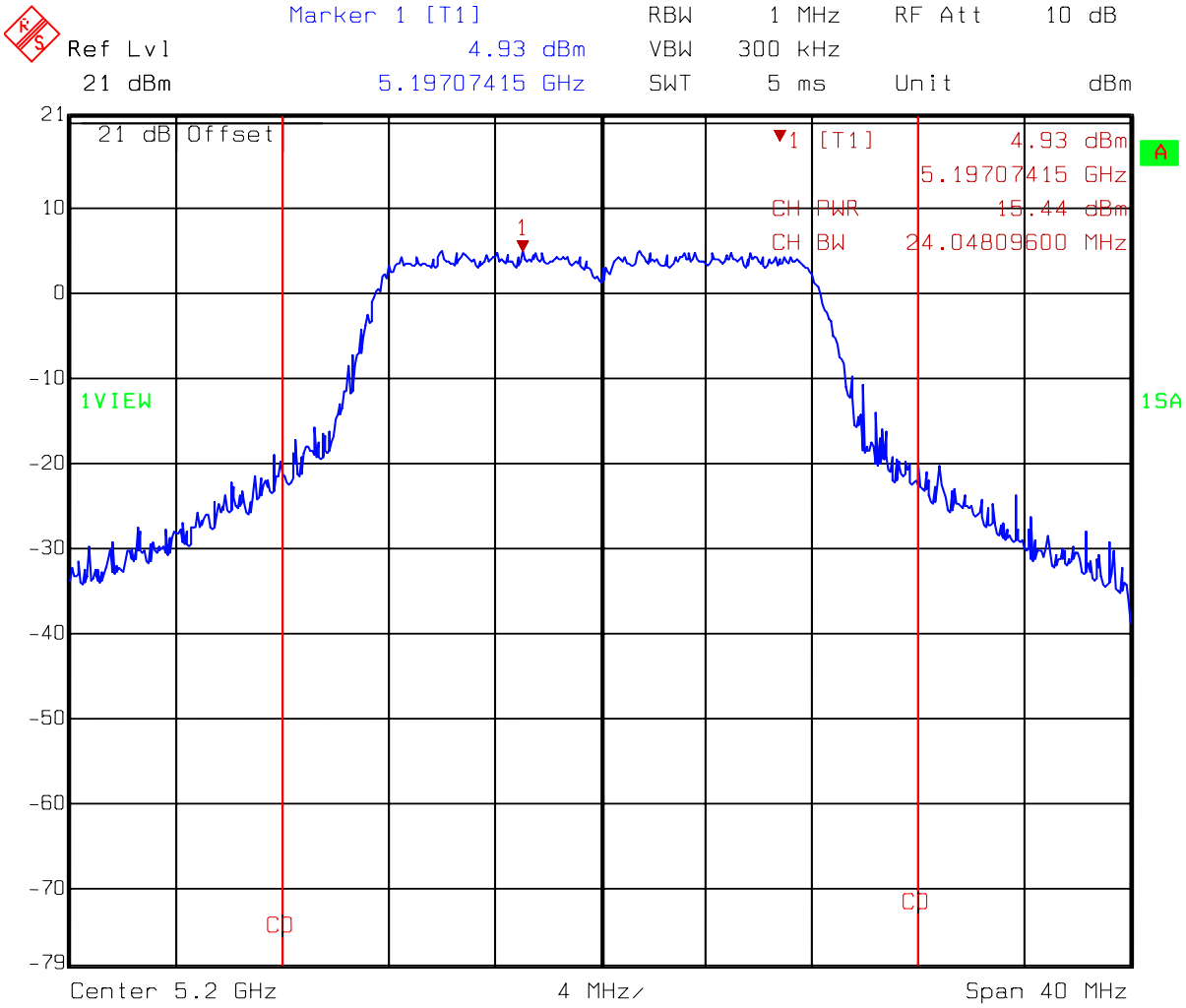
Please see the plot below.

For Frequency band (5180MHz ~ 5240MHz)



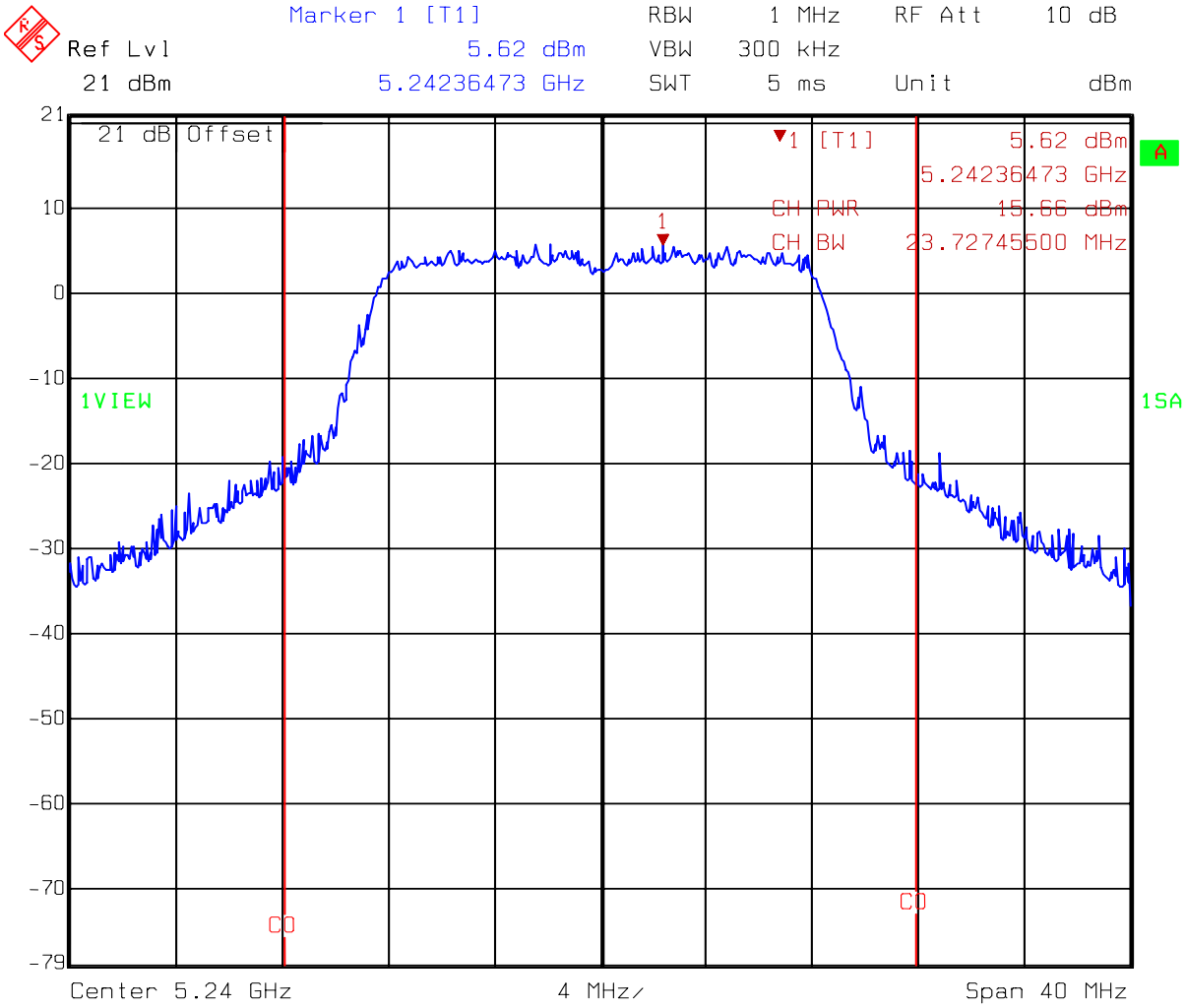
Title: Output Power
Comment A: CH 36 at 802.11a mode (Limit 17.000 dBm)
Date: 30.MAR.2007 10:35:04

For Frequency band (5180MHz ~ 5240MHz)



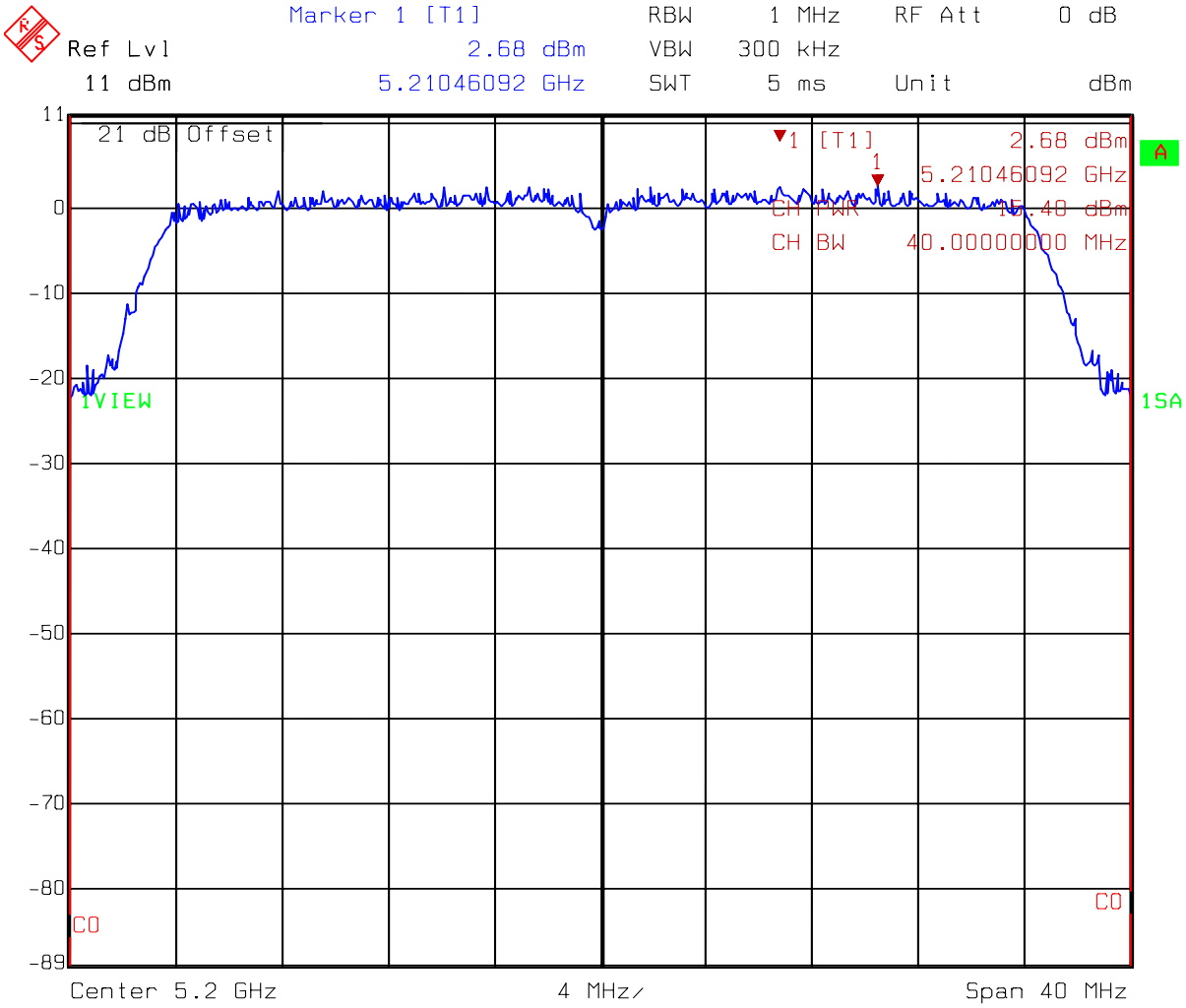
Title: Output Power
Comment A: CH 40 at 802.11a mode (Limit 17.000 dBm)
Date: 30.MAR.2007 10:37:36

For Frequency band (5180MHz ~ 5240MHz)



Title: Output Power
Comment A: CH 48 at 802.11a mode (Limit 17.000 dBm)
Date: 30.MAR.2007 10:46:30

For Frequency band (5180MHz ~ 5240MHz)-Turbo mode



Title: Output Power
Comment A: CH 40 at 802.11a mode (Limit 17.000 dBm)
Date: 30.MAR.2007 10:43:22

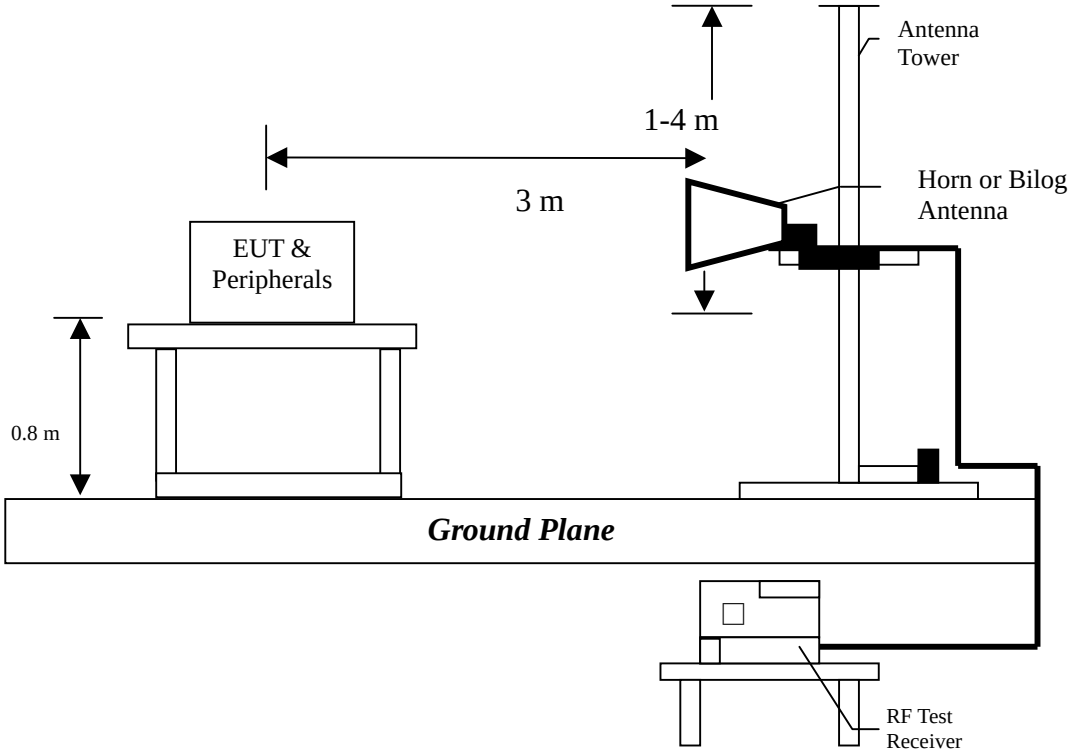
7. Radiated Emission test (FCC 15.205 & 15.209)

7.1 Operating environment

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

7.2 Test setup & procedure

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



The frequency range from 30MHz to 1000MHz using Bilog Antenna.
The frequency range over 1GHz using Horn Antenna.

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.

7.3 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.

7.4 Radiated spurious emission test data

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

The test was performed on EUT under 802.11a continuously transmitting mode. Channel low, middle, high were verified.

7.4.2 Measurement results: frequency above 1GHz

EUT : NWD-670SU
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	46.58	52.96	68	-15.04
10364.00	PK	V	33.72	48.15	42.4	56.83	68	-11.17
15551.00	PK	H	38.46	50.66	51.42	63.62	68	-4.38

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 : NWD-670SU
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	46.93	53.31	68	-14.69
10406.00	PK	V	33.72	48.15	42.53	56.96	68	-11.04
15614.00	PK	V	38.46	50.66	52.79	64.99	68	-3.01

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 : NWD-670SU
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)
6983.00	PK	V	36.58	42.96	46.08	52.46	68	-15.54
15719.00	PK	V	38.46	50.66	51.51	63.71	68	-4.29

Remark:
1.Corrected Level = Reading Level + Correction Factor－Preamp
2.Correction Factor = Antenna Factor + Cable Loss
3. The frequency measured ranges from 1GHz to 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 : NWD-670SU
Frequency band : 5180MHz ~ 5240MHz
Test Condition : 802.11a Tx at channel 40(Turbo)

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	46.73	53.11	68	-14.89

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

8. 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.

8.1 Operating environment

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

8.2 Test setup & procedure

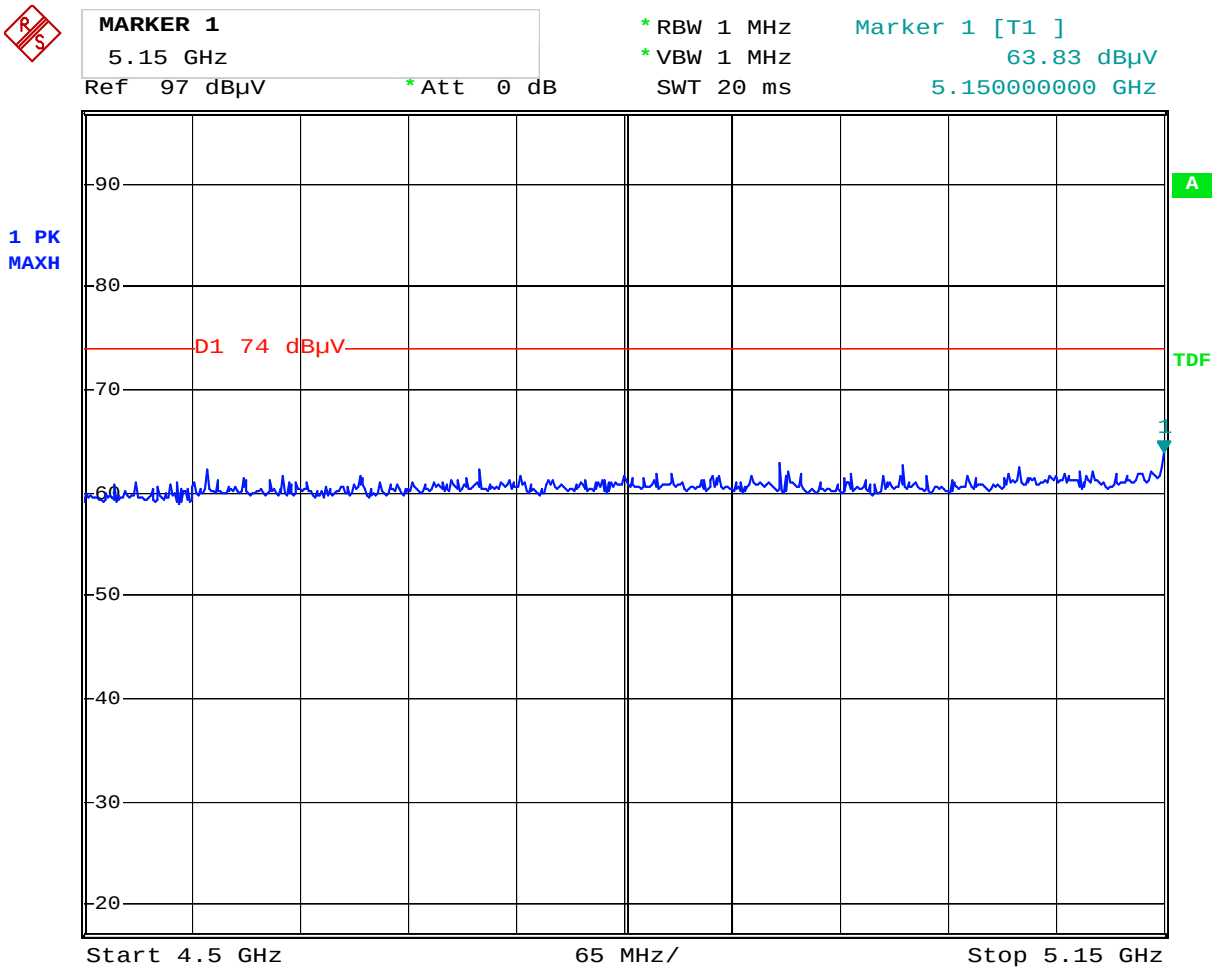
Same as radiated emission test (See clause 7.2 of this report)

8.3 Test Result

Test Mode: 802.11a mode

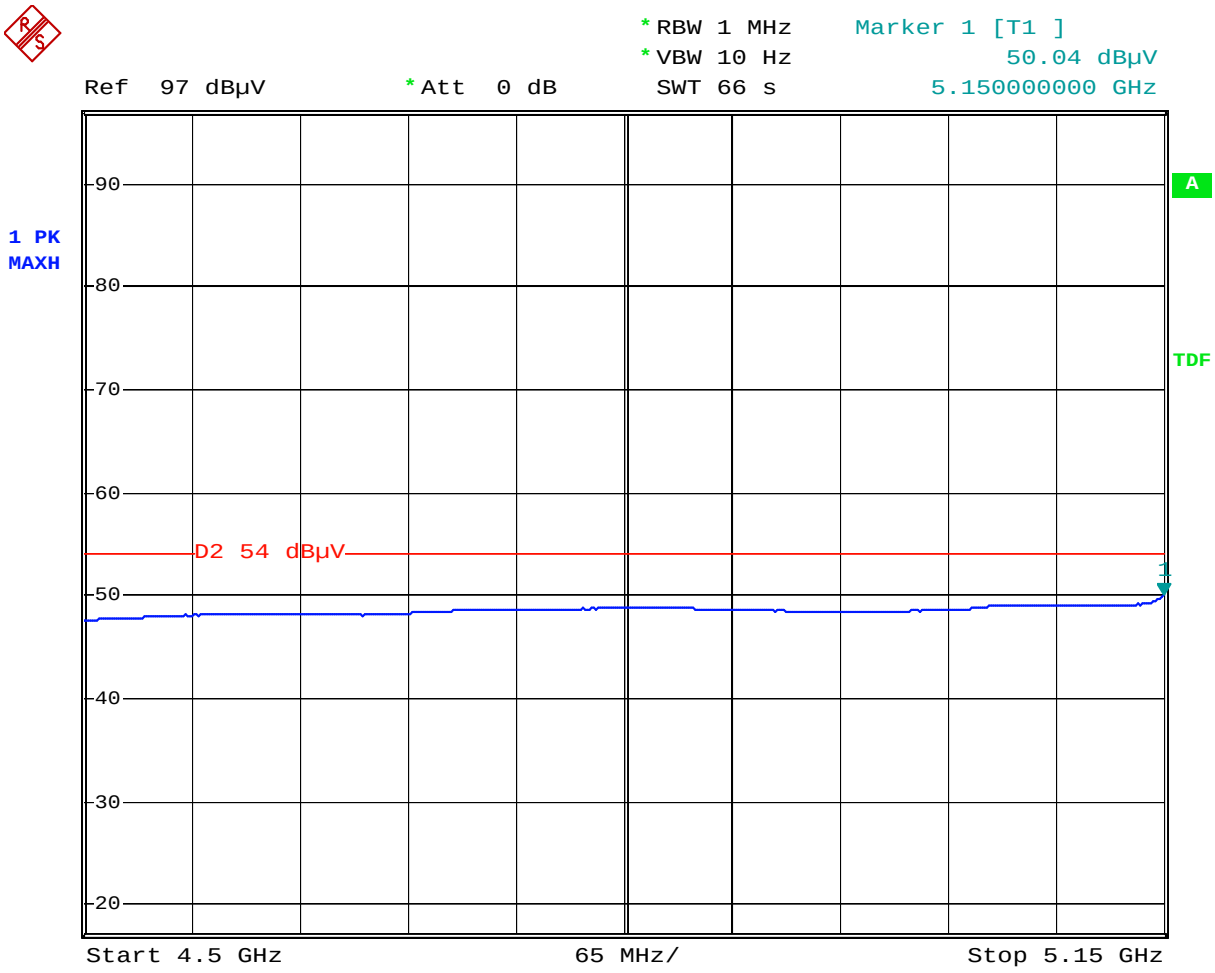
Channel	Measurement Freq.Band (MHz)	Detector	The Max. Field Strength in Restrict Band (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
36 (lowest)	4500-5150	PK	63.83	74	-10.17
		AV	50.04	54	-3.96

Test Mode: 802.11a mode ch36 (PK)



Comment: 11A 5180 PK
Date: 29.MAR.2007 20:20:21

Test Mode: 802.11a mode ch36 (AV)



Comment: 11A 5180 AV
Date: 29.MAR.2007 20:23:44