

# EMC TEST REPORT

**Report No.** : EME-040629  
**Model No.** : GateOne 500A,  
GateOne 240G  
**Issued Date** : June 28, 2004

**Applicant** : ZyGATE Communications Inc.  
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Taiwan

**Test By** : Intertek Testing Services Taiwan Ltd.  
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Project Engineer

*Jackey Chiu*

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Jackey Chiu

Reviewed By

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**Summary of Tests**

**High Speed, Long Range-Ethernet Wireless Bridge: GateOne 500A  
FCC ID: R3N-GATEONE50A24G**

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

**High Speed, Long Range-Ethernet Wireless Bridge: GateOne 240G  
FCC ID: R3N-GATEONE50A24G**

Test	Reference	Results
Minimum 6dB Bandwidth test	15.247(a)(2)	Complies
Maximum Output Power test	15.247(b)	Complies
Radiated Spurious Emission test	15.205, 15.209	Complies
Power Spectrum Density test	15.247(d)	Complies

## 1. General information

### 1.1 Identification of the EUT

#### 1.1.1 GateOne 500A

Applicant : ZyGATE Communications Inc.  
Product : High Speed, Long Rang-Ethernet Wireless Bridge  
Model No. : GateOne 500A  
FCC ID. : R3N-GATEONE50A24G  
Frequency Range : 5745MHz to 5825MHz  
Channel Number : 7channels  
Frequency of Each Channel (Normal mode) : 5745 MHz, 5765 MHz, 5785 MHz, 5805 MHz, 5825 MHz,  
Frequency of Each Channel (Turbo mode) : 5760 MHz, 5800MHz  
Type of Modulation : OFDM  
Power Supply : 15Vdc  
Power Cord : N/A  
Sample Received : May 25, 2004  
Test Date(s) : May 16, 2004 ~ June 23, 2004

#### 1.1.2 GateOne 240G

Applicant : ZyGATE Communications Inc.  
Product : High Speed, Long Rang-Ethernet Wireless Bridge  
Model No. : GateOne 240G  
FCC ID. : R3N-GATEONE50A24G  
Frequency Range : 2412MHz to 2462MHz  
Channel Number : 11channels  
Frequency of Each Channel : 2412+5k MHz; k=0~10  
Type of Modulation : OFDM  
Rated Power : 15Vdc

The test result of 2.4GHz and 5GHz are contained in this report. The test procedure and test data for 2.4GHz are arranged after the procedure and data of 5GHz.

## 1.2 Additional information about the EUT

The EUT is a Wireless Bridge for Inter-building Point to Point Ethernet connection. We verified that models GateOne 240G and GateOne 500A are identical in hardware aspect, and the different is in antenna and firmware.

The model name define as listed below

Model Name	Define
GateOne 240G	2.4G
GateOne 500A	5.8G

The model: GateOne 500A is including two appatus when shipment, they are named as GateOne 500A-AP and GateOne 500A-AC. It is a whole set when operation, each one can be treated as Tx or Rx. The difference is in model number, except that the software or hardware of these two models are the same.

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

## 1.3 Antenna description

The antenna is an 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.

### 1.3.1 GateOne 500A

Antenna Gain : 22dBi(802.11a)  
Antenna Type : Flat panel antenna  
Connector Type : N Type male

### 1.3.2 GateOne 240G

Antenna Gain : 15.21dBi(802.11g)  
Antenna Type : Flat panel antenna  
Connector Type : N Type male

**1.4 Peripherals equipment**

Peripherals	Manufacturer	Product No.	Serial No.
Notebook	DALL	PP01L	CN-06P83-48643-33V-0112
Notebook	DALL	PP01L	CN-03P83-48643-33O-3930

## **2. Test specifications**

### **2.1 Test standard**

The GateOne 500A (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 GateOne 240G (EUT) was performed according to the procedures in FCC Part 15 Subpart C Section §15.205 、 §15.207 、 §15.209 、 §15.247 and ANSI C63.4/2001.

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

Radiated emissions were investigated 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**

During the conducted emission test, the EUT worked in normal operating. In the other test, it worked in continuously transmitting.



**2.4 Test equipment**

Equipment	Brand	Frequency range	Model No.	Series No.	Last Cal.Date
EMI Test Receiver	Rohde & Schwarz	9kHz~2.75GHz	ESCS 30	825788/014	Feb. 18, 2004
EMI Test Receiver	Rohde & Schwarz	20Hz~26.5GHz	ESMI	825428/005	June 10, 2004
Spectrum Analyzer	Rohde & Schwarz	9kHz~30GHz	FSP 30	100137	July 10, 2004
Spectrum Analyzer	Rohde & Schwarz	20Hz~40GHz	FSEK 30	100186	Oct. 9, 2003
Horn Antenna	EMCO	1GHz~18GHz	3115	9906-5890	Oct. 15, 2003
Horn Antenna	SCHWARZBECK	14GHz~40GHz	BBHA 9170	159	June 21, 2004
Bilog Antenna	SCHWARZBECK	25MHz~1.7GHz	VULB 9160	3133	Feb. 21, 2004
Turn Table	HDGmbH	N/A	DS 420S	420/669/01	N/A
Antenna Tower	HDGmbH	N/A	MA 240	240/573	N/A
Microwave Amplifier	Agilent	2GHz~26.5GHz	8348A	3111A00567	Dec. 20, 2003
RF Power Meter	Boonton	10kHz~100GHz	4231A	79401	Mar. 25, 2004
Power Sensor	Boonton	30MHz~8GHz	51011-EMC	32482	Mar. 25, 2004
LISN	Rohde & Schwarz	9KHz~30MHz	ESH3-Z5	EC344	Jan. 20, 2004

Note: The above equipments are within the valid calibration period.

### 3. Peak Output Power test

#### 3.1 Operating environment

Temperature: 20 °C  
 Relative Humidity: 48 %  
 Atmospheric Pressure: 1023 hPa

#### 3.2 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 (0dB) was added to the reading to obtain power at the EUT antenna terminals.

#### 3.3 Limit

Operating Frequency (MHz)	Output power limit
5725~5825	< 1W (30dBm) or 17dBm+10logB

#### 3.4 Measured data of Maximum Output Power test results

Normal mode:

Frequency (MHz)	Reading (dBm)	Power Output		Limit (dBm)
		(dBm)	(mW)	
5745	21.03	21.03	126.77	30
5785	19.88	19.88	97.27	30
5825	19.97	19.97	98.63	30

Turbo mode:

Frequency (MHz)	Reading (dBm)	Power Output		Limit (dBm)
		(dBm)	(mW)	
5760	19.97	19.97	99.31	30
5800	20.03	20.03	100.69	30

#### 4. Power Spectrum Density test

##### 4.1 Operating environment

Temperature: 20 °C  
 Relative Humidity: 48 %  
 Atmospheric Pressure: 1023 hPa

##### 4.2 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 1MHz. Power spectrum density was read directly and cable loss (1.5dB)/external attenuator (10dB) correction was added to the reading to obtain power at the EUT antenna terminals.

Limit

Operating Frequency (MHz)	Power density limit
5725~5825	< 17dBm/MHz

##### 4.3 Measured data of Power Spectrum Density test results

Normal mode:

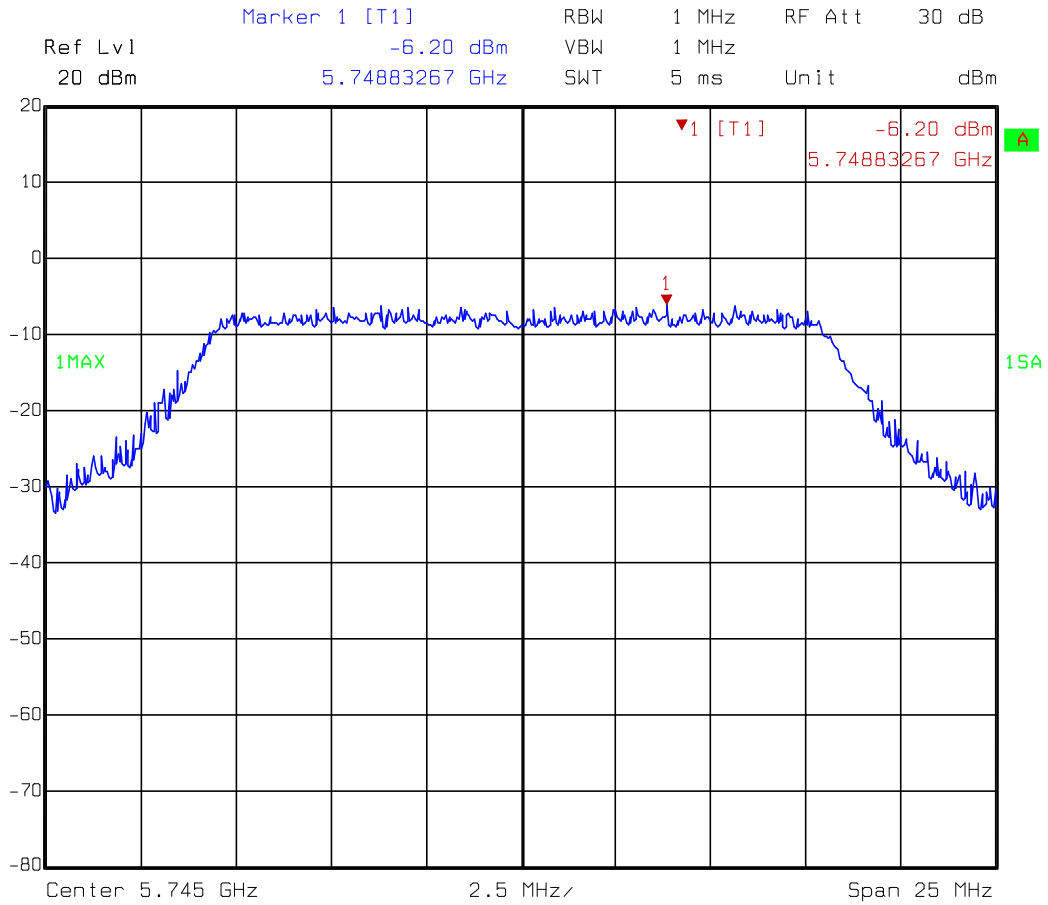
Frequency (MHz)	Measured level (dBm/MHz)	Limit (dBm/MHz)
5745	5.30	17
5785	2.59	17
5825	5.29	17

Turbo mode:

Frequency (MHz)	Measured level (dBm/MHz)	Limit (dBm/MHz)
5760	3.01	17
5800	3.3	17

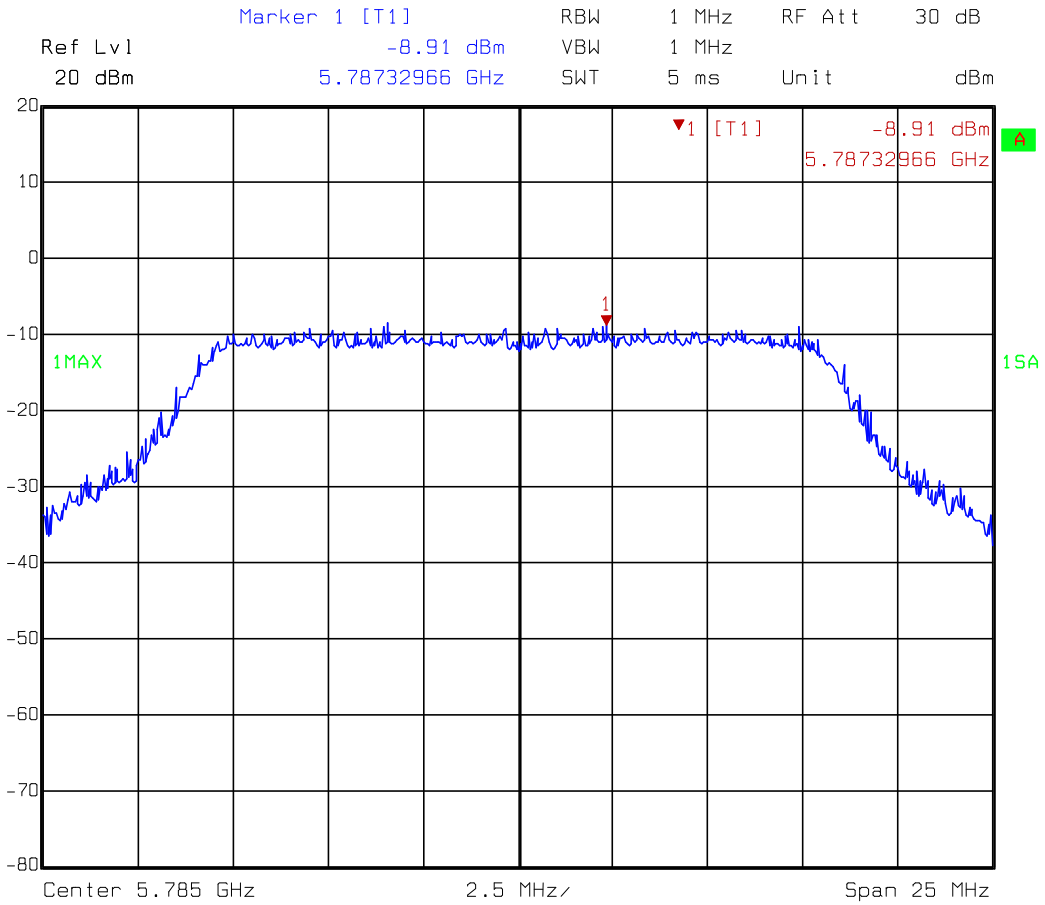
Please see the plot below.

## Test Mode: 802.11a OFDM Modulation Normal mode



Comment A: Power density 5745MHz (conducted)  
ATT=10dB CL=1.5dB (EC365)

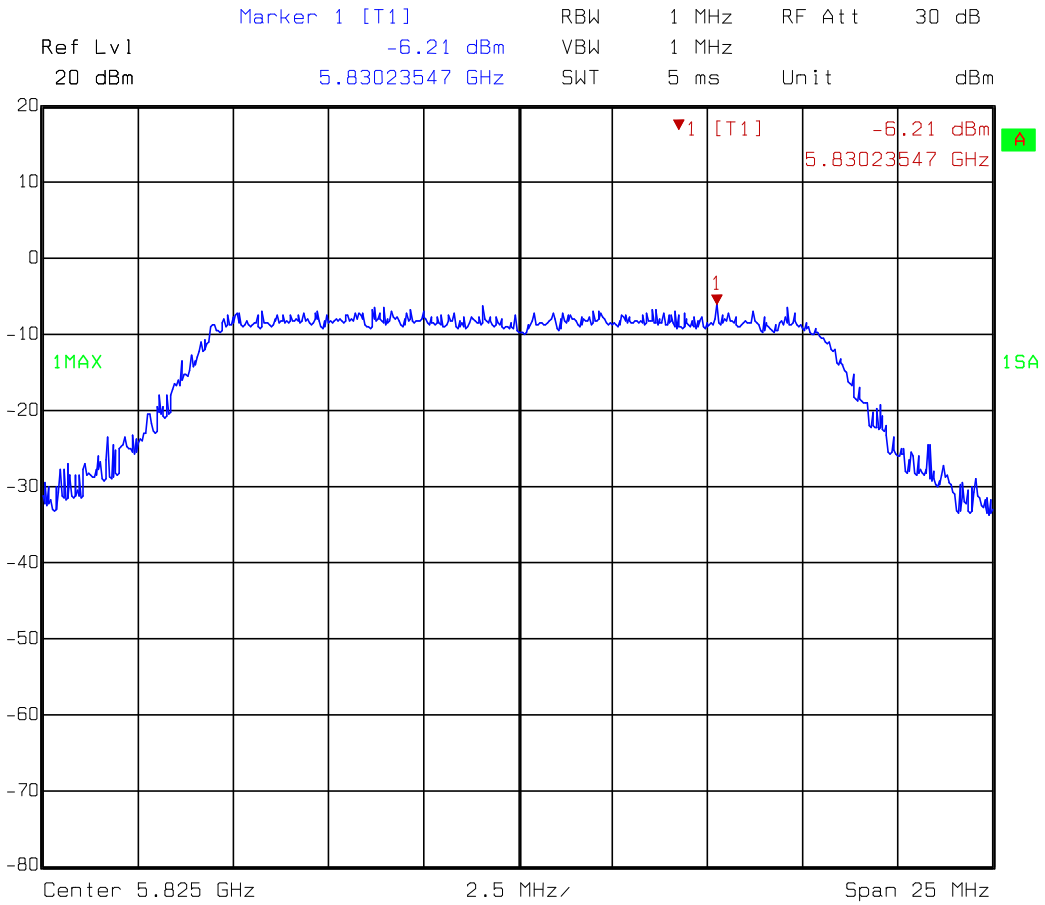
Date: 03.JUN.2004 11:35:15



Comment A: Power density 5785MHz (conducted)

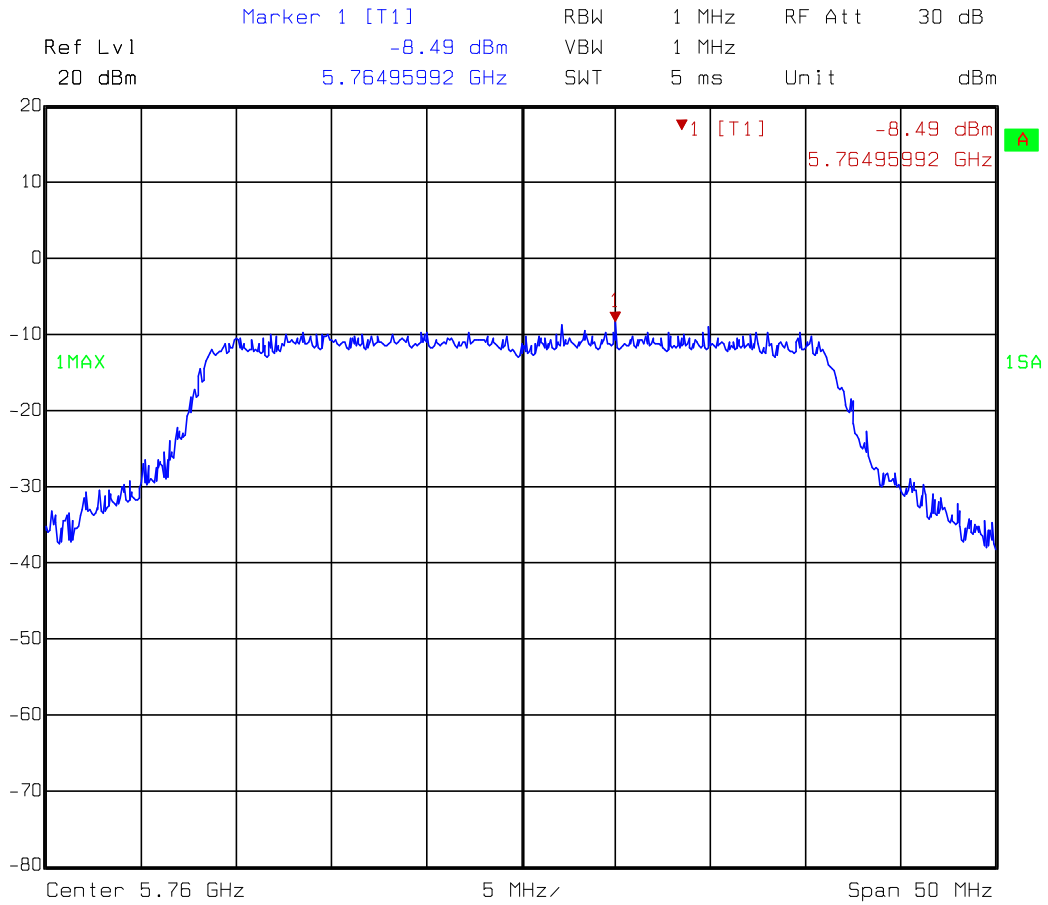
ATT=10dB CL=1.5dB (EC365)

Date: 03.JUN.2004 11:34:08



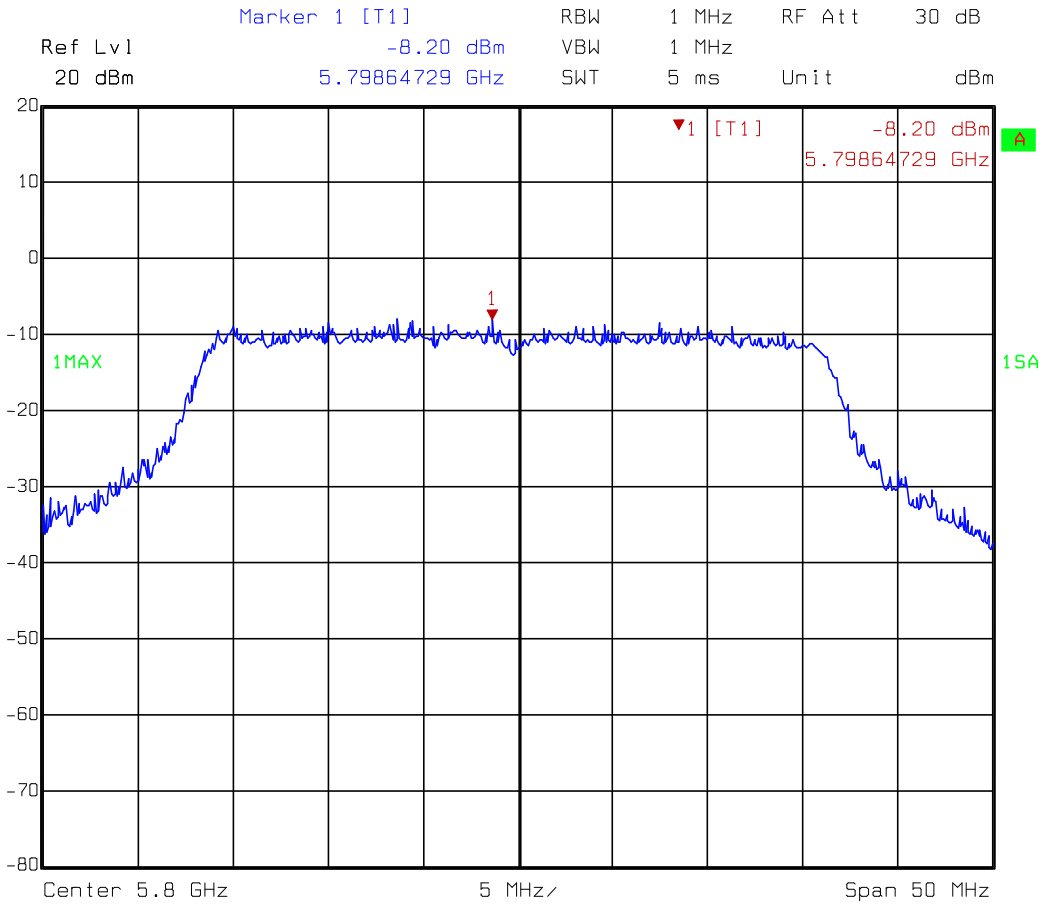
Comment A: Power density 5825MHz (conducted)  
ATT=10dB CL=1.5dB (EC365)  
Date: 03.JUN.2004 11:35:52

## Test Mode: 802.11a OFDM Modulation Turbo mode



Comment A: Power density 5760MHz (conducted)  
ATT=10dB CL=1.5dB (EC365)

Date: 03.JUN.2004 11:40:20



Comment A: Power density 5800MHz (conducted)  
ATT=10dB CL=1.5dB (EC365)  
Date: 03.JUN.2004 11:39:47



## 5. Peak excursion to average ratio test

### 5.1 Operating environment

Temperature: 20 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure: 1023 hPa

### 5.2 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=1MHz 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
5725~5825	<13dB

### 5.3 Measured data of Peak excursion to average ratio test results

Normal mode:

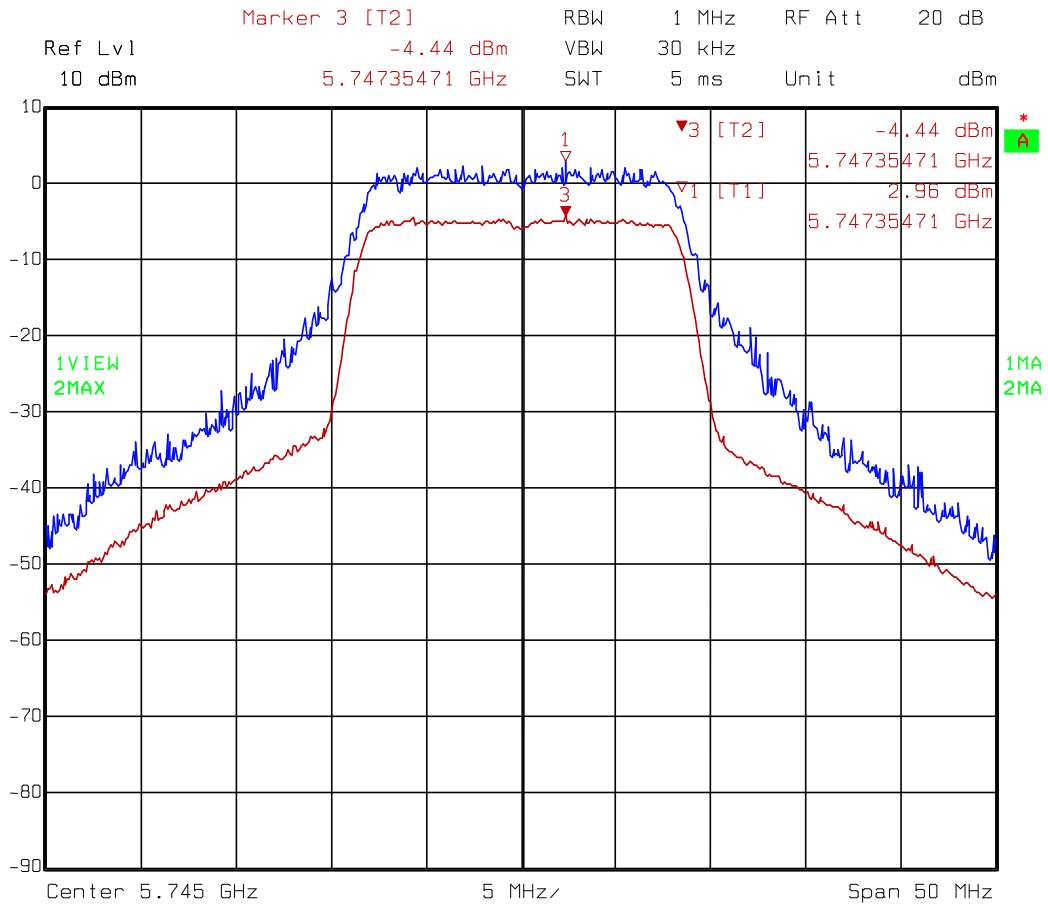
Frequency (MHz)	Measured peak excursion (dB)	Limit (dB)
5745	7.40	13
5785	7.35	13
5825	6.66	13

Turbo mode:

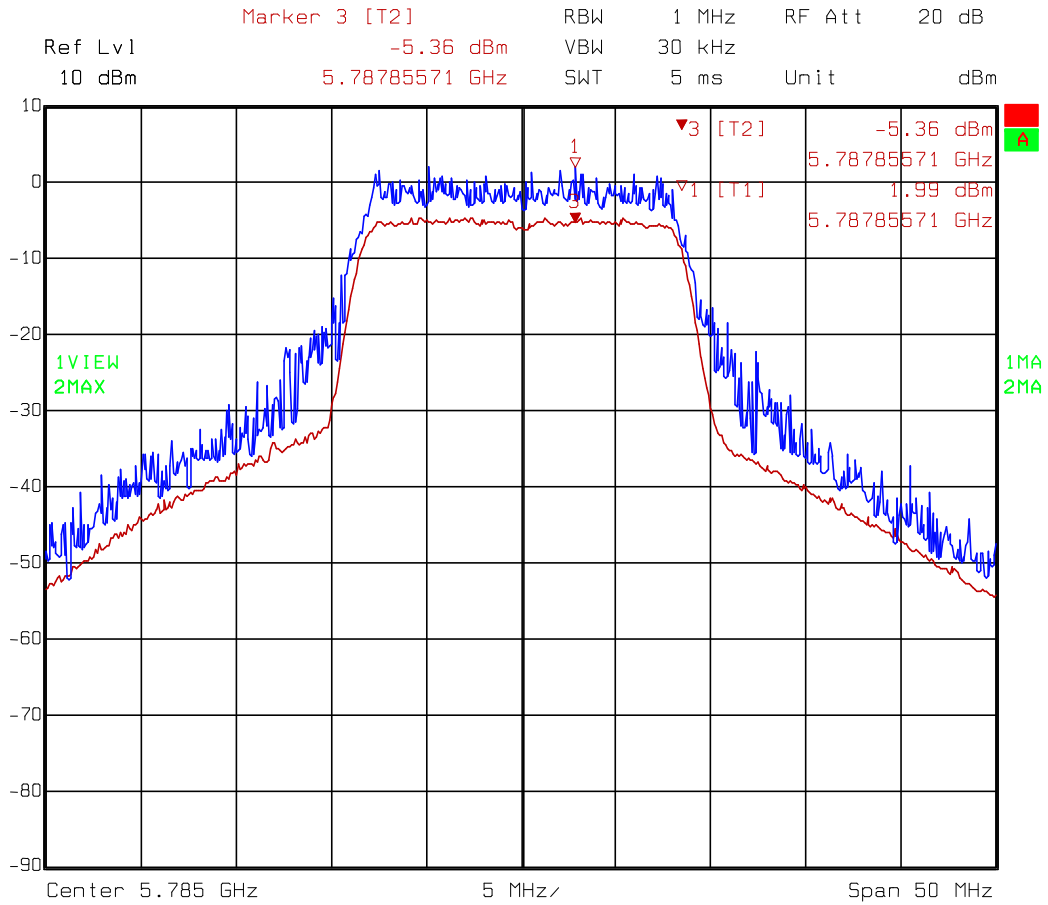
Frequency (MHz)	Measured peak excursion (dB)	Limit (dB)
5760	7.31	13
5800	6.00	13

Please see the plot below.

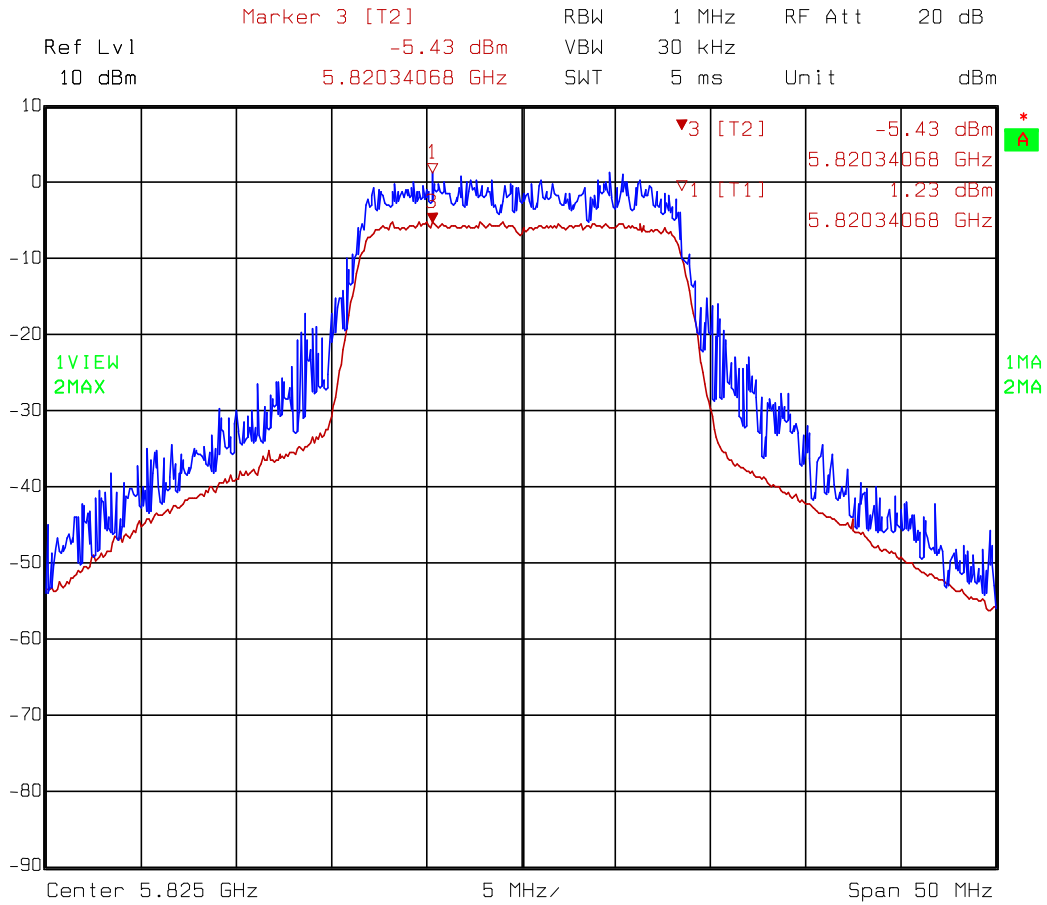
## Test Mode: 802.11a OFDM Modulation Normal mode



Comment A: excursion 5745MHz  
 Date: 28.MAY 2004 17:12:44

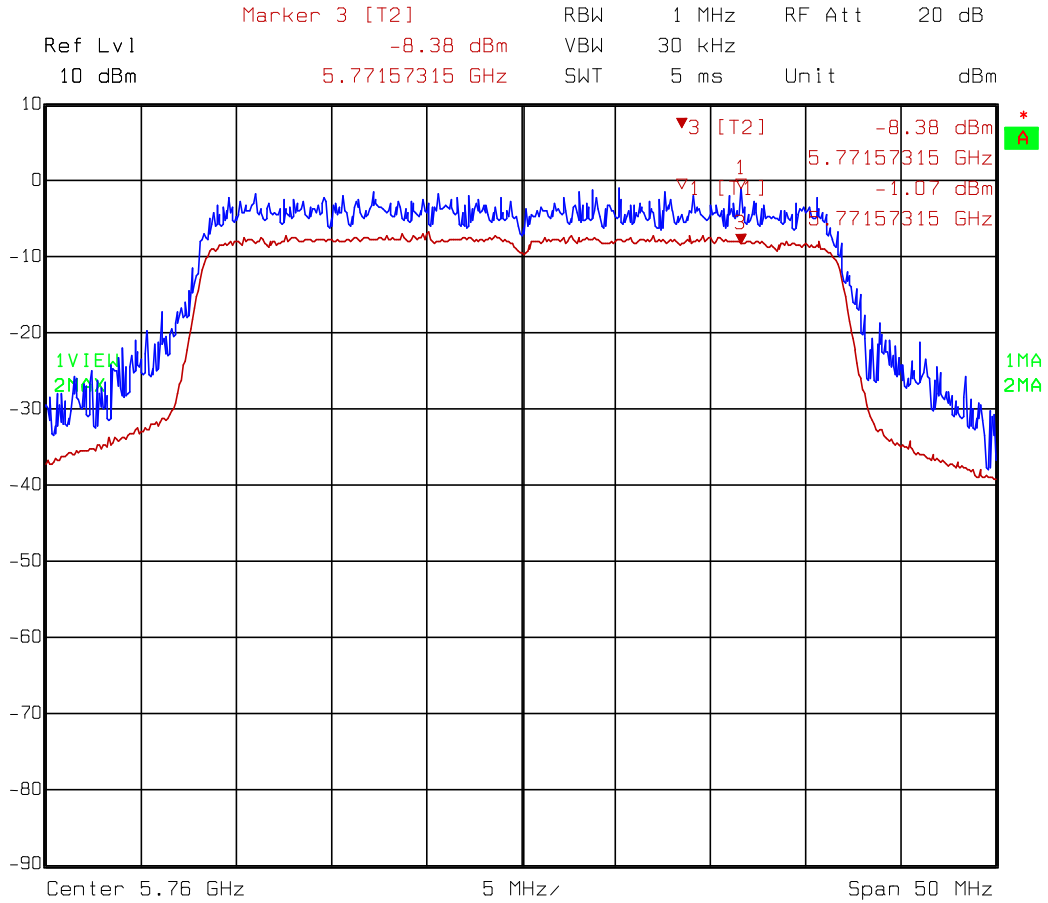


Comment A: excursion 5785MHz  
Date: 28.MAY 2004 17:10:01

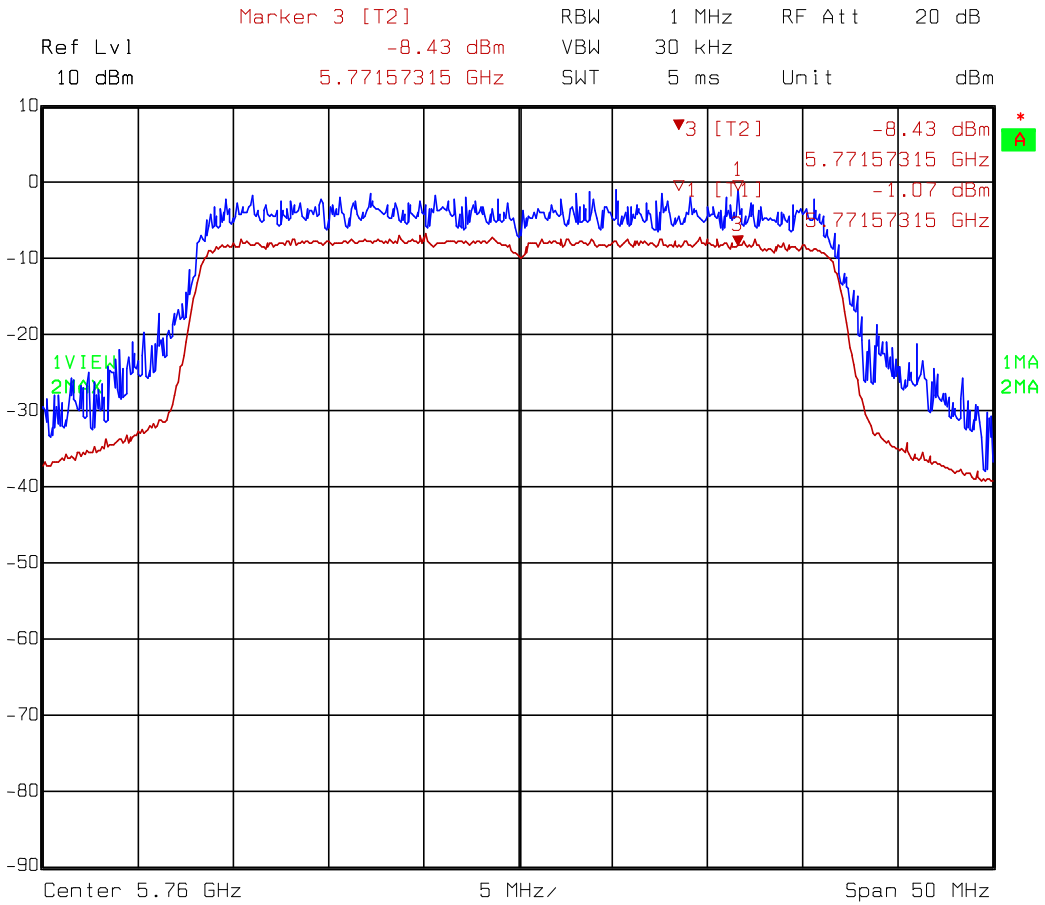


Comment A: excursion 5825MHz  
 Date: 28.MAY 2004 17:14:45

## Test Mode: 802.11a OFDM Modulation Turbo mode



Comment A: excursion 5760MHz  
Date: 28.MAY 2004 17:19:06



Comment A: excursion 5800MHz  
 Date: 28.MAY 2004 17:18:46

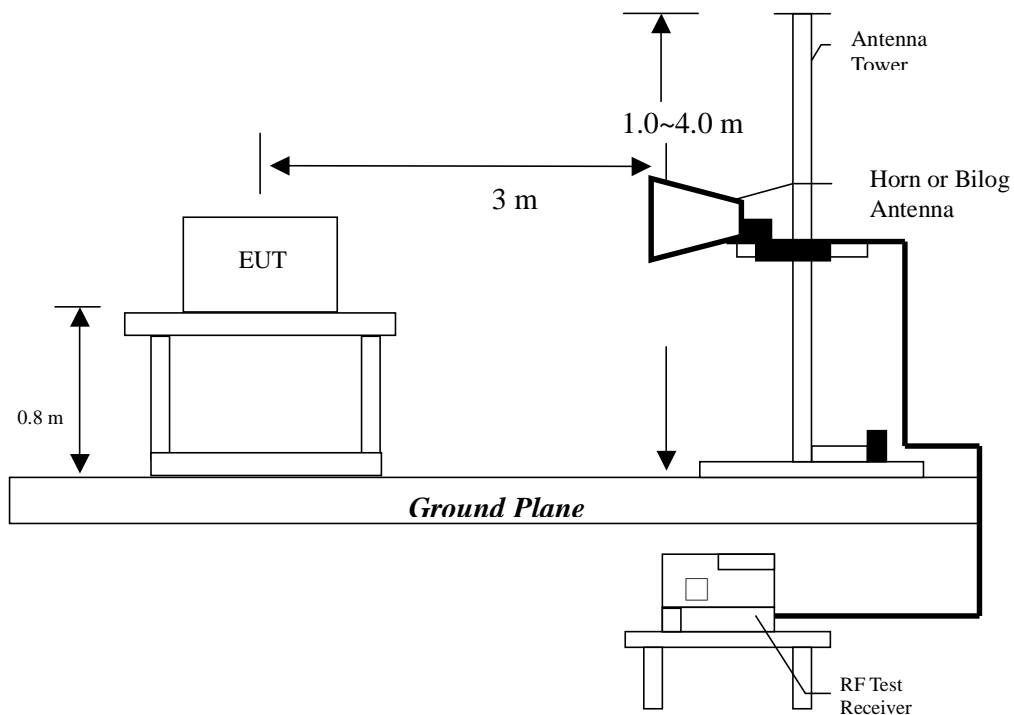
## 6. Radiated Emission test

### 6.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

### 6.2 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.

### 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 $\mu$ 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  $\pm 3.078$  dB.

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.02$  dB.



### 6.4 Radiated spurious emission test data

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

EUT : GateOne 500A  
 Worst Case Condition : Tx at 5745MHz

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
59.100	QP	V	13.13	25.50	38.63	40.00	-1.37	120.00	288.00
86.300	QP	V	9.55	25.89	35.44	40.00	-4.56	124.00	189.00
132.800	QP	V	13.53	22.20	35.73	43.50	-7.77	114.00	254.00
220.100	QP	V	11.94	25.60	37.54	46.00	-8.46	145.00	178.00
398.600	QP	V	16.37	24.60	40.97	46.00	-5.03	168.00	102.00
497.500	QP	V	18.82	14.90	33.72	46.00	-12.28	200.00	115.00
59.100	QP	H	13.13	21.70	34.83	40.00	-5.17	158.00	168.00
90.100	QP	H	9.85	23.90	33.75	43.50	-9.75	168.00	164.00
132.800	QP	H	13.53	23.70	37.23	43.50	-6.27	108.00	224.00
220.100	QP	H	11.94	27.70	39.64	46.00	-6.36	168.00	125.00
398.600	QP	H	16.37	22.20	38.57	46.00	-7.43	198.00	245.00
664.400	QP	H	21.51	16.80	38.31	46.00	-7.69	212.00	246.00

**Remark:**

1. Corrected Level = Reading Level + Correction Factor
2. Correction Factor = Antenna Factor + Cable Loss
3. “-“ means the emission is below the noise floor.

#### **6.4.2 Measurement results: frequency above 1GHz**

EUT : GateOne 500A  
Test Mode : Normal and Turbo mode

**Test Result:**

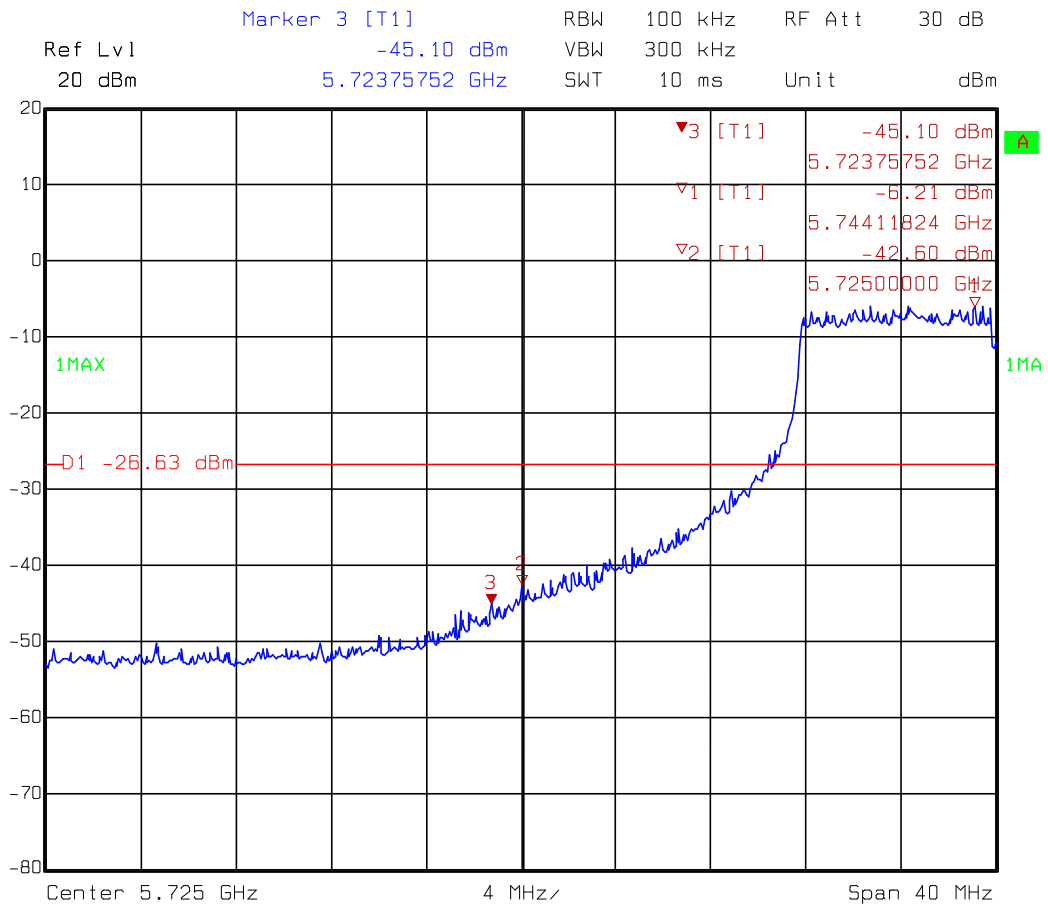
No spurious emission was found above the spectrum analyzer's noise floor.

**7. Emission on the band edge §FCC 15.205**

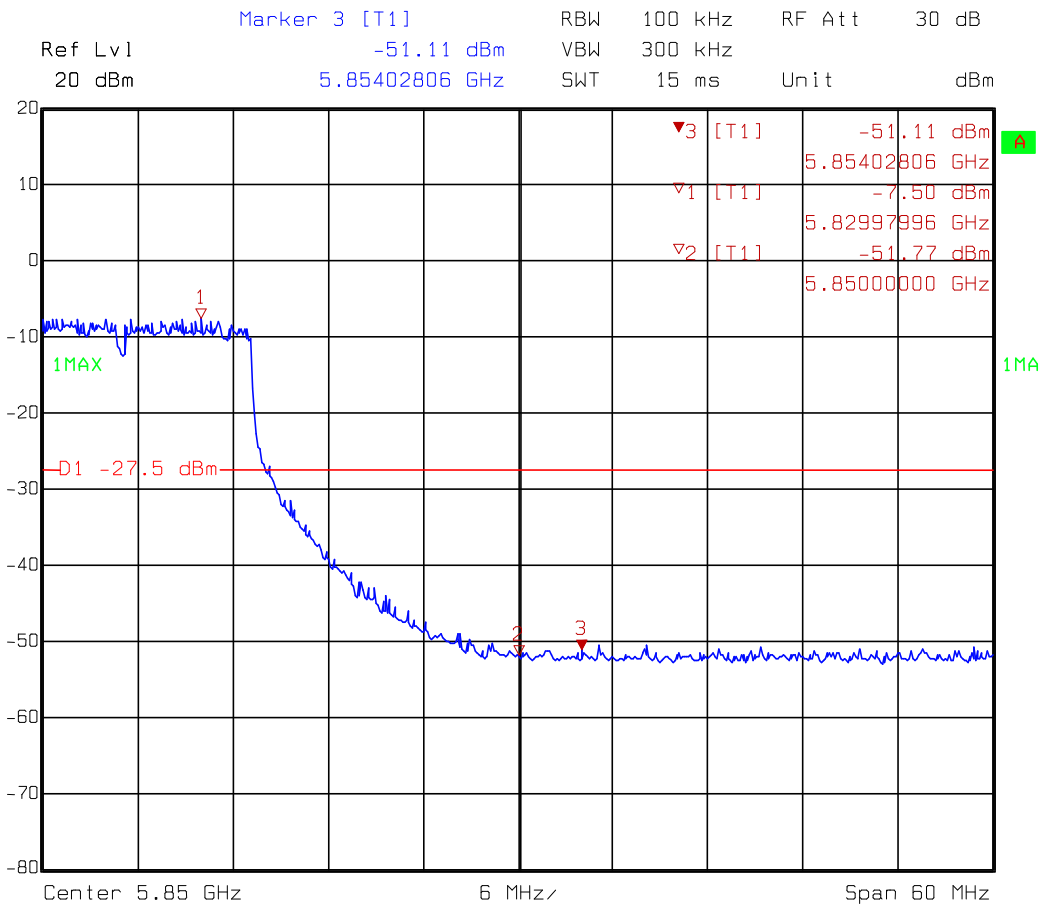
The measurement was made to the average and peak field strength of the fundamental frequency. And the spurious emission in the restrict band must also comply with the FCC subpart C 15.209.

Please see the plot below.

## 7.1 Band-edge (Conducted method)

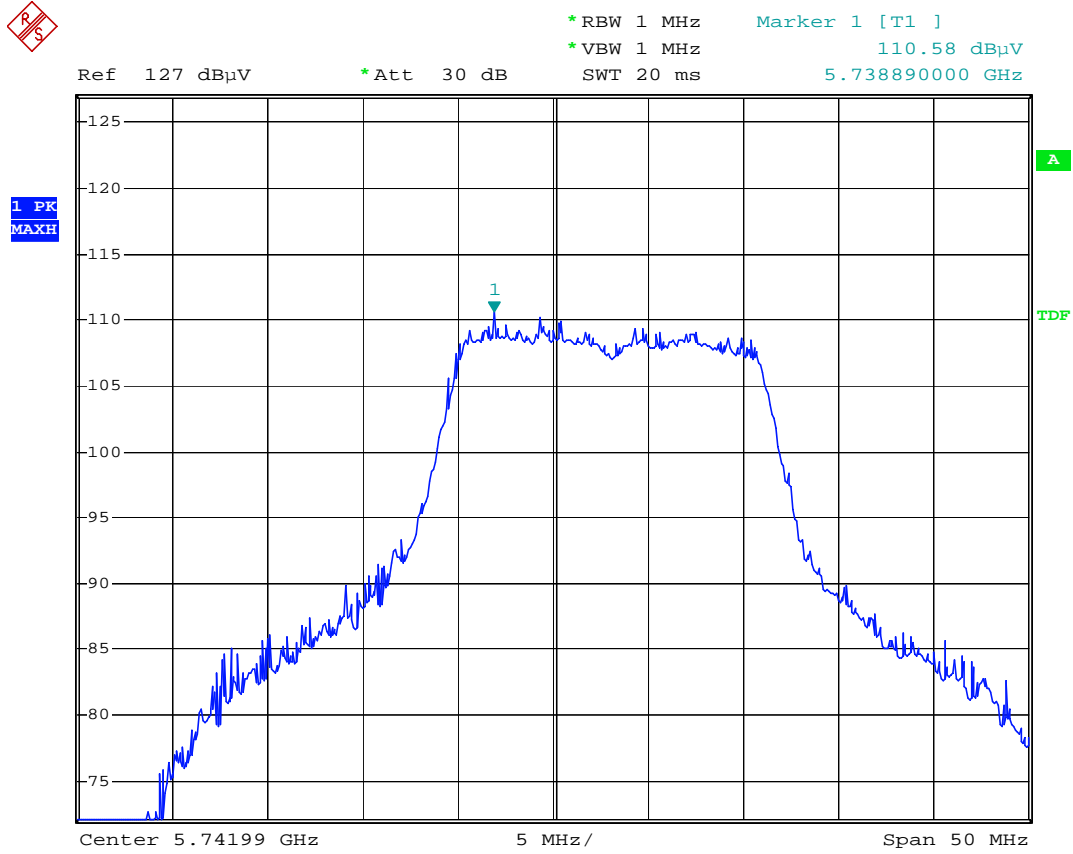


Comment A: Band-edge at 5745MHz (EC365) CL=1.5dB  
 Date: 28.MAY 2004 16:50:37

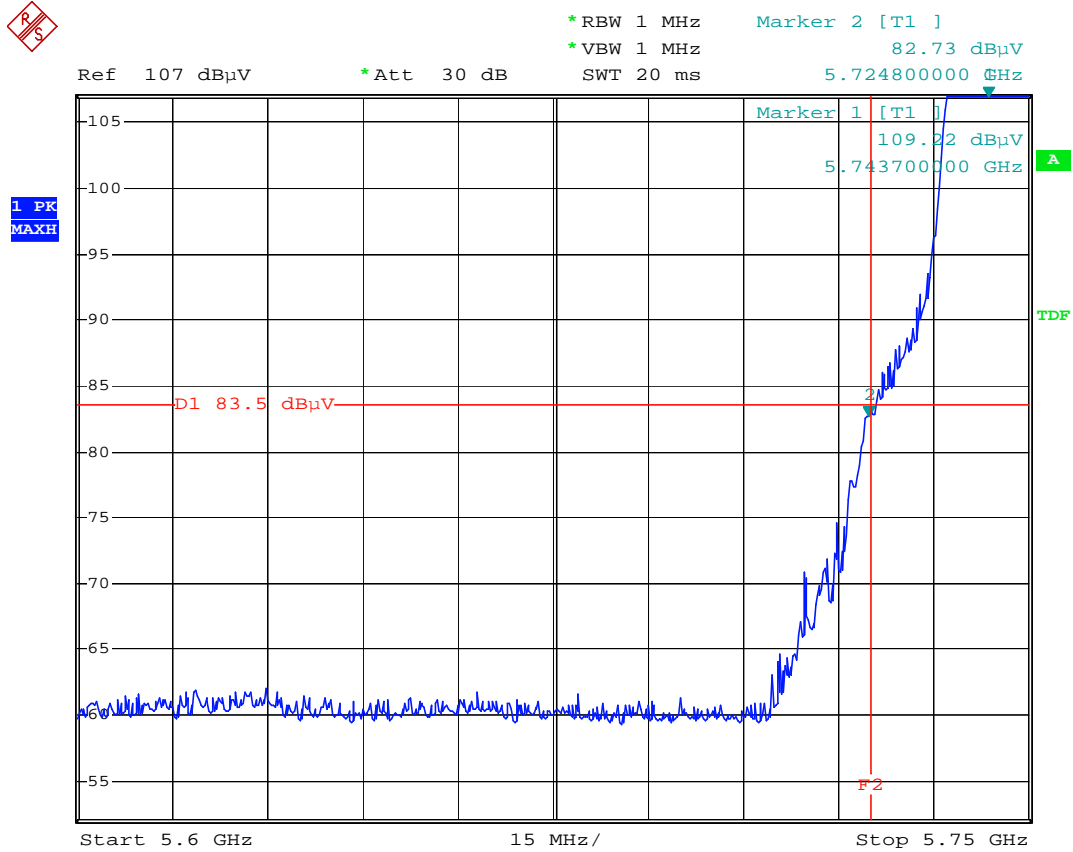


Comment A: Band-edge at 5825MHz (EC365) CL=1.5dB  
 Date: 28.MAY 2004 16:45:25

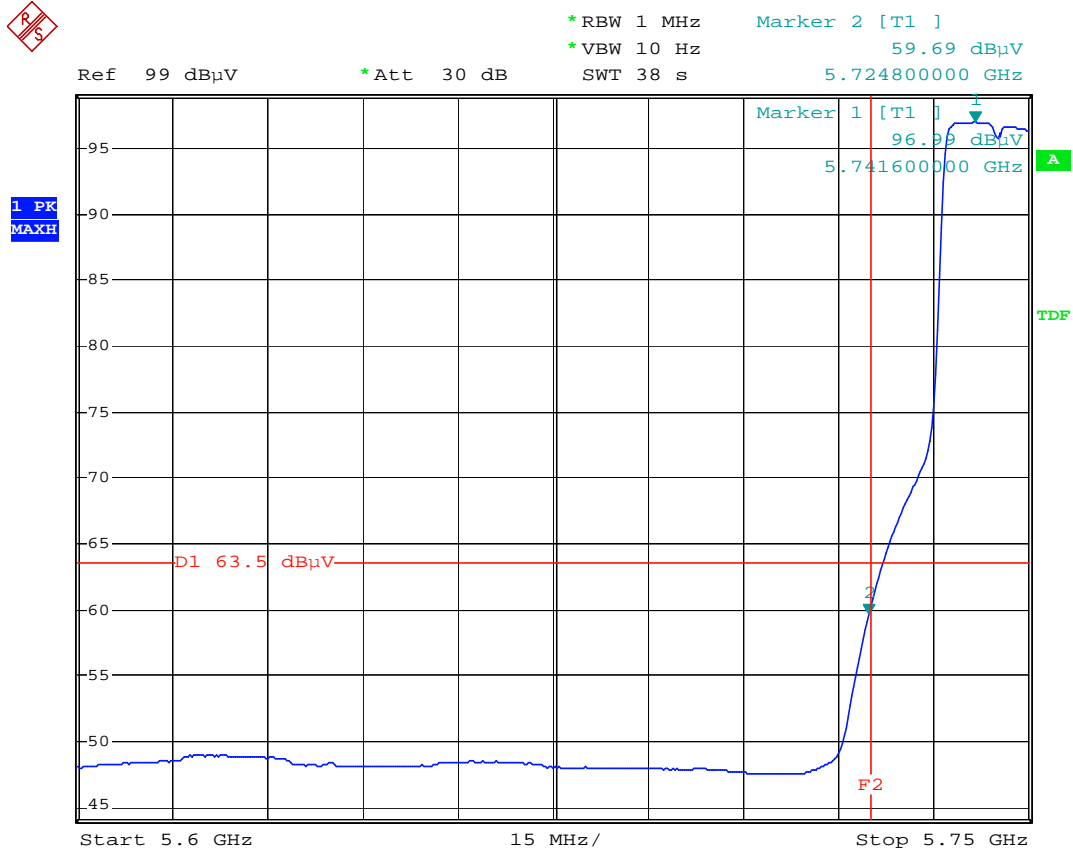
## 7.2 Band-edge (Radiated method)



Comment: Band-edge test at low channel  
Comment: Peak detector F2=5725MHz  
Date: 23.JUN.2004 17:54:50

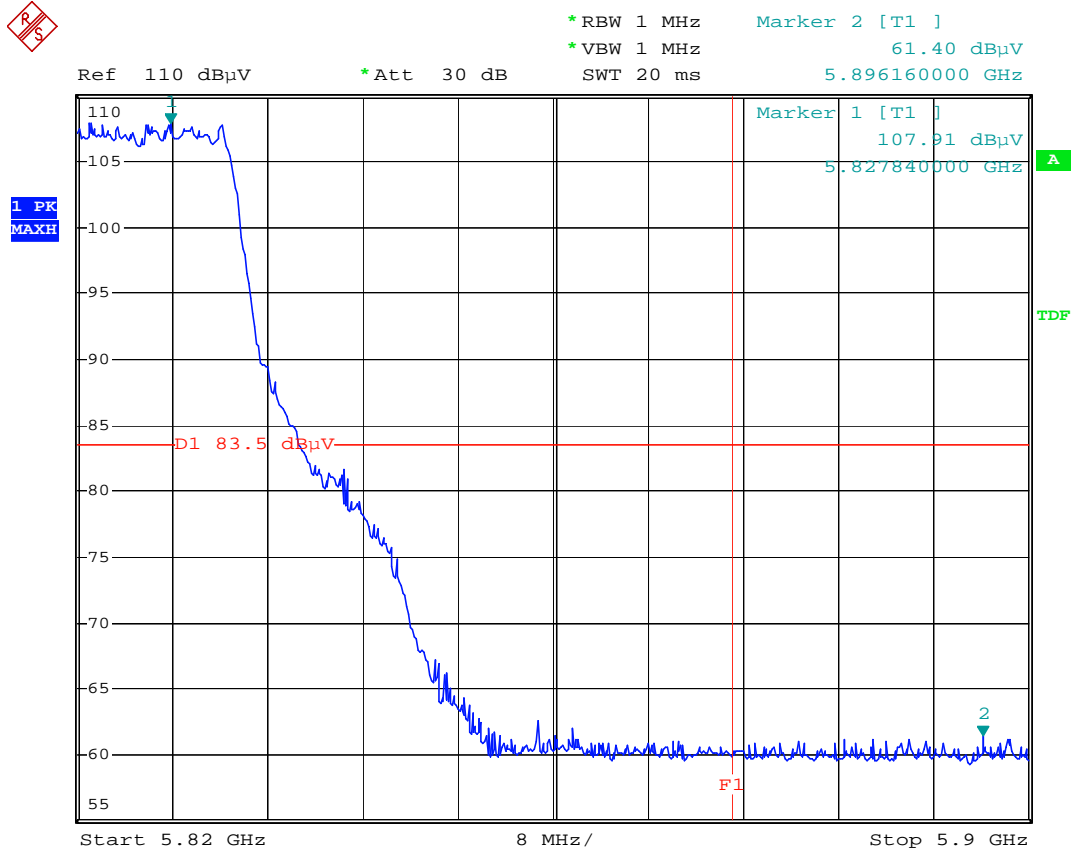


Comment: Band-edge test at low channel  
 Comment: Peak detector F2=2390MHz  
 Date: 23.JUN.2004 17:57:55

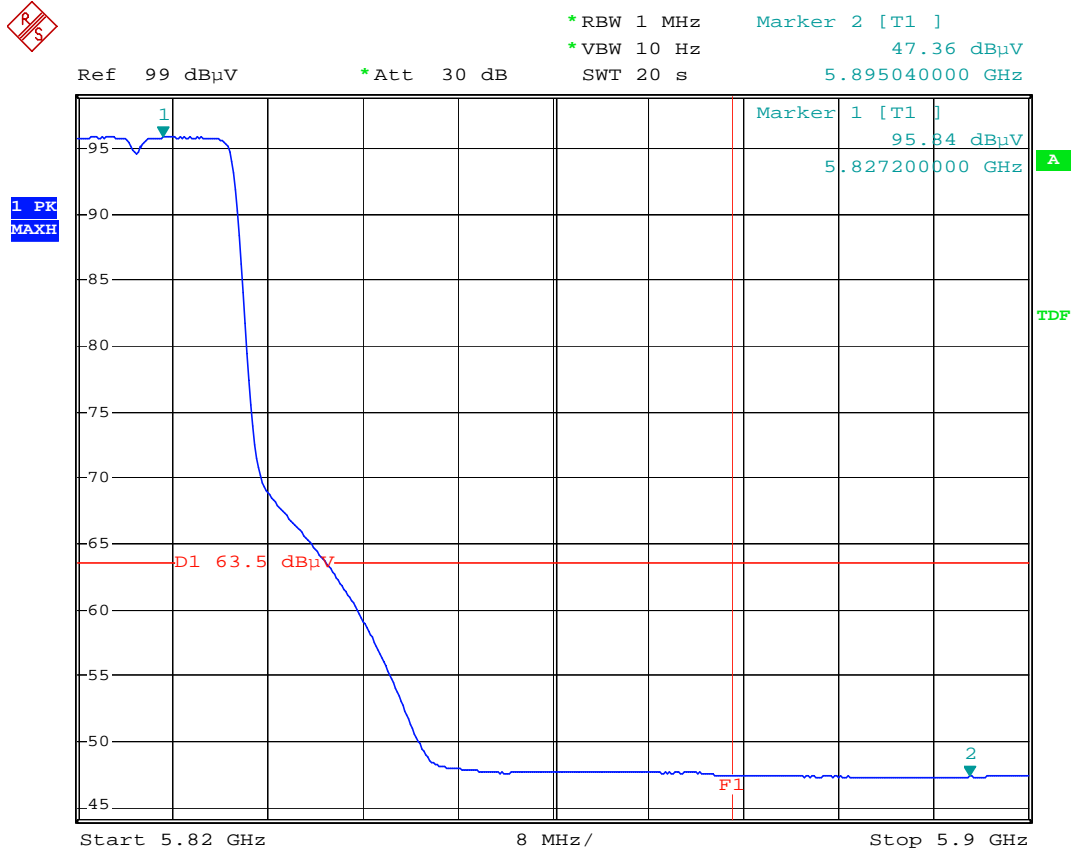


Comment: Band-edge test at low channel  
 Comment: Average detector F2=2390MHz  
 Date: 23.JUN.2004 18:01:41





Comment: Band-edge test at high channel  
 Comment: Peak detector F1=5875MHz  
 Date: 23.JUN.2004 18:09:40



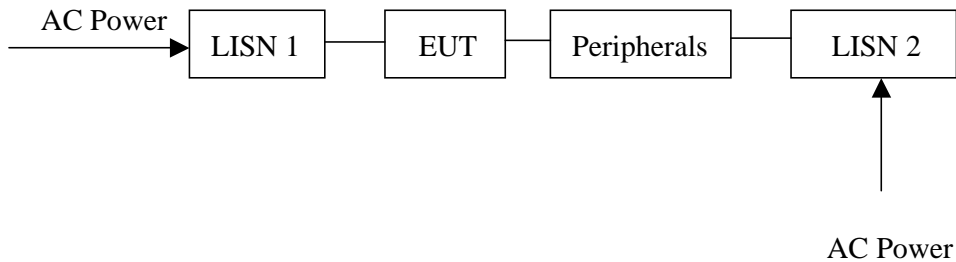
Comment: Band-edge test at high channel  
 Comment: Average detector F1=5875MHz  
 Date: 23.JUN.2004 18:08:54

## 8. Power Line Conducted Emission test §FCC 15.207

### 8.1 Operating environment

Temperature:	23	°C	(10-40°C)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1061hPa)

### 8.2 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 C63.4/1992 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

## 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.

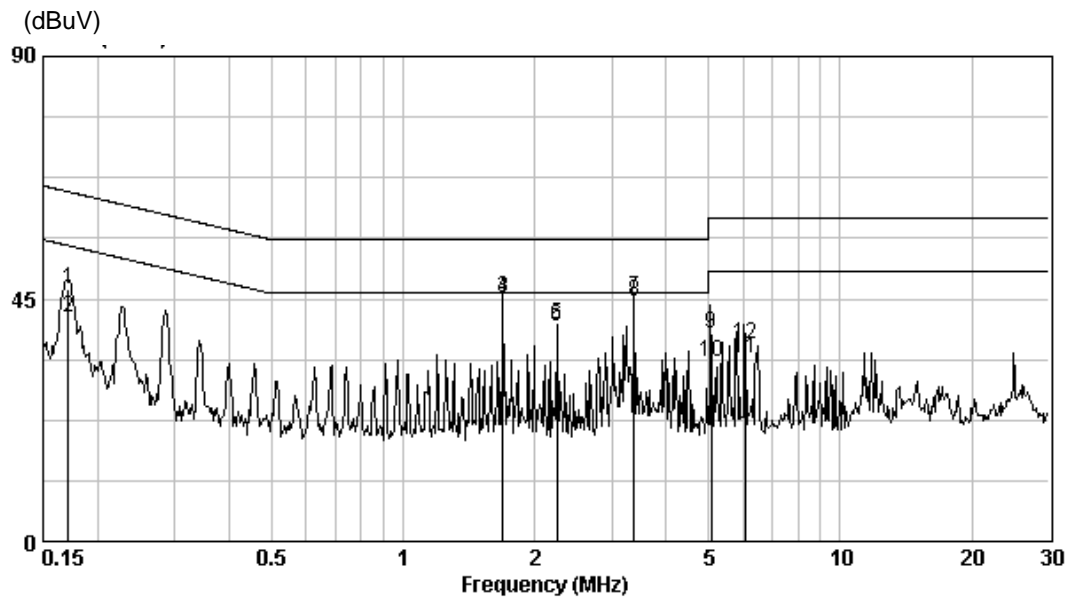
### 8.3 Power Line Conducted Emission test data

Phase: Line  
 Model No.: GateOne 500A, GateOne 240G  
 Worst Case Condition: Normal operating mode

Freq. (MHz)	Correction Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
0.172	0.10	46.85	64.87	-18.02	QP
0.172	0.10	41.44	54.87	-13.43	AVERAGE
1.691	0.10	45.26	56.00	-10.74	QP
1.691	0.10	45.06	46.00	-0.94	AVERAGE
2.253	0.11	40.23	56.00	-15.77	QP
2.253	0.11	39.74	46.00	-6.26	AVERAGE
3.382	0.17	45.31	56.00	-10.69	QP
3.382	0.17	44.61	46.00	-1.39	AVERAGE
5.077	0.24	38.59	60.00	-21.41	QP
5.077	0.24	33.36	50.00	-16.64	AVERAGE
6.050	0.27	36.72	60.00	-23.28	QP
6.050	0.27	33.93	50.00	-16.07	AVERAGE

Remark:

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

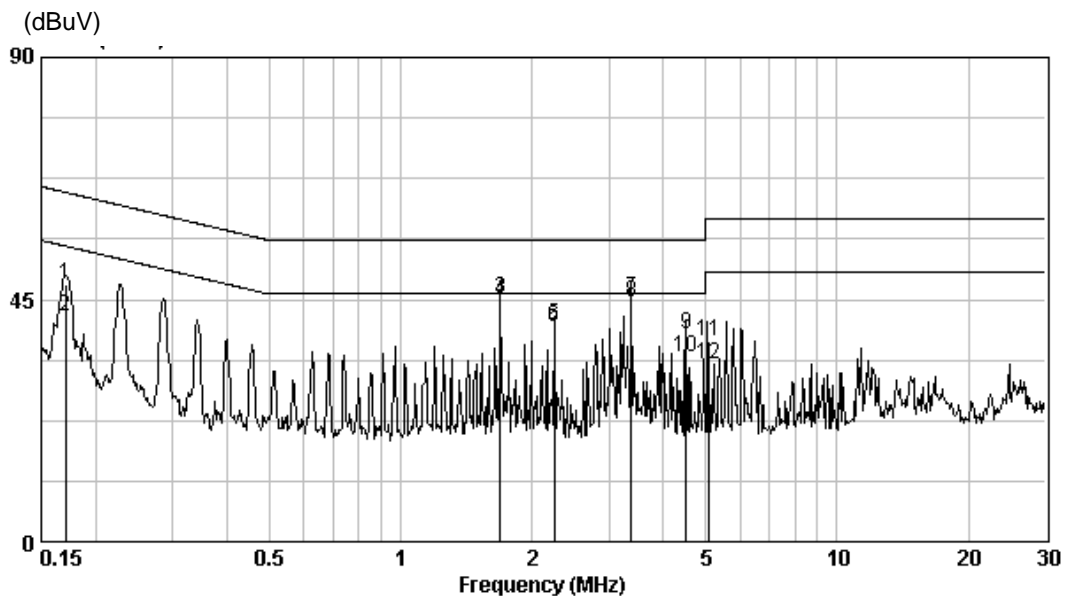


Phase: Neutral  
 Model No.: GateOne 500A, GateOne 240G  
 Worst Case Condition: Normal operating mode

Freq. (MHz)	Correction Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
0.170	0.10	47.79	64.94	-17.15	QP
0.170	0.10	41.99	54.94	-12.95	AVERAGE
1.691	0.10	45.28	56.00	-10.72	QP
1.691	0.10	44.98	46.00	-1.02	AVERAGE
2.253	0.11	40.37	56.00	-15.63	QP
2.253	0.11	39.89	46.00	-6.11	AVERAGE
3.382	0.17	45.25	56.00	-10.75	QP
3.382	0.17	44.52	46.00	-1.48	AVERAGE
4.505	0.20	38.68	56.00	-17.32	QP
4.505	0.20	34.28	46.00	-11.72	AVERAGE
5.077	0.20	37.14	60.00	-22.86	QP
5.077	0.20	32.89	50.00	-17.11	AVERAGE

Remark:

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



## 9. Minimum 6dB Bandwidth test

### 9.1 Operating environment

Temperature: 23 °C  
 Relative Humidity: 55 %  
 Atmospheric Pressure 1023 hPa

### 9.2 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 300kHz, 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.

### 9.3 Measured data of Minimum 6dB Bandwidth test results

Test Mode: 802.11g OFDM Modulation mode

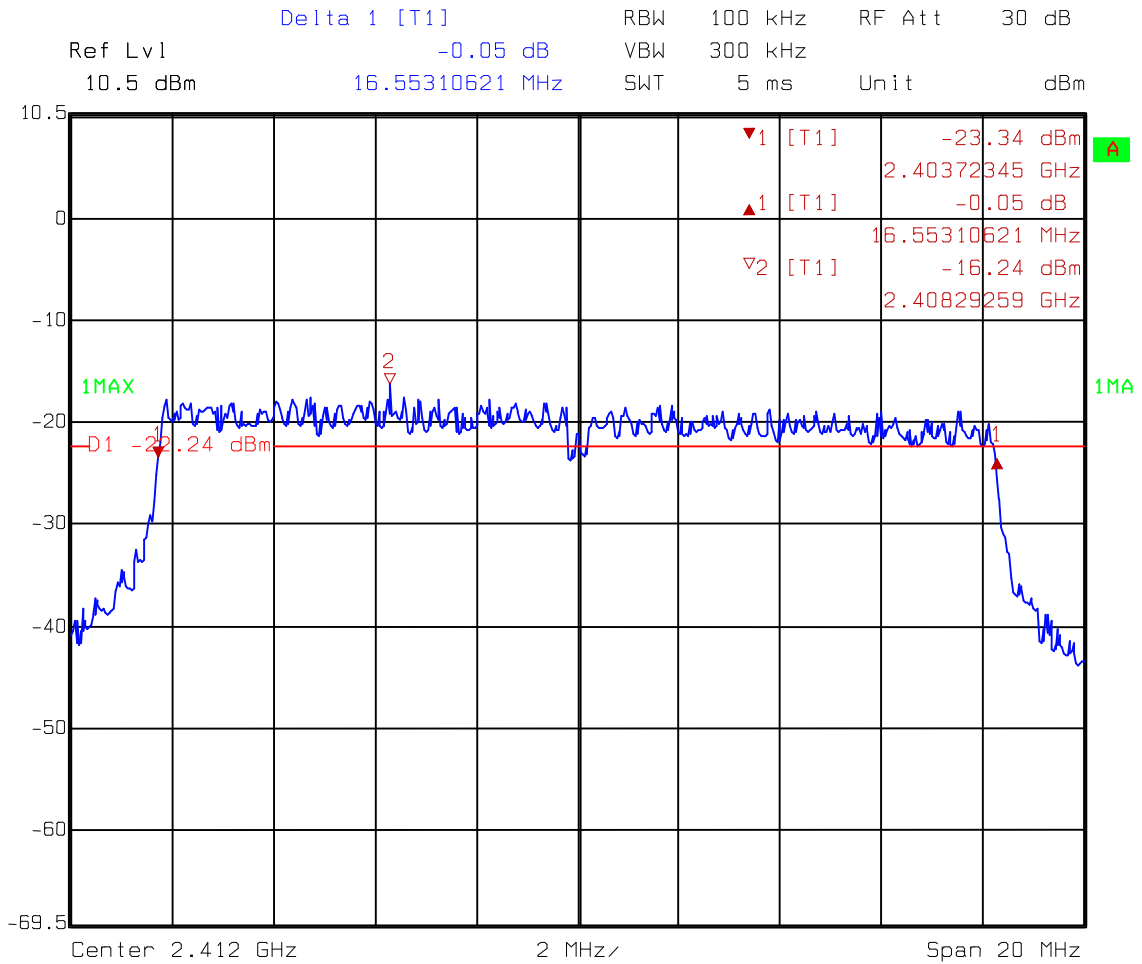
Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
1	2412	16.553	> 500kHz
6	2437	16.633	> 500kHz
11	2462	16.633	> 500kHz

Test Mode: 802.11g Turbo mode

Channel	Frequency (MHz)	Bandwidth (MHz)	Limit
6	2437	33.106	> 500kHz

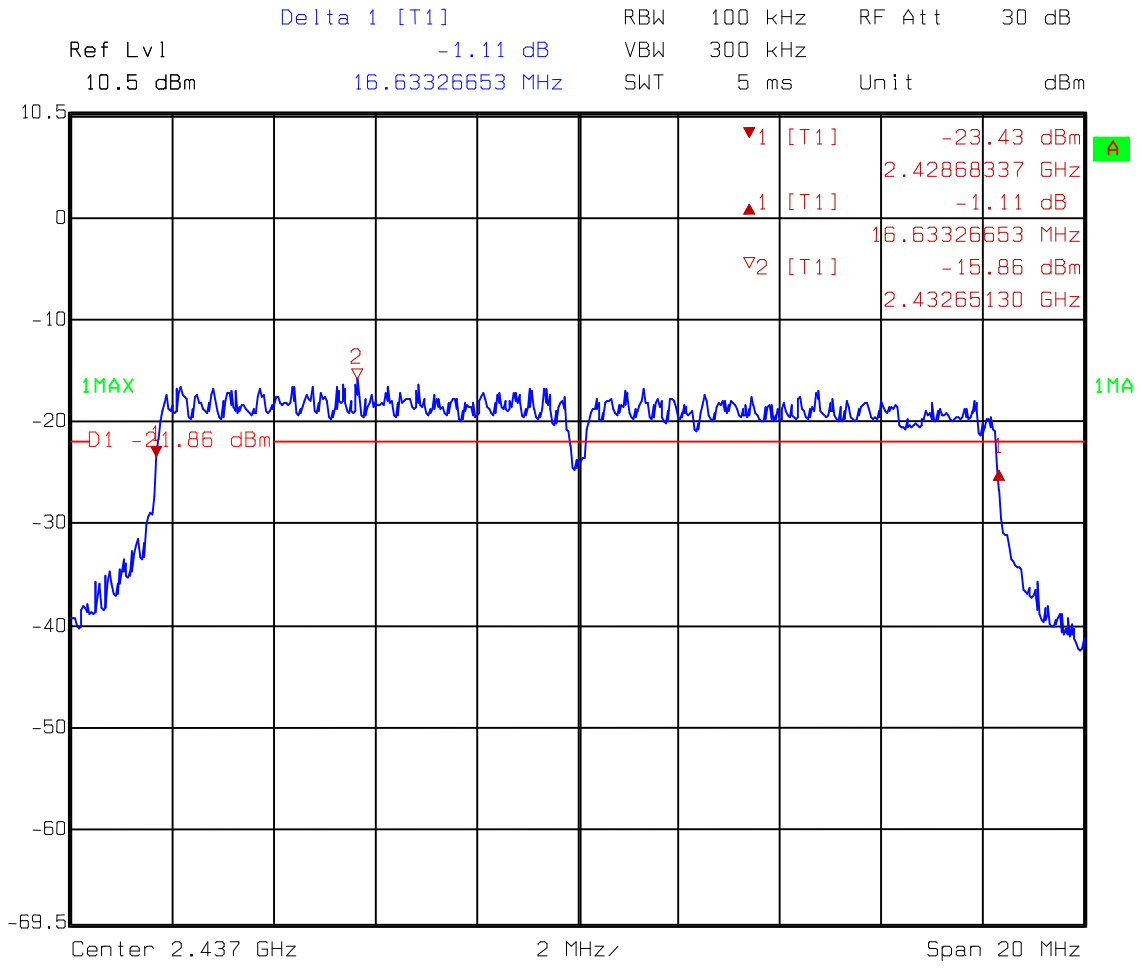
Please see the plot below.

## Test Mode: 802.11g OFDM Modulation Normal mode

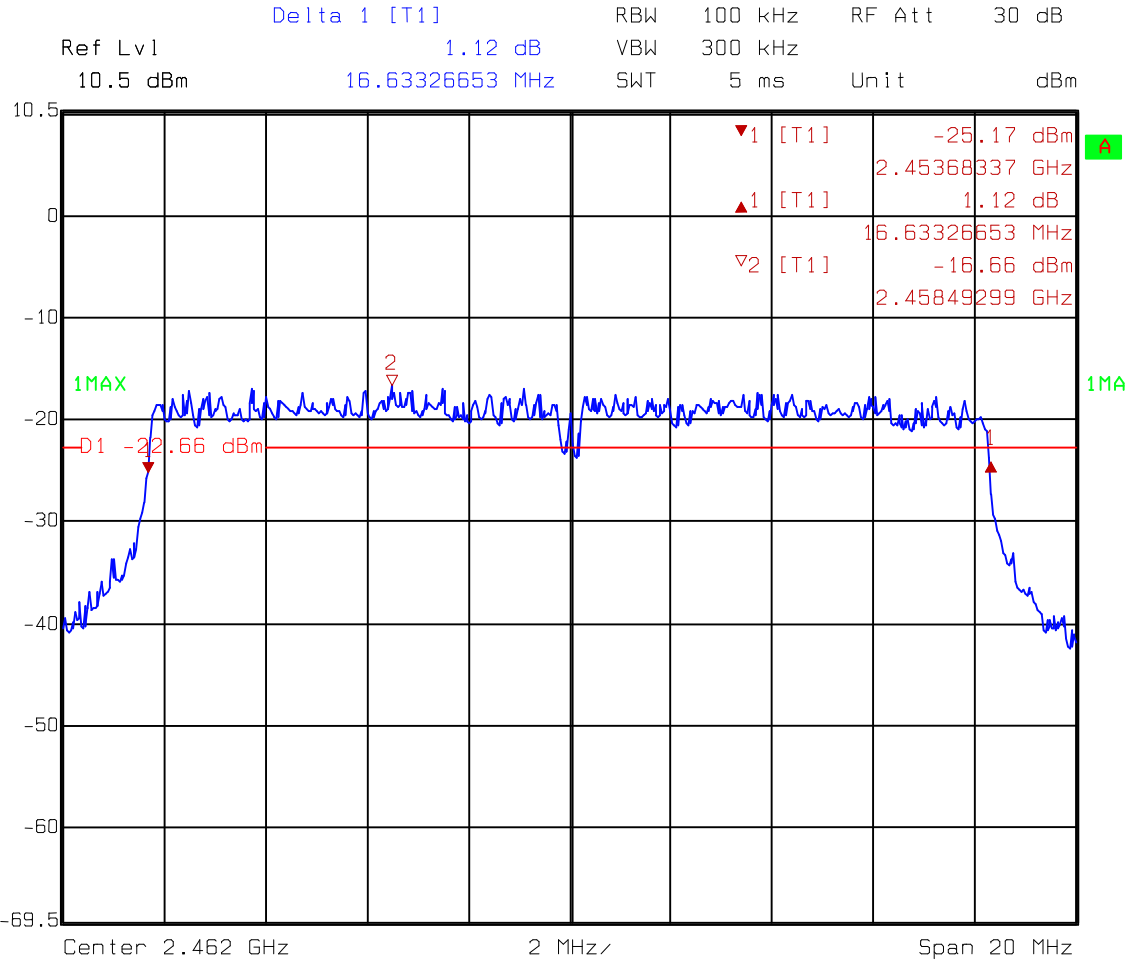


Comment A: 6dB bandwidth at low channel (EC365)  
Date: 24.JUN.2004 09:15:35



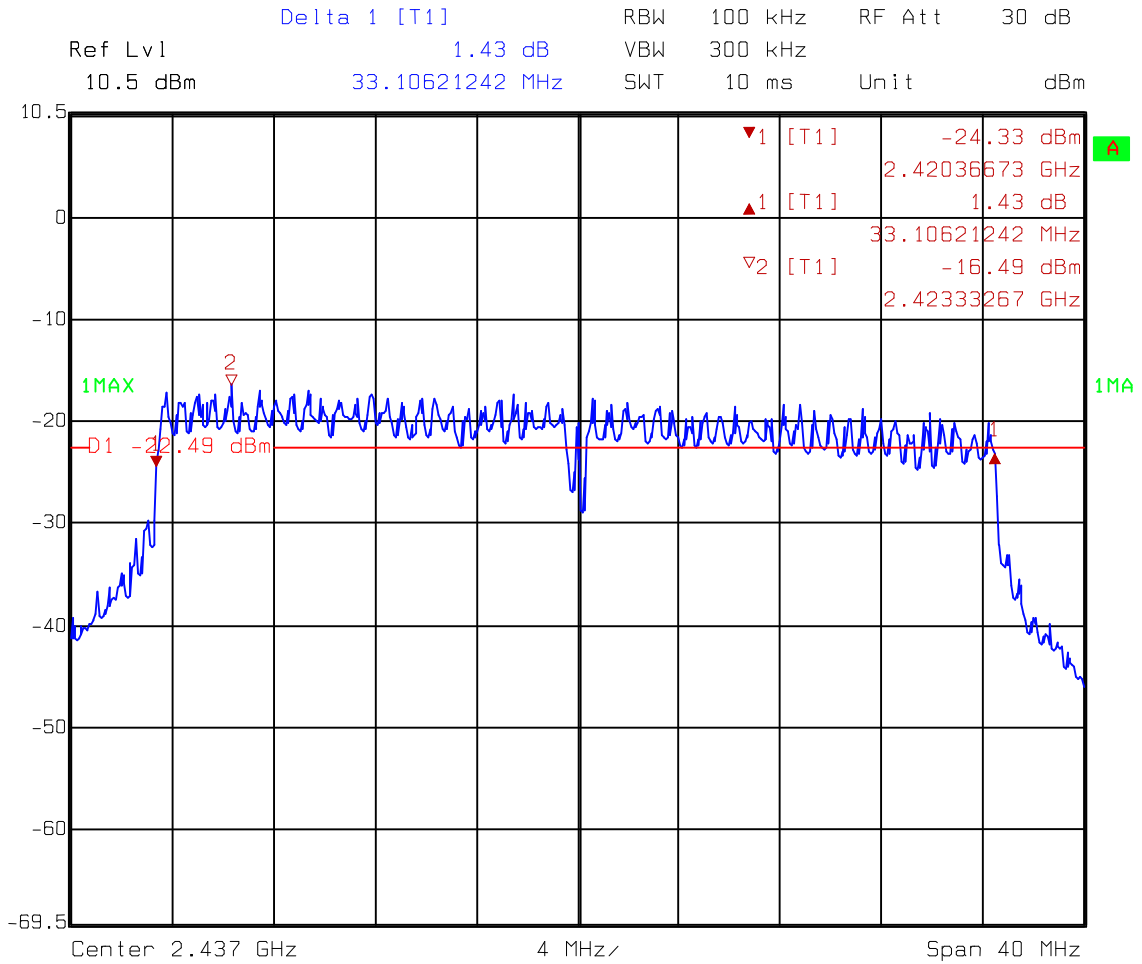


Comment A: 6dB bandwidth at middle channel (EC365)  
Date: 24.JUN.2004 09:13:56



Comment A: 6dB bandwidth at high channel (EC365)  
 Date: 24.JUN.2004 09:16:58

## Test Mode: 802.11g OFDM Modulation Turbo mode



Comment A: 6dB bandwidth at middle channel (EC365) Turbo  
Date: 24.JUN.2004 09:18:37

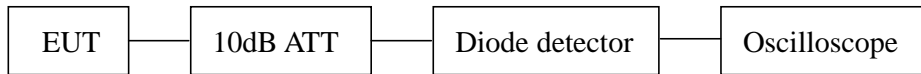
## 10. Maximum Output Power test

### 10.1 Operating environment

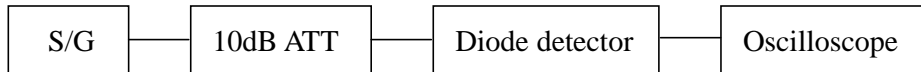
Temperature: 22 °C  
 Relative Humidity: 54 %  
 Atmospheric Pressure 1023 hPa

### 10.2 Test setup & procedure

A:



B:



1. The output of the transmitter via a 10 dB attenuator and coupled to a diode detector.
2. The output of the diode detector connected to the vertical channel of and oscilloscope. The observed trace of the oscilloscope shall be recorded as “A”.
3. The transmitter replaced by a signal generator. The output frequency of the signal made equal to the center of the frequency range occupied by the transmitter and unmodulated.
4. The output of the signal generator raised to reach the peak of trace “A” named X.
5. The signal generator output level X (dBm) is the transmitter peak output power.

### 10.3 Measured data of Maximum Output Power test results

Test Mode: 802.11g OFDM Modulation

Channel	Frequency (MHz)	Reading (dBm)	Output Power		Limit (dBm)
			(dBm)	(mW)	
1	2412	13.84	13.84	24.21	26.93
6	2437	15.15	15.15	32.73	26.93
11	2462	14.73	14.73	29.72	26.93

Test Mode: 802.11g Turbo mode

Channel	Frequency (MHz)	Reading (dBm)	Output Power		Limit (dBm)
			(dBm)	(mW)	
6	2437	15.15	15.15	32.73	26.93

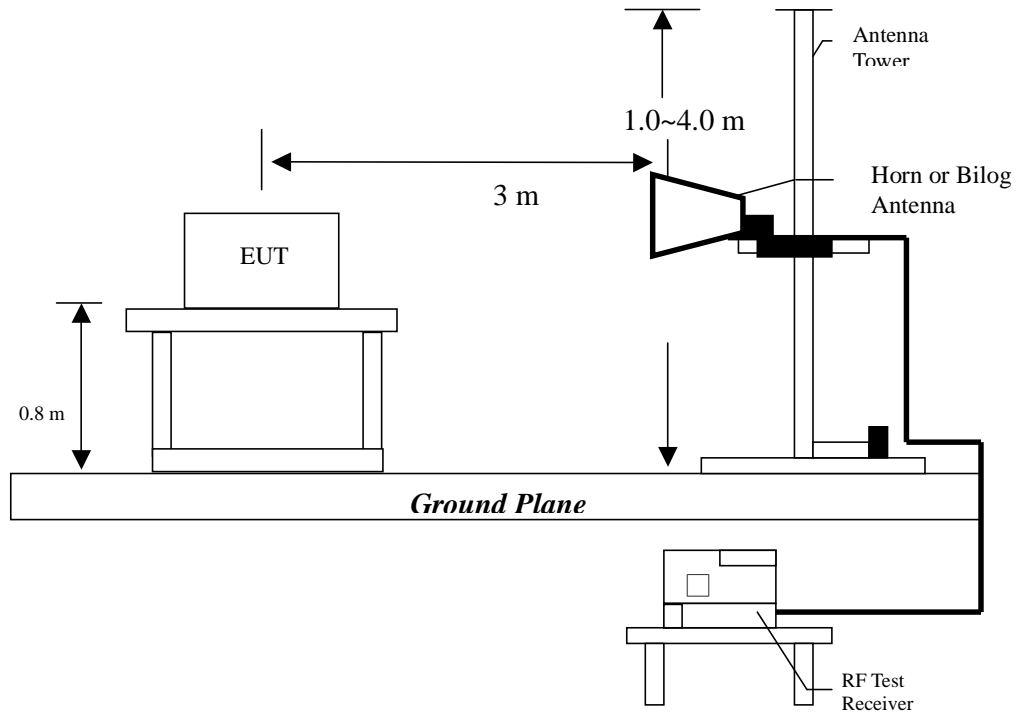
## 11. Radiated Emission test

### 11.1 Operating environment

Temperature:	25	°C	(10-40°C)
Relative Humidity:	55	%	(10-90%)
Atmospheric Pressure	1023	hPa	(860-1060hPa)

### 11.2 Test setup & procedure

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



Radiated emissions were investigated 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 three meter reading using inverse scaling with distance.

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

### 11.3 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 $\mu$ 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  $\pm 4.98$  dB.

Expanded uncertainty (k=2) of conducted emission measurement is  $\pm 2.02$  dB.

**11.4 Radiated spurious emission test data**

**11.4.1 Measurement results: frequencies equal to or less than 1 GHz**

EUT : GateOne 240G

Worst Case Condition : Tx at channel 1

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV)	Limit @ 3 m (dBuV)	Margin (dB)	Antenna high (cm)	Turn Table angle (degree)
76.600	QP	V	10.72	28.70	39.42	40.00	-0.58	112.00	85.00
132.800	QP	V	13.53	19.50	33.03	43.50	-10.47	105.00	214.00
204.600	QP	V	12.72	22.50	35.22	43.50	-8.28	117.00	351.00
398.600	QP	V	16.37	19.50	35.87	46.00	-10.13	120.00	238.00
664.400	QP	V	21.51	11.90	33.41	46.00	-12.59	112.00	250.00
930.200	QP	V	25.56	11.30	36.86	46.00	-9.14	110.00	265.00
76.600	QP	H	10.72	21.70	32.42	40.00	-7.58	254.00	186.00
132.800	QP	H	13.53	22.00	35.53	43.50	-7.97	264.00	254.00
204.600	QP	H	12.72	24.10	36.82	43.50	-6.68	321.00	188.00
398.600	QP	H	16.37	21.30	37.67	46.00	-8.33	298.00	110.00
664.000	QP	H	21.51	16.20	37.71	46.00	-8.29	298.00	110.00
930.200	QP	H	25.56	11.90	37.46	46.00	-8.54	187.00	168.00

Remark:

1. Corrected Level = Reading Level + Correction Factor

2. Correction Factor = Antenna Factor + Cable Loss

#### 11.4.2 Measurement results: frequency above 1GHz

EUT : GateOne 240G  
Test Mode : Tx at channel 1, 6, 11or Turbo mode

##### Test Result:

No spurious emission was found above the spectrum analyzer's noise floor.

##### For PK:

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

##### For AV:

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



## 12. Power Spectrum Density test

### 12.1 Operating environment

Temperature: 26 °C  
 Relative Humidity: 50 %  
 Atmospheric Pressure 1023 hPa

### 12.2 Test setup & procedure

The power spectrum density per FCC §15.247(d) 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 1.5 MHz, and the sweep time set at 500 seconds. Power Density was read directly and cable loss (0dB)/external attenuator (dB) 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.

### 12.3 Measured data of Power Spectrum Density test results

Test Mode: 802.11g OFDM Modulation mode

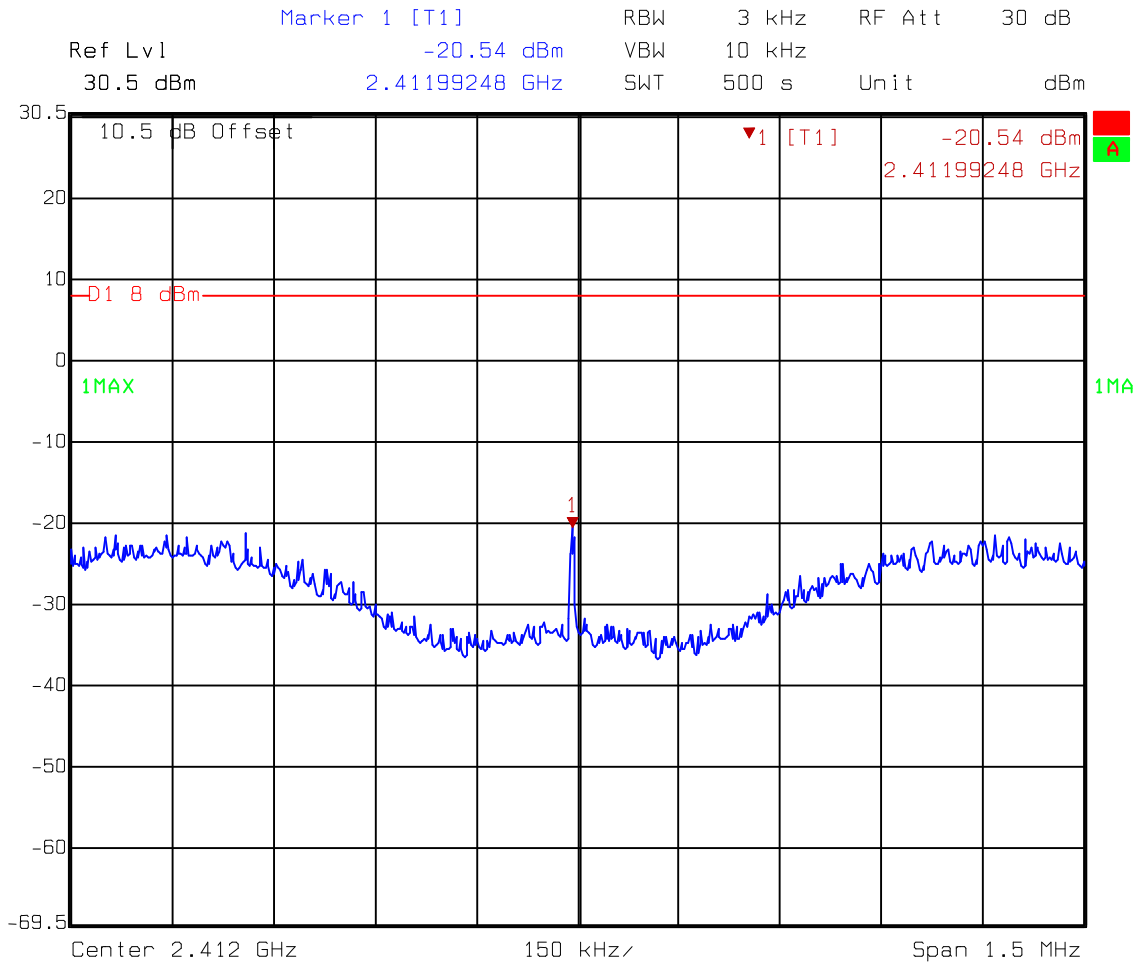
Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
1	2411.99	-20.54	8
6	2436.99	-14.54	8
11	2461.51	-20.91	8

Test Mode: 802.11g Turbo mode

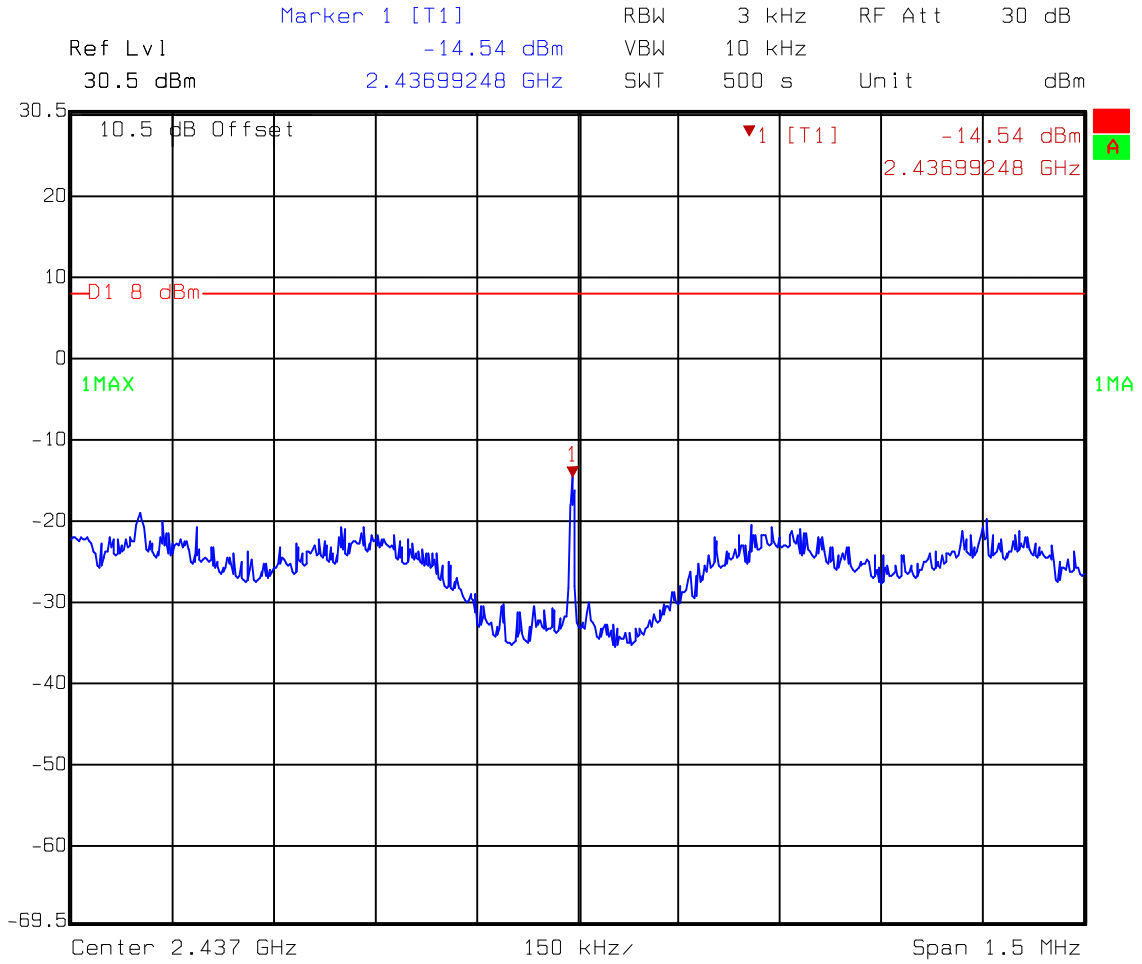
Channel	Frequency (MHz)	Measured level (dBm)	Limit (dBm)
6	2436.99	-12.17	8

Please see the plot below.

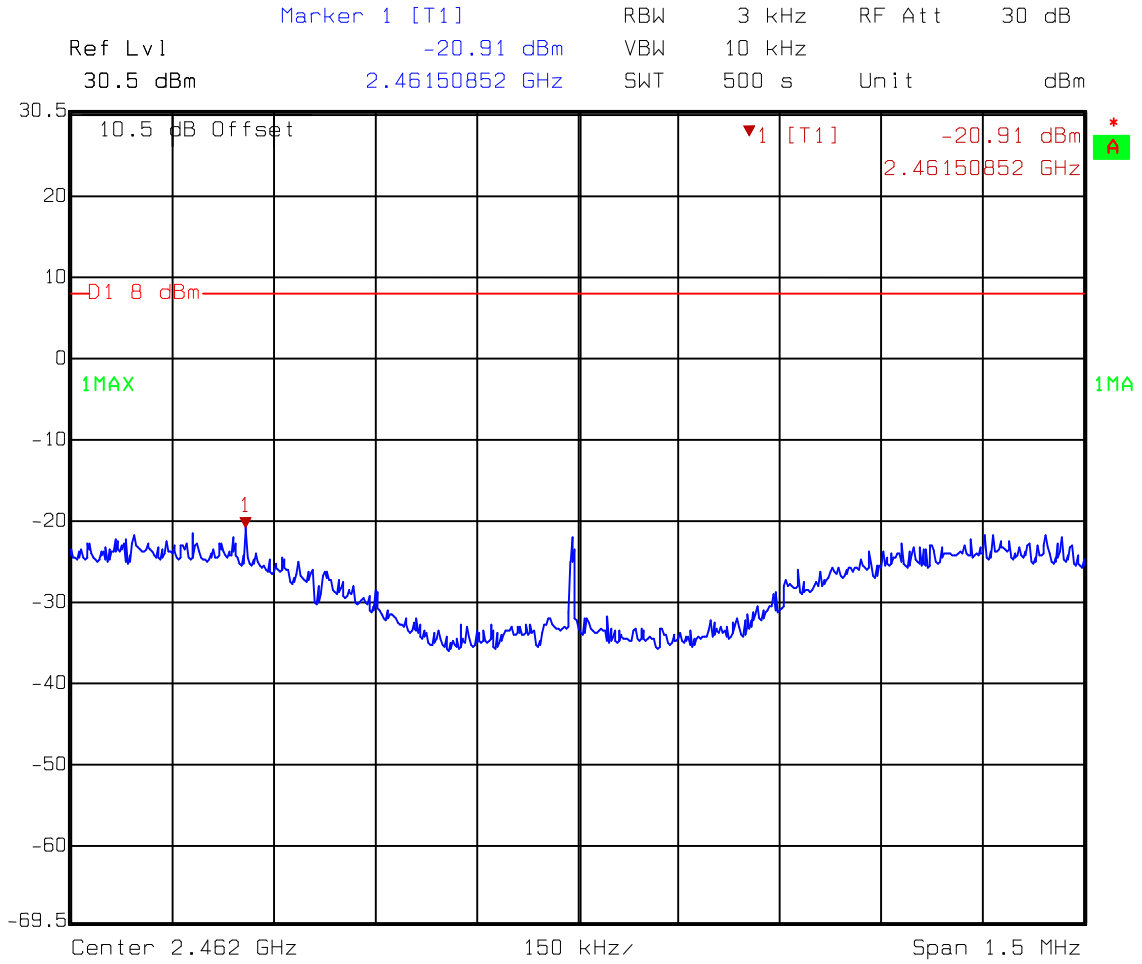
## Test Mode: 802.11g OFDM Modulation Normal mode



Comment A: Power spectrum density at low channel (EC365)  
Date: 24.JUN.2004 09:34:45

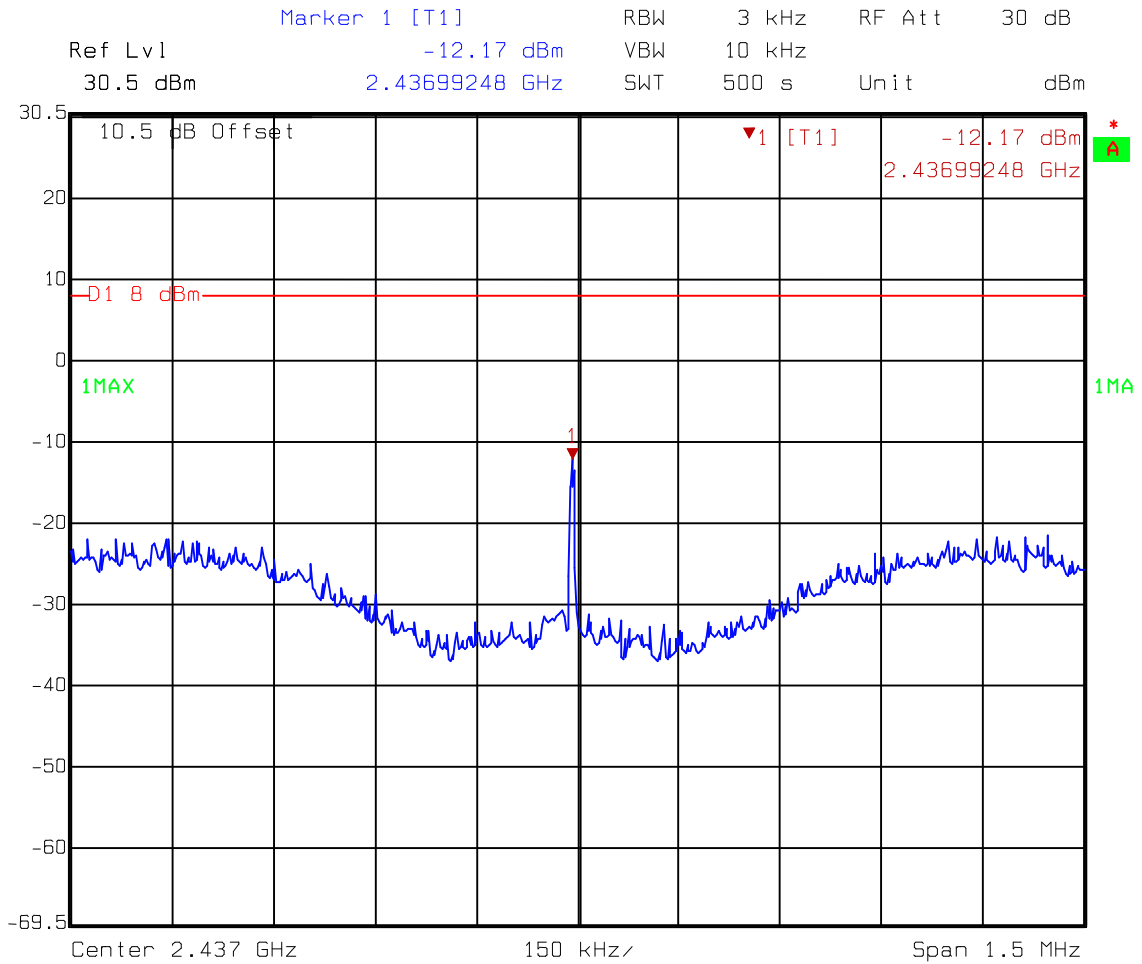


Comment A: Power spectrum density at middle channel (EC365)  
Date: 24.JUN.2004 09:32:03



Comment A: Power spectrum density at high channel (EC365)  
Date: 24.JUN.2004 09:35:45

## Test Mode: 802.11g OFDM Modulation Turbo mode



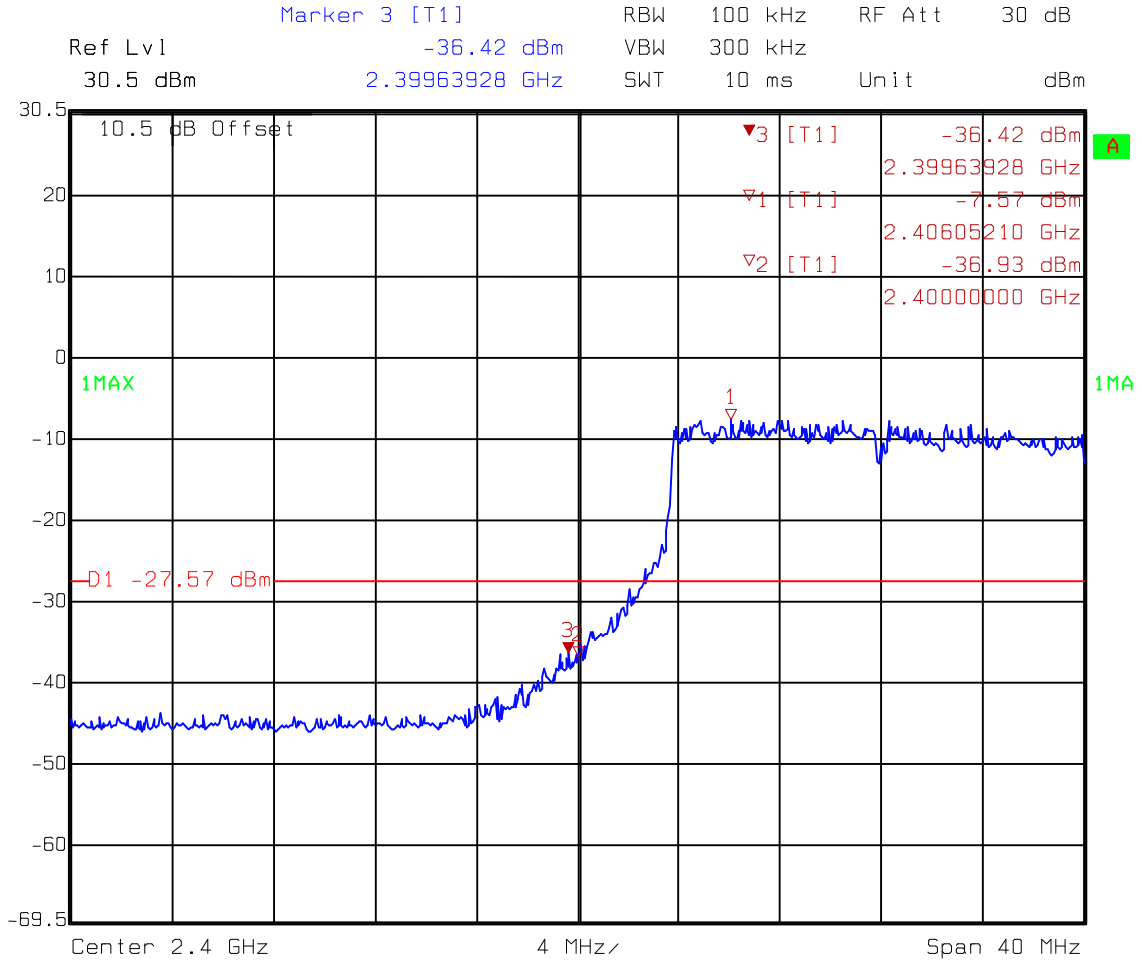
Comment A: Power spectrum density at middle channel (EC365) Turbo  
 Date: 24.JUN.2004 09:32:47

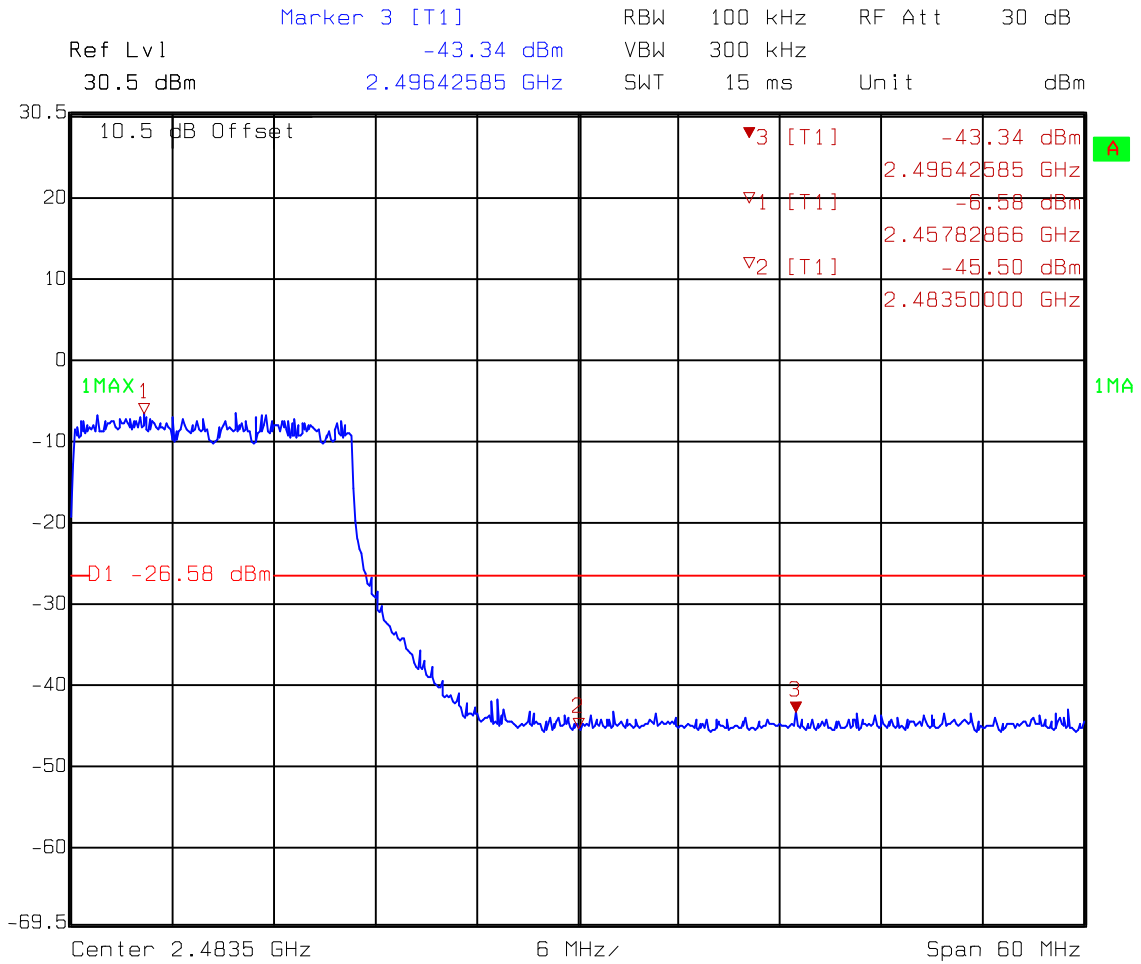
### **13. Emission on the band edge §FCC 15.247(C)**

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.

Please see the plot below.

### 13.1 Band-edge (Conducted method)





Comment A: Band-edge at high channel (EC365)

Date: 24.JUN.2004 09:24:38