



FCC 47 CFR PART 15 SUBPART E

TEST REPORT

For

Tablet PC built in 5GHz Wireless LAN module

Model: ZE1, TravelMate C200

Trade Name: acer

Issued to

Acer Inc.

**8F, 88, Sec.1, Hsin Tai Wu Rd., Hsichih,
Taipei Hsien 221,
Taiwan, R.O.C.**

Issued by

**Compliance Certification Services Inc.
No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang,
Taoyuan Hsien, (338) Taiwan, R.O.C.**

TEL: 886-3-324-0332

FAX: 886-3-324-5235



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TABLE OF CONTENTS

- 1. TEST RESULT CERTIFICATION..... 3**
- 2. EUT DESCRIPTION 4**
- 3. TEST METHODOLOGY 5**
 - 3.1 EUT CONFIGURATION 5
 - 3.2 EUT EXERCISE 5
 - 3.3 GENERAL TEST PROCEDURES..... 5
 - 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS..... 6
 - 3.5 DESCRIPTION OF TEST MODES..... 6
- 4. INSTRUMENT CALIBRATION..... 7**
 - 4.1 MEASUREMENT EQUIPMENT USED 7
- 5. FACILITIES AND ACCREDITATIONS 8**
 - 5.1 FACILITIES 8
 - 5.2 EQUIPMENT 8
 - 5.3 LABORATORY ACCREDITATIONS AND LISTING..... 8
 - 5.4 TABLE OF ACCREDITATIONS AND LISTINGS 9
- 6. SETUP OF EQUIPMENT UNDER TEST 10**
 - 6.1 SETUP CONFIGURATION OF EUT 10
 - 6.2 SUPPORT EQUIPMENT 10
- 7. FCC PART 15 REQUIREMENTS..... 11**
 - 7.1 26 DB EMISSION BANDWIDTH..... 11
 - 7.2 PEAK POWER 14
 - 7.3 BAND EDGES MEASUREMENT..... 18
 - 7.4 PEAK POWER SPECTRAL DENSITY 23
 - 7.5 PEAK EXCURSION 26
 - 7.6 RADIATED UNDESIRABLE EMISSION 29
 - 7.7 CONDUCTED UNDESIRABLE EMISSION 35
 - 7.8 POWERLINE CONDUCTED EMISSIONS 38
 - 7.9 TRANSMISSION IN ABSENCE OF DATA 41
 - 7.10 FREQUENCY STABILITY 41
- APPENDIX I PHOTOGRAPHS OF TEST SETUP 42**
- APPENDIX II RADIO FREQUENCY EXPOSURE..... 45**



1. TEST RESULT CERTIFICATION

Applicant: Acer Inc.
 8F, 88, Sec.1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221,
 Taiwan, R.O.C.

Equipment Under Test: Tablet PC built in 5GHz Wireless LAN module

Trade Name: acer

Model: ZE1, TravelMate C200

Date of Test: September 15 ~ October 4, 2005

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart E	No non-compliance noted

We hereby certify that:

Compliance Certification Services Inc. tested the above equipment. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.407.

The test results of this report relate only to the tested sample identified in this report.

Approved by:

Reviewed by:

 Gavin Lim
 Section Manager
 Compliance Certification Services Inc.

 Amanda Wu
 Section Manager
 Compliance Certification Services Inc.



2. EUT DESCRIPTION

Product	Tablet PC built in 5GHz Wireless LAN module
Trade Name	acer
Model Number	ZE1, TravelMate C200
Model Discrepancy	All the above models are identical except the model designation.
Power Supply	Model Number: PA-1650-02 I/P: AC 100-240V, 1.6A, 50-60Hz O/P: DC 19V, 3.42A, 65W
Frequency Range	5.15~5.35 GHz
Transmit Power	15.74 dBm
Modulation Technique	OFDM (QPSK, BPSK, 16-QAM, 64-QAM)
Transmit Data Rate	54, 48, 36, 24, 18, 12, 9, 6 Mbps
Number of Channels	8 Channels
Antenna Specification	Antenna Type: PIFA Antenna Antenna Gain: 1.91 dBi

Operation Frequency:

UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII)	
CHANNEL	MHz
1	5180
2	5200
3	5220
4	5240
5	5260
6	5280
7	5300
8	5320

Remark:

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: HLZZE1ABG, filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.



3. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4. Radiated testing was performed at an antenna to EUT distance 3 meters.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed for RF field strength measurement to meet the Commissions requirement, and is operated in a manner intended to generate the maximum emission in a continuous normal application.

3.2 EUT EXERCISE

The EUT is operated in the engineering mode to fix the Tx frequency for the purposes of measurement.

According to its specifications, the EUT must comply with the requirements of Section 15.407 under the FCC Rules Part 15 Subpart E.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is positioned at 0.8 m above the ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4, the conducted emission from the EUT is measured in the frequency range between 0.15 MHz and 30MHz, using the CISPR Quasi-Peak detector mode.

Radiated Emissions

The EUT is placed on the turntable, which is 0.8 m above the ground plane. The turntable is then rotated for 360 degrees to determine the proper orientation for the maximum emission level. The EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission level. And, each emission is to be maximized by changing the horizontal and vertical polarization of the receiving antenna. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.



3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	(²)
13.36 - 13.41	322 - 335.4		

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

3.5 DESCRIPTION OF TEST MODES

The EUT (model: ZE1) had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

Channel Low (5180MHz), Channel Mid (5260MHz) and Channel High (5320MHz) with 6Mbps data rate were chosen for full testing.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis) and laptop mode. The worst emission was found in laptop position and the worst case was recorded.



4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.1 MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: Each piece of equipment is scheduled for calibration once a year.

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2006

Open Area Test Site # 3				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESVS20	838804/004	01/08/2006
Spectrum Analyzer	R&S	FSP30	100112	09/23/2006
Spectrum Analyzer	Agilent	E4446A	MY43360131	01/10/2006
Pre-Amplifier	MITEC	AFS42-00102650	924206	N.C.R.
Pre-Amplifier	MITEC	AMF-6F-260400	945377	N.C.R.
Bilog Antenna	SCHWAZBECK	VULB9163	145	07/05/2006
Horn Antenna	EMCO	3115	00022250	04/18/2006
Horn Antenna	EMCO	3116	2487	12/08/2005
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R.
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R.
Controller	EMCO	2090	9709-1256	N.C.R.
RF Switch	ANRITSU	MP59B	M53867	N.C.R.
Site NSA	C&C	N/A	N/A	09/06/2006

Remark: The measurement uncertainty is less than +/- 2.16dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI TEST RECEIVER 9kHz-30MHz	ROHDE & SCHWARZ	ESHS30	828144/003	09/24/2006
TWO-LINE V-NETWORK 9kHz-30MHz	SCHAFFNER	NNB41	03/10013	06/11/2006
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	02/17/2006
Test S/W	LABVIEW (V 6.1)			

Remark: The measurement uncertainty is less than +/- 2.81dB, which is evaluated as per the NAMAS NIS 81 and CISPR/A/291/CDV.



5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No. 81-1, Lane 210, Bade Rd. 2, Luchu Hsiang, Taoyuan Hsien, Taiwan, R.O.C.

No. 199, Chungsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.








Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

5.3 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200600-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (Registration no: 93105 and 90471).

5.4 TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	EN 55011, EN 55014-1, AS/NZS 1044, CNS 13783-1, EN 55022, CNS 13438, EN 61000-3-2, EN 61000-3-3, ANSI C63.4, FCC OST/MP-5, AS/NZS CISPR 22, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11	 200600-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 93105, 90471
Japan	VCCI	4 3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 R-393/1066/725/879 C-402/747/912
Norway	NEMKO	EN 50081-1/2, EN 50082-1/2, IEC 61000-6-1/2, EN 50091-2, EN 50130-4, EN 55011, EN 55013, EN 55014-1/2, EN 55015, EN 55022, EN 55024, EN 61000-3-2/3, EN 61326-1, IEC 61000-4-2/3/4/5/6/8/11, EN 60601-1-2, EN 300 328-2, EN 300 422-2, EN 301 419-1, EN 301 489-01/03/07/08/09/17, EN 301 419-2/3, EN 300 454-2, EN 301 357-2	 ELA 124a ELA 124b ELA 124c
Taiwan	CNLA	EN 300 328-1/2, EN 300 220-1/2/3, EN 300 440-1/2, EN 61000-3-2, EN 61000-3-3, 47 CFR FCC Part 15 Subpart C/D/E, EN 55013, CNS 13439, EN 55014-1, CNS 13783-1, EN 55022, CNS 13438, CISPR 22, AS/NZS 3548, EN 61000-4-2/3/4/5/6/8/11, ENV 50204, IEEE Std 1528, FCC OET Bulletin, 65+Supplement C, EN50360, EN50361, EN50371, RSS102	 0363 ILAC MRA
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS 13439, CNS 14115	 SL2-IS-E-0014 SL2-IN-E-0014 SL2-A1-E-0014 SL2-R1-E-0014 SL2-R2-E-0014 SL2-L1-E-0014
Canada	Industry Canada	RSS212, Issue 1	 IC 3991-3 IC 3991-4

* No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

* Australia: MRA of NVLAP AS/NZS 4771 &AS/NZS 4268.



6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Wireless Router (remote)	PLANEX	BLW-045AG	40DDA0421	N/A	N/A	Unshielded, 1.8m

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

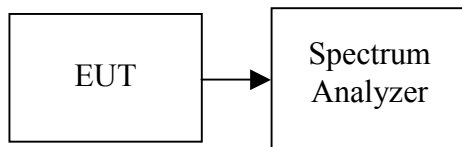
7. FCC PART 15 REQUIREMENTS

7.1 26 dB EMISSION BANDWIDTH

LIMIT

For purposes of this subpart, the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

Test Configuration



TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low-loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW > 1%EBW, VBW > RBW, Span >26dB bandwidth (Base Mode) / >26dB bandwidth (Turbo Mode), and Sweep = auto.
4. Mark the peak frequency and -26dB (upper and lower) frequency.
5. Repeat until all the rest channels were investigated.

TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Bandwidth (B) (MHz)
Low	5180	22.317
Mid	5260	23.453
High	5320	22.804



Test Plot

CH Low

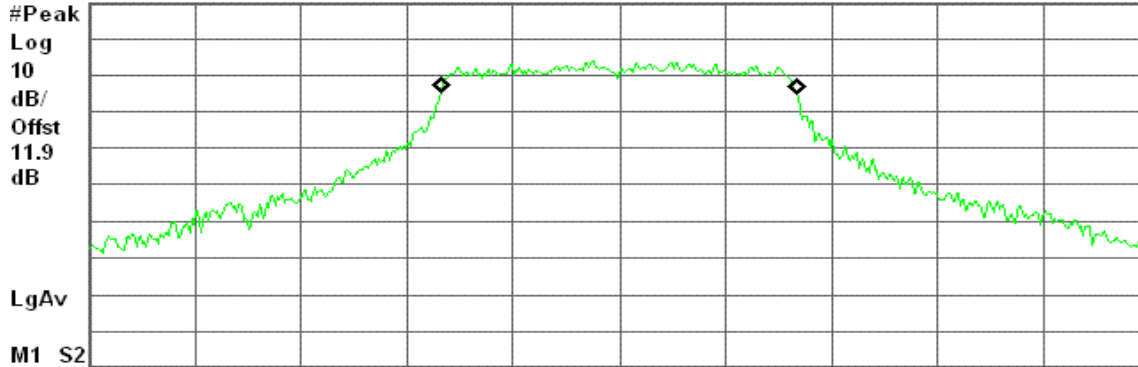
Agilent 22:43:54 Sep 27, 2005

R L

26 dB BW, a Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 5.180 00 GHz

Span 50 MHz

#Res BW 220 kHz

#VBW 680 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.6592 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -19.315 kHz
x dB Bandwidth 22.317 MHz

CH Mid

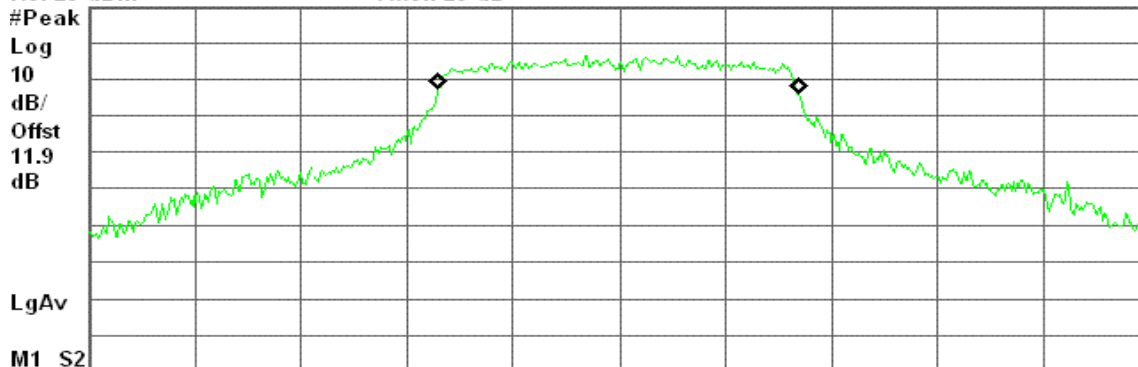
Agilent 22:59:36 Sep 27, 2005

R L

26 dB BW, a Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 5.260 00 GHz

Span 50 MHz

#Res BW 270 kHz

#VBW 750 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.8376 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -43.361 kHz
x dB Bandwidth 23.453 MHz



CH High

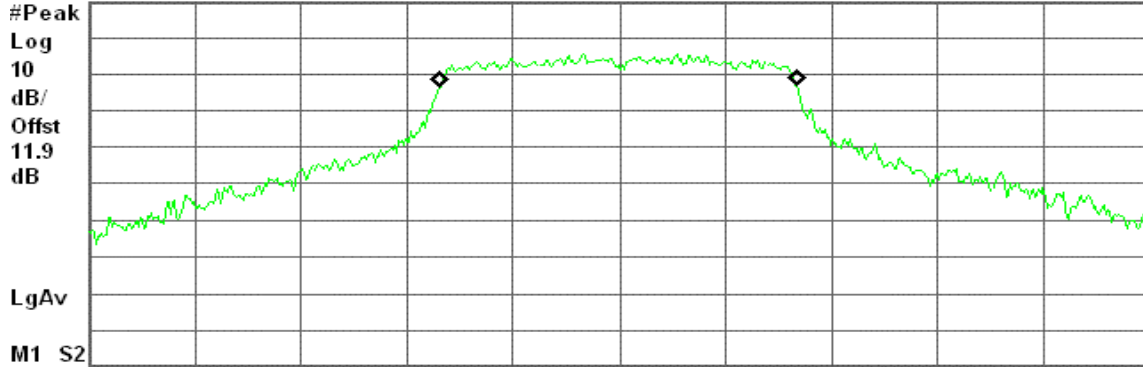
Agilent 23:08:40 Sep 27, 2005

R L

26 dB BW, a Mode High Ch.

Ref 20 dBm

Atten 20 dB



Center 5.320 00 GHz

Span 50 MHz

#Res BW 240 kHz

#VBW 750 kHz

Sweep 1 ms (601 pts)

Occupied Bandwidth
16.7356 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -31.396 kHz
x dB Bandwidth 22.804 MHz



7.2 PEAK POWER

LIMIT

- For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50mW (17dBm) or $4\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4dBm in any 1 MHz band.
- For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250mW (24dBm) or $11\text{dBm} + 10\log B$, where B is the 26dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11dBm in any 1 MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. The peak power shall not exceeded the limit as follows:

Specified Limit of the Peak Power

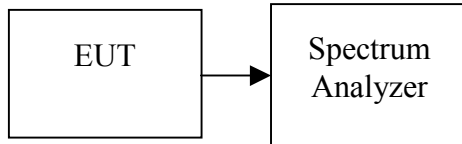
Channel	Frequency (MHz)	26 dB Bandwidth (B) (MHz)	10 Log B (dB)	4 + 10 Log B or 11 + 10 Log B (dBm)	Power Limit (dBm)
Low	5180	22.317	13.486	17.486	17
Mid	5260	23.453	13.70	24.70	24
High	5320	22.804	13.58	24.58	24

(Remark: Maximum antenna gain = 1.91dBi, therefore there is no reduction due to antenna gain.)



Test Configuration

The EUT was connected to a spectrum analyzer through a 50 Ω RF cable.



TEST PROCEDURE

Set span to encompass the entire emission bandwidth (EBW) of the signal.

Set RBW = 1 MHz / Set VBW = 3 MHz.

Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”. Trace average 100 traces in power averaging mode. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Result
Low	5180	14.06	17	PASS
Mid	5260	15.74	24	PASS
High	5320	15.01	24	PASS



Test Plot

CH Low

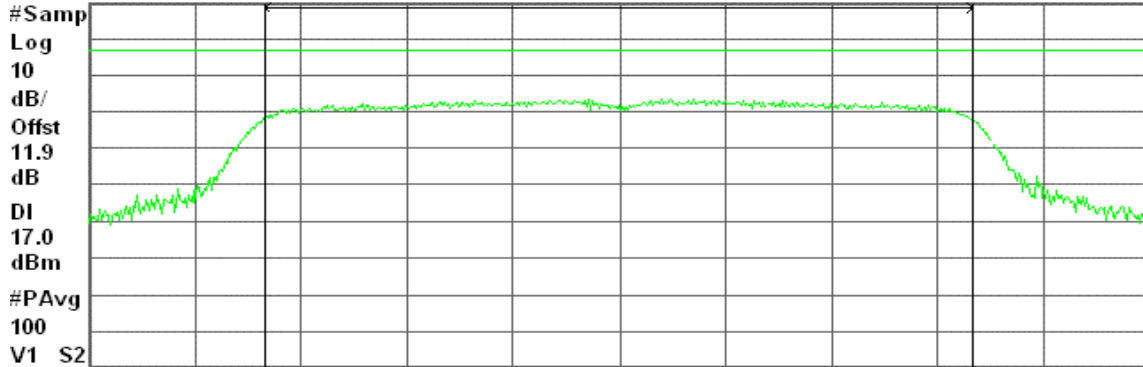
Agilent 22:44:34 Sep 27, 2005

R L

Peak Transmit Power, a Mode Low Ch.

Ref 30 dBm

Atten 30 dB



Center 5.180 00 GHz

Span 24.84 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.06 dBm / 16.5600 MHz

-58.13 dBm/Hz

CH Mid

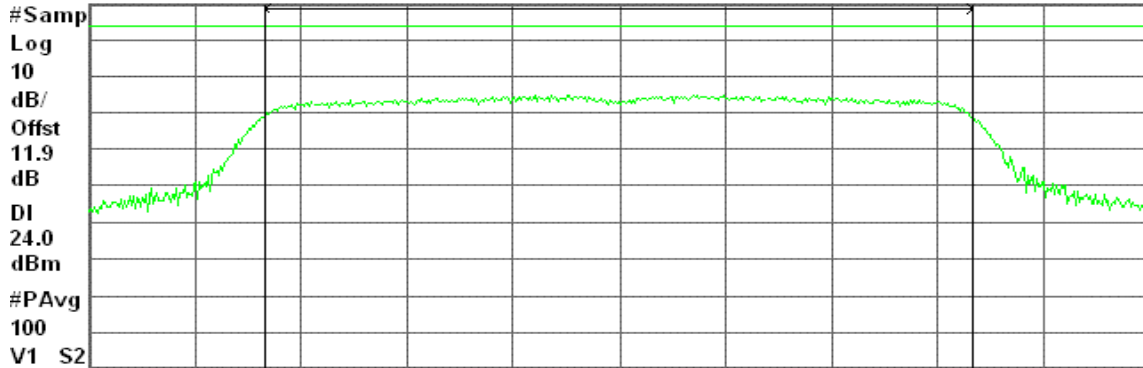
Agilent 23:01:25 Sep 27, 2005

R L

Peak Transmit Power, a Mode Mid Ch.

Ref 30 dBm

Atten 30 dB



Center 5.260 00 GHz

Span 24.98 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

15.74 dBm / 16.6500 MHz

-56.48 dBm/Hz



CH High

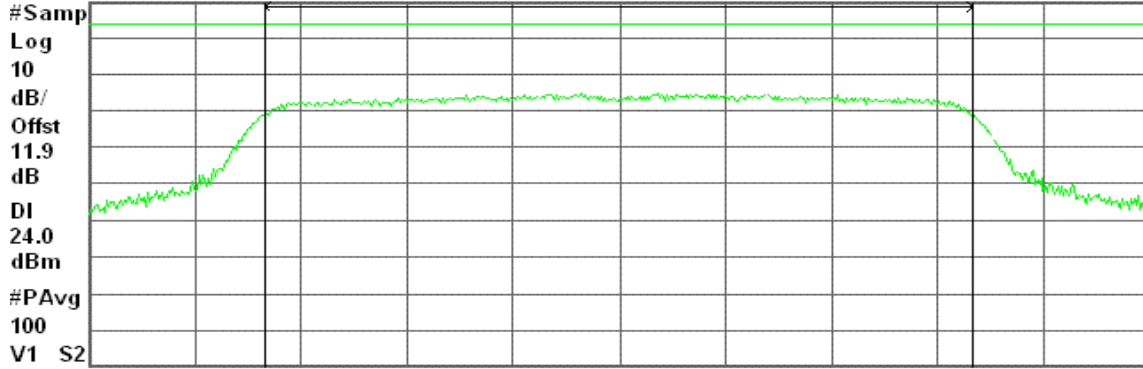
Agilent 23:09:44 Sep 27, 2005

R L

Peak Transmit Power, a Mode High Ch.

Ref 30 dBm

Atten 30 dB



Center 5.320 00 GHz

Span 24.96 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

15.01 dBm / 16.6400 MHz

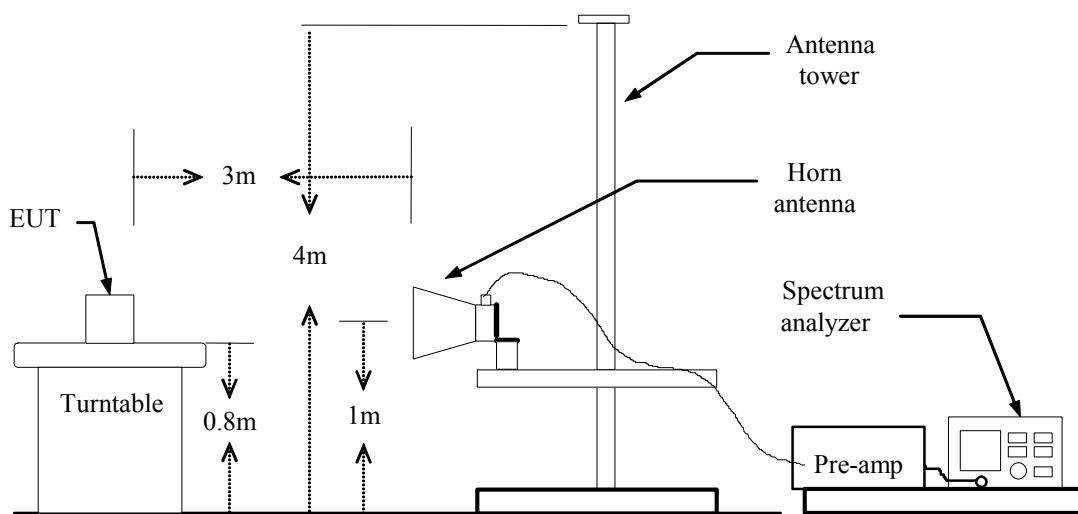
-57.21 dBm/Hz

7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.407(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. 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).

Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
 - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
 - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

TEST RESULTS

Refer to attach spectrum analyzer data chart.



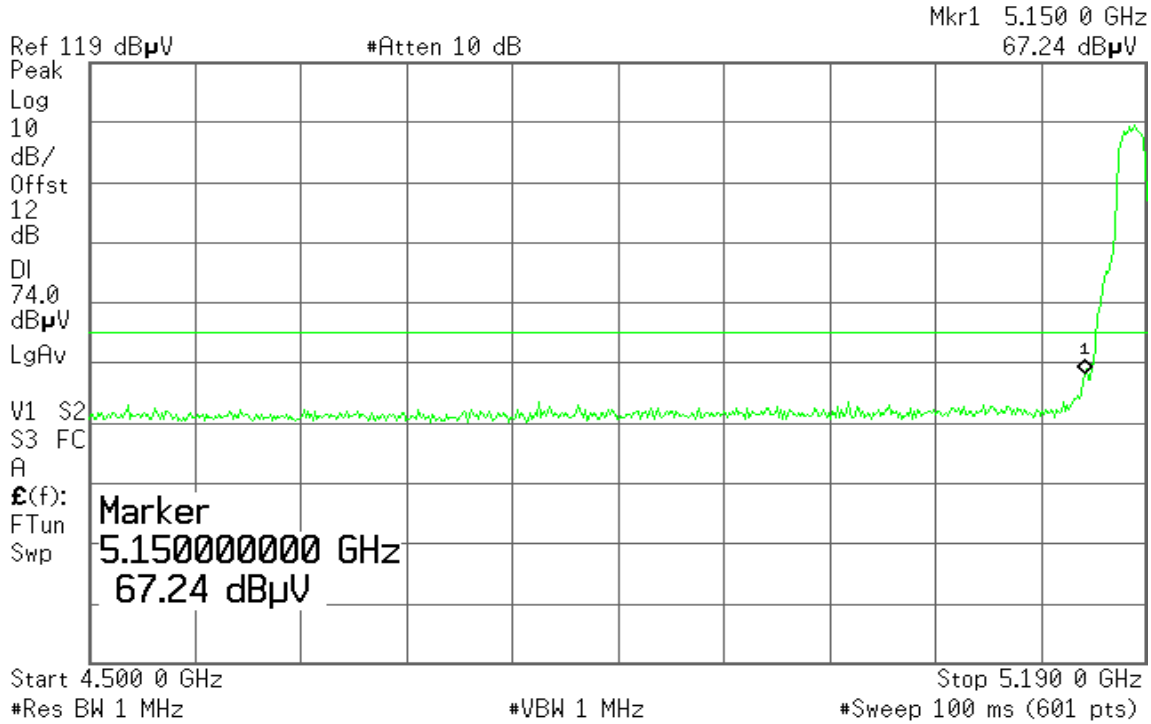
Band Edges (CH Low)

Detector mode: Peak

Polarity: Vertical

Agilent 17:29:54 Sep 15, 2005

T

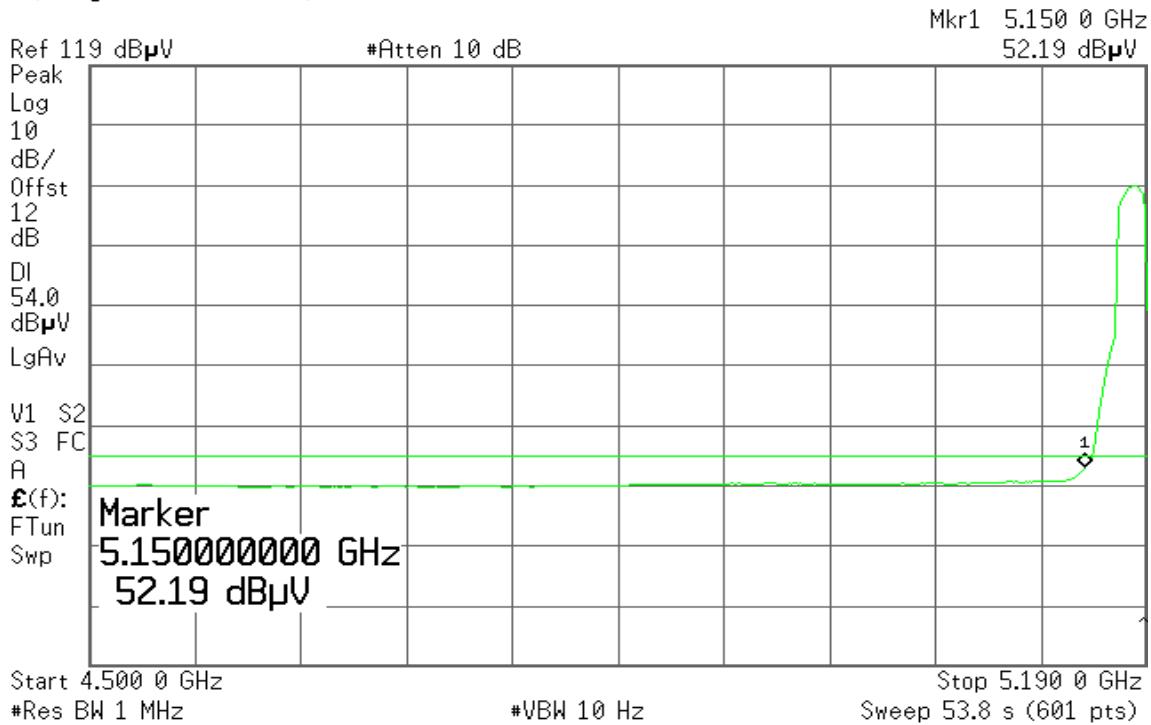


Detector mode: Average

Polarity: Vertical

Agilent 17:28:39 Sep 15, 2005

T



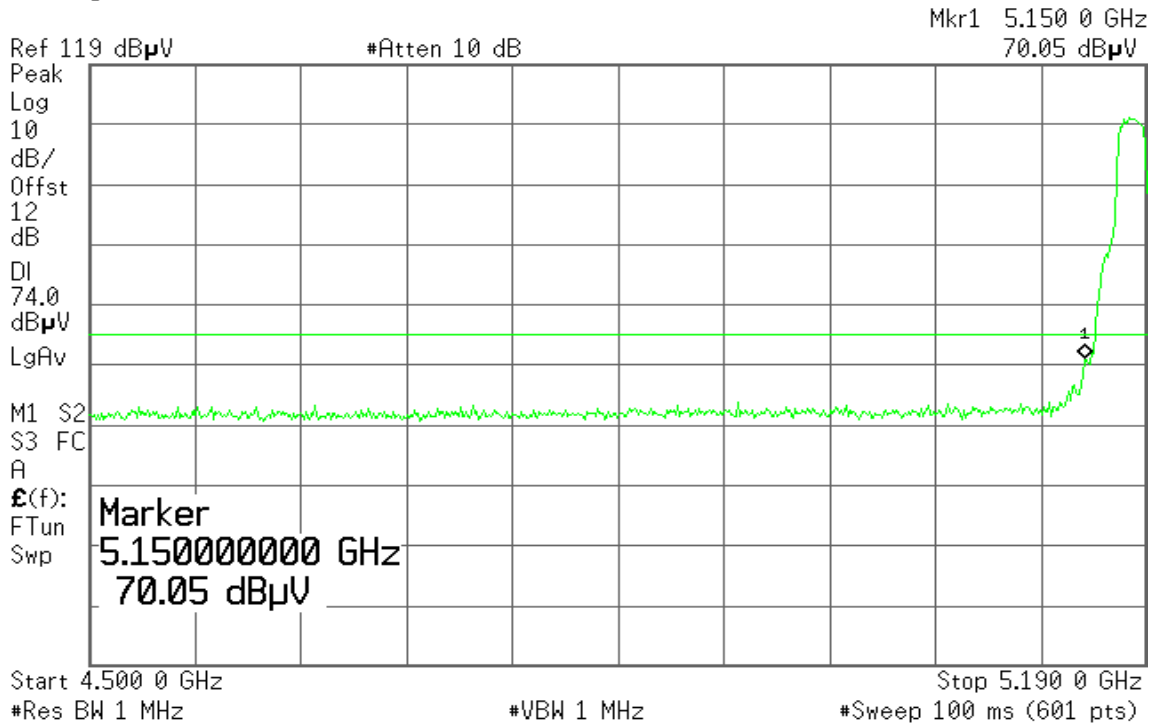


Detector mode: Peak

Polarity: Horizontal

Agilent 17:23:35 Sep 15, 2005

T

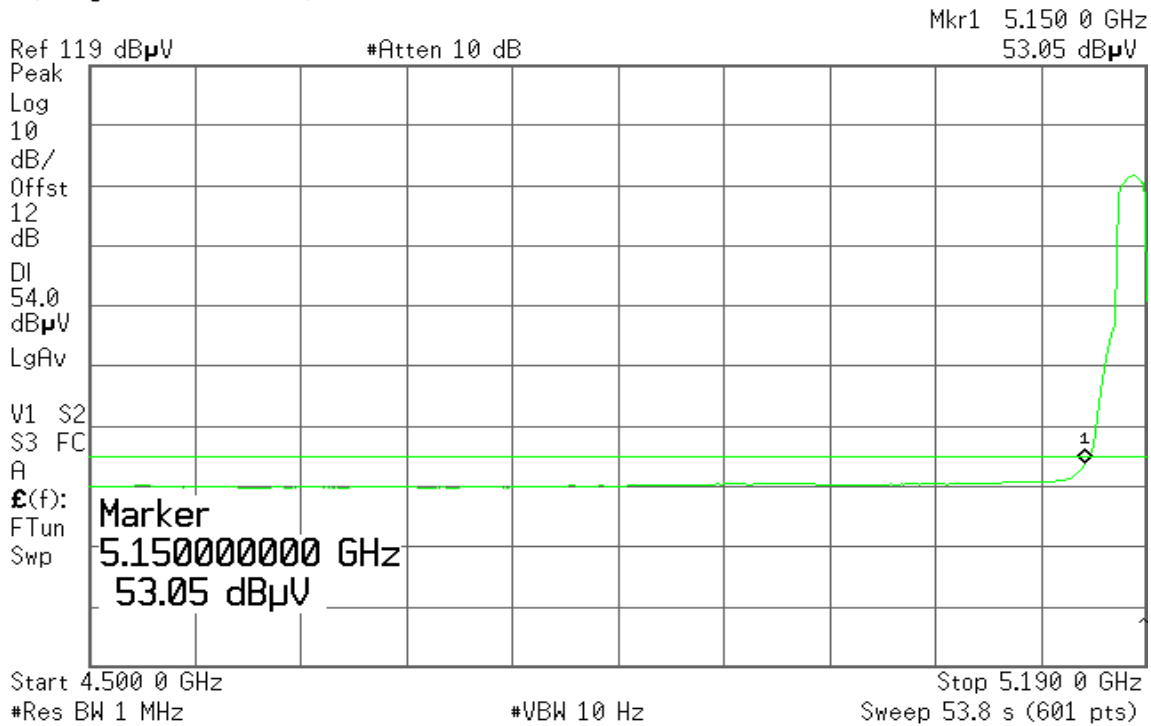


Detector mode: Average

Polarity: Horizontal

Agilent 17:22:21 Sep 15, 2005

T





Band Edges (CH High)

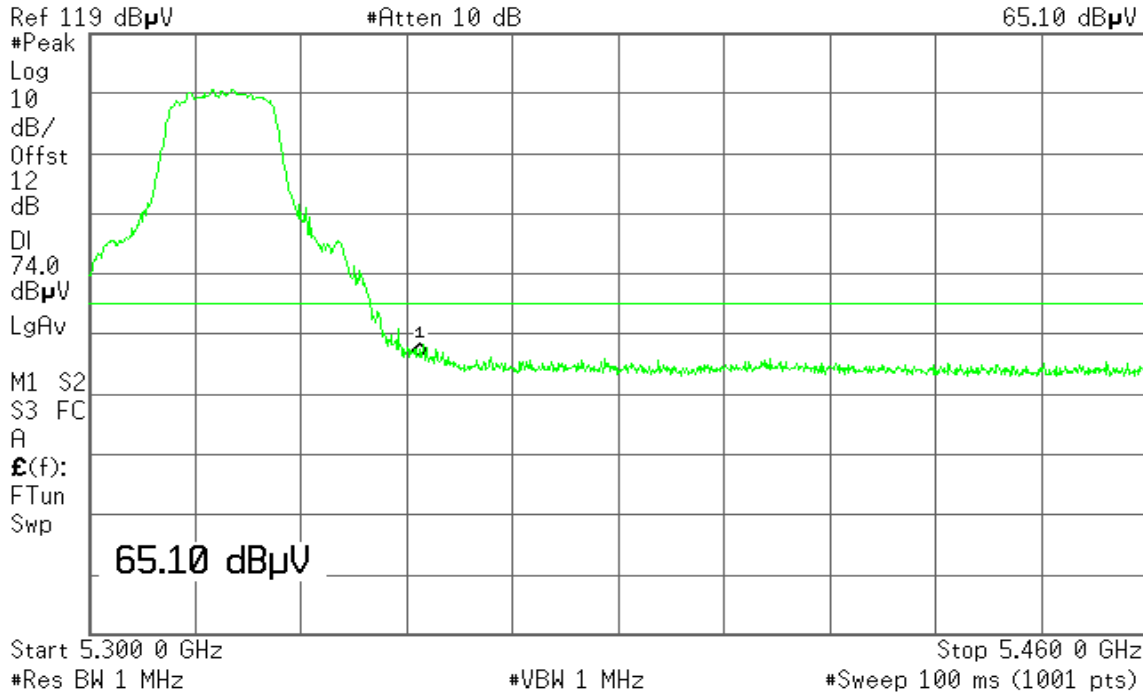
Detector mode: Peak

Polarity: Vertical

Agilent 15:14:02 Sep 19, 2005

T

Mkr1 5.350 0 GHz
65.10 dBµV



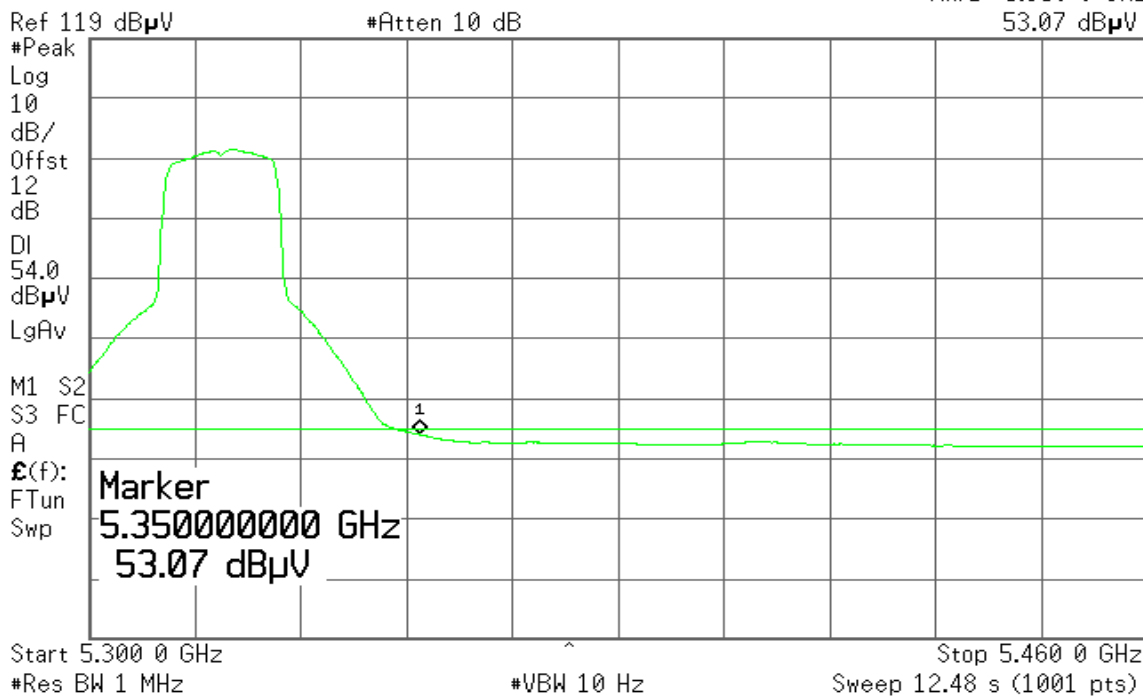
Detector mode: Average

Polarity: Vertical

Agilent 15:13:14 Sep 19, 2005

R L

Mkr1 5.350 0 GHz
53.07 dBµV





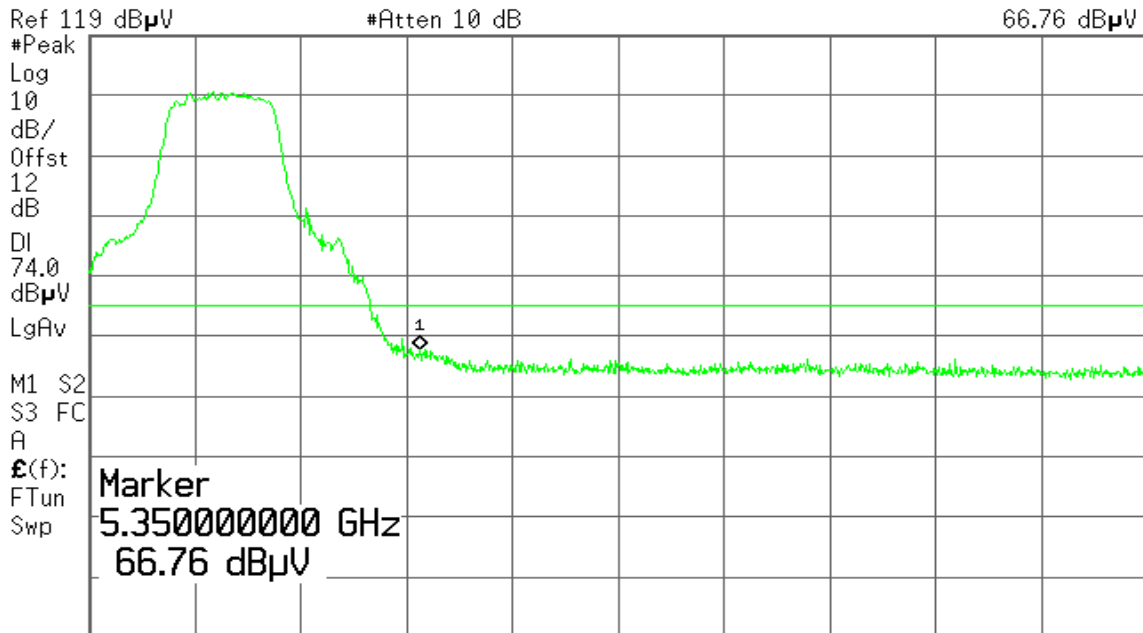
Detector mode: Peak

Polarity: Horizontal

Agilent 15:06:48 Sep 19, 2005

T

Mkr1 5.350 0 GHz
66.76 dBµV



Start 5.300 0 GHz #Res BW 1 MHz #VBW 1 MHz Stop 5.460 0 GHz #Sweep 100 ms (1001 pts)

Detector mode: Average

Polarity: Horizontal

Agilent 15:05:54 Sep 19, 2005

T

Mkr1 5.350 0 GHz
53.13 dBµV



Start 5.300 0 GHz #Res BW 1 MHz #VBW 10 Hz Stop 5.460 0 GHz Sweep 12.48 s (1001 pts)



7.4 PEAK POWER SPECTRAL DENSITY

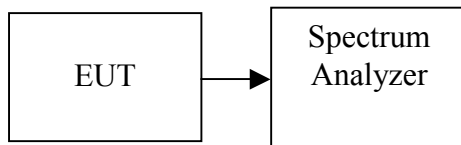
LIMIT

- For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4dBm in any 1MHz band.
- For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11dBm in any 1MHz band.

If transmitting antennas of directional gain greater than 6dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test Configuration

TEST PROCEDURE



1. Place the EUT on the table and set it in transmitting mode.
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 1MHz, VBW = 3MHz, Span = 50MHz, Sweep=1ms
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed

TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)	Result
Low	5180	3.626	4	-0.374	PASS
Mid	5260	6.645	11	-4.355	PASS
High	5320	4.783	11	-6.217	PASS



Test Plot

CH Low

Agilent 22:44:51 Sep 27, 2005

R L

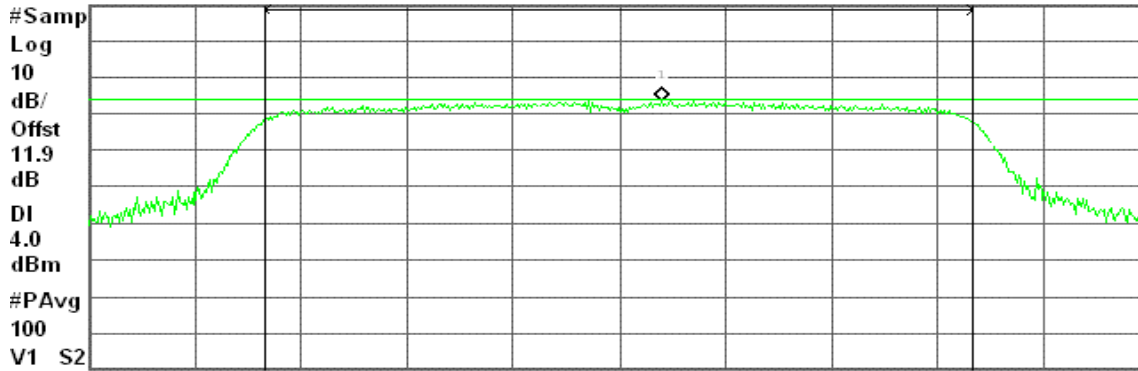
Peak Power Spectral Density, a Mode Low Ch.

Mkr1 5.180 99 GHz

Ref 30 dBm

Atten 30 dB

3.626 dBm



Center 5.180 00 GHz

Span 24.84 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

13.98 dBm / 16.5600 MHz

-58.21 dBm/Hz

CH Mid

Agilent 12:04:11 Sep 30, 2005

R T

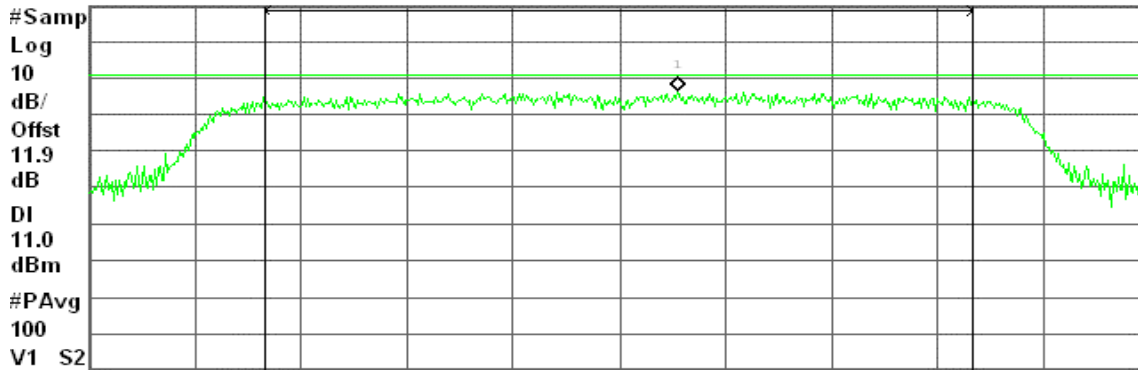
Peak Power Spectral Density, a Mode Mid Ch.

Mkr1 5.261 21 GHz

Ref 30 dBm

Atten 30 dB

6.645 dBm



Center 5.260 00 GHz

Span 21.98 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

15.45 dBm / 14.6500 MHz

-56.21 dBm/Hz



CH High

Agilent 23:10:17 Sep 27, 2005

R L

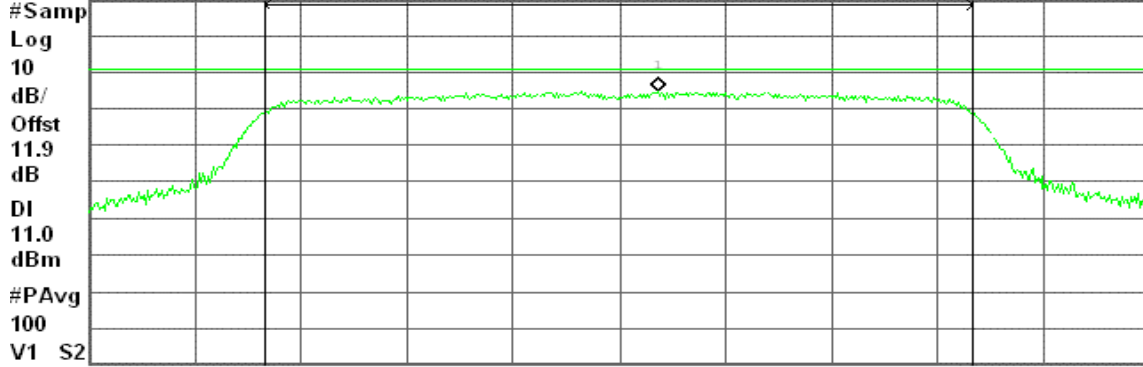
Peak Power Spectral Density, a Mode High Ch.

Mkr1 5.320 92 GHz

Ref 30 dBm

Atten 30 dB

4.783 dBm



Center 5.320 00 GHz

Span 24.96 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

14.94 dBm / 16.6400 MHz

-57.27 dBm/Hz

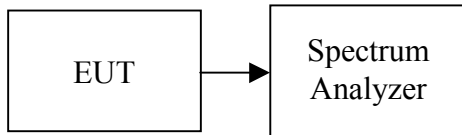


7.5 PEAK EXCURSION

LIMIT

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

Test Configuration



TEST PROCEDURE

The test is performed in accordance with <FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices> – Part 15, Subpart E, August 2002.

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
3. Trace A, Set RBW = 1MHz, VBW = 1MHz, Span >26dB bandwidth (Base Mode) / >26dB bandwidth (Turbo Mode), Max. hold.
4. Trace B, Set RBW = 1MHz, VBW = 30kHz, Span >26dB bandwidth (Base Mode) / >26dB bandwidth (Turbo Mode), Max. hold.
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat the above procedure until measurements for all frequencies were complete.

TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)	Result
Low	5180	10.00	13	-3.00	PASS
Mid	5260	9.66	13	-3.34	PASS
High	5320	10.04	13	-2.96	PASS

(Remark: Maximum antenna gain = 1.94dBi, therefore there is no reduction due to antenna gain.)



Test Plot

CH Low

Agilent 22:51:03 Sep 27, 2005

R L

Peak Excursion, a Mode Low Ch.

Δ Mkr1 -840 kHz

Ref 30 dBm

Atten 30 dB

10.00 dB

#Peak

Log

10

dB/

Offst

11.9

dB

#PAvg

V1 V2

Center 5.180 00 GHz

Span 24.84 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

18.25 dBm / 16.5600 MHz

-53.94 dBm/Hz

CH Mid

Agilent 23:04:27 Sep 27, 2005

R T

Peak Excursion, a Mode Mid Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

9.66 dB

#Peak

Log

10

dB/

Offst

11.9

dB

#PAvg

V1 V2

Center 5.260 00 GHz

Span 24.98 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

21.78 dBm / 16.6500 MHz

-50.43 dBm/Hz



CH High

Agilent 23:10:51 Sep 27, 2005

R L

Peak Excursion, a Mode High Ch.

Δ Mkr1 0 Hz

Ref 30 dBm

Atten 30 dB

10.04 dB

#Peak

Log

10

dB/

Offst

11.9

dB

#PAvg

V1 V2

Center 5.320 00 GHz

Span 24.96 MHz

#Res BW 1 MHz

#VBW 3 MHz

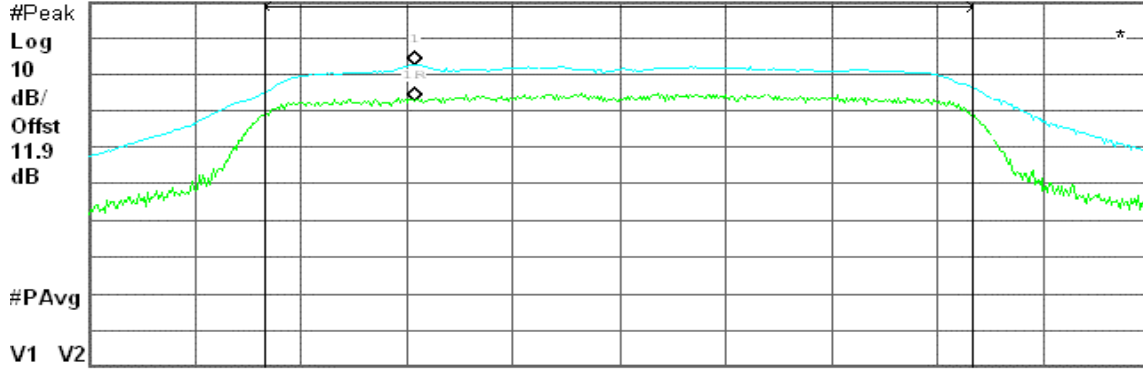
Sweep 20 ms (601 pts)

Channel Power

Power Spectral Density

21.54 dBm / 16.6400 MHz

-50.67 dBm/Hz



7.6 RADIATED UNDESIRABLE EMISSION

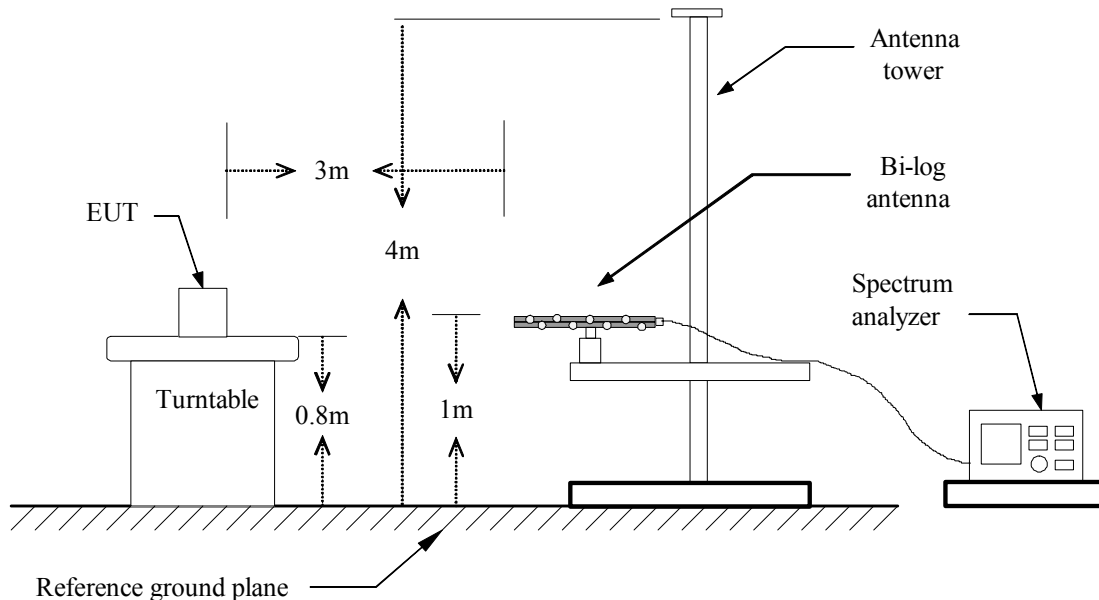
LIMIT

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

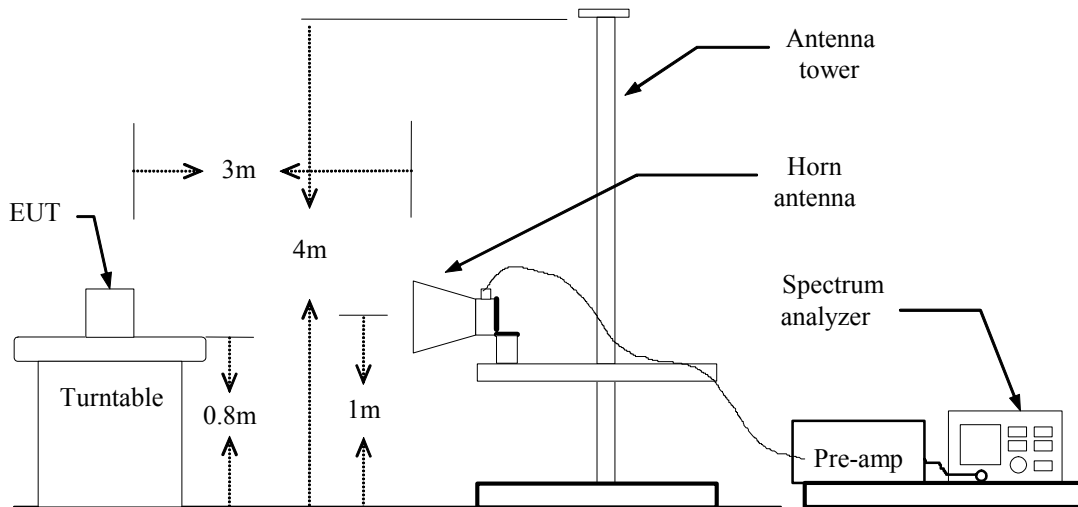
The provisions of §15.205 apply to intentional radiators operating under this section. The EUT is set to transmit in a continuous mode.

Test Configuration

Below 1 GHz



Above 1 GHz



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.



TEST RESULTS

Below 1 GHz

Operation Mode: Normal Link

Test Date: September 6, 2005

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 55% RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. (H/V)	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
47.69	V	Peak	15.20	12.90	28.10	40.00	-11.90
250.05	V	Peak	18.80	14.90	33.70	46.00	-12.30
280.50	V	Peak	17.60	14.70	32.30	46.00	-13.70
330.00	V	Peak	14.20	16.10	30.30	46.00	-15.70
500.10	V	Peak	13.50	21.20	34.70	46.00	-11.30
560.00	V	Peak	12.50	22.20	34.70	46.00	-11.30
48.00	H	Peak	19.20	12.90	32.10	40.00	-7.90
200.10	H	Peak	17.70	11.70	29.40	43.50	-14.10
250.05	H	Peak	17.60	14.90	32.50	46.00	-13.50
283.35	H	Peak	18.50	14.90	33.40	46.00	-12.60
336.10	H	Peak	16.80	16.10	32.90	46.00	-13.10
565.00	H	Peak	15.30	22.30	37.60	46.00	-8.40

Remark:

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/Quasi-peak detector mode.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. The IF bandwidth of SPA between 30MHz and 1GHz was 100 kHz.



TEST RESULTS

Above 1 GHz

Operation Mode: TX / IEEE 802.11a / CH Low

Test Date: September 22, 2005

Temperature: 25°C

Tested by: Eric Cheng

Humidity: 55% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1595.00	V	61.77	-6.76	55.01	54.00	1.01	Peak
1595.00	V	46.71	-6.76	39.95	54.00	-14.05	Average
N/A							
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
 $Peak\ limit\ (74dBuV/m) = Average\ Limit\ (54dBuV/m) + 20dB$
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. $Margin\ (dB) = Result\ (Remark) - Limit\ (Average)\ (dBuV/m)$



Operation Mode: TX / IEEE 802.11a / CH Mid

Test Date: September 22, 2005

Temperature: 25°C

Tested by: Eric Cheng

Humidity: 55% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
N/A							
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB.
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m)



Operation Mode: TX / IEEE 802.11a / CH High

Test Date: September 22, 2005

Temperature: 25°C

Tested by: Eric Cheng

Humidity: 55% RH

Polarity: Ver. / Hor.

Frequency (MHz)	Ant. Pol. H/V	Reading (dBuV)	Corr. (dB/m)	Result (Peak/ Average) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark (Peak/ Average)
1600.00	V	56.32	-6.75	49.57	54.00	-4.43	Peak
N/A							
N/A							

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit, but not more than 20dB.
Peak limit (74dBuV/m) = Average Limit (54dBuV/m)+20dB
3. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak/Average detector mode of the emission shown in Remark column.
5. Margin (dB) = Result (Remark) – Limit (Average) (dBuV/m)

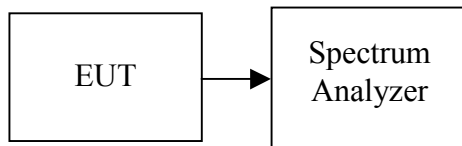
7.7 CONDUCTED UNDESIRABLE EMISSION

LIMIT

Transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm / MHz. Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

The provisions of §15.205 apply to intentional radiators operating under this section.

Test Configuration



TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



Test Plot

CH Low

30MHz ~ 40GHz

Agilent 22:49:40 Sep 27, 2005

R L

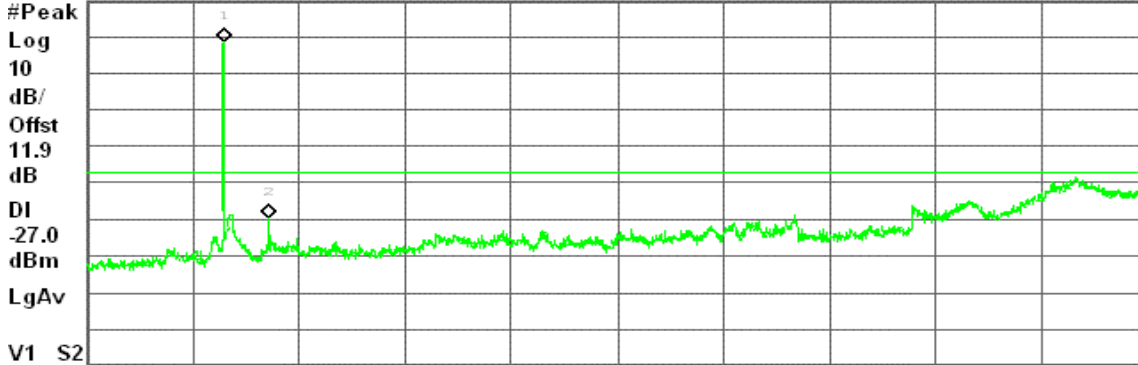
Conducted Spur., a Mode Low Ch.

Mkr2 6.90 GHz

Ref 20 dBm

Atten 20 dB

-39.78 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

Sweep 100 ms (2001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	5.19 GHz	8.74 dBm
2	(1)	Freq	6.90 GHz	-39.78 dBm

CH Mid

30MHz ~ 40GHz

Agilent 23:06:26 Sep 27, 2005

L

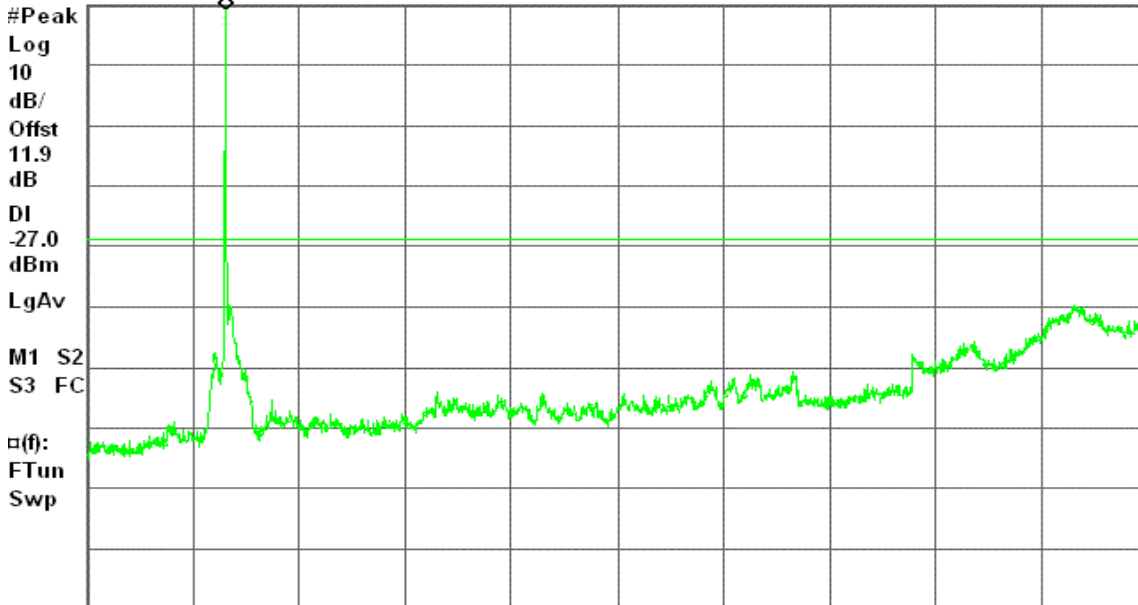
Conducted Spur., a Mode Mid Ch.

Mkr1 5.27 GHz

Ref 11.9 dBm

#Atten 10 dB

11.23 dBm



Center 20.02 GHz

Span 39.97 GHz

#Res BW 1 MHz

#VBW 1 MHz

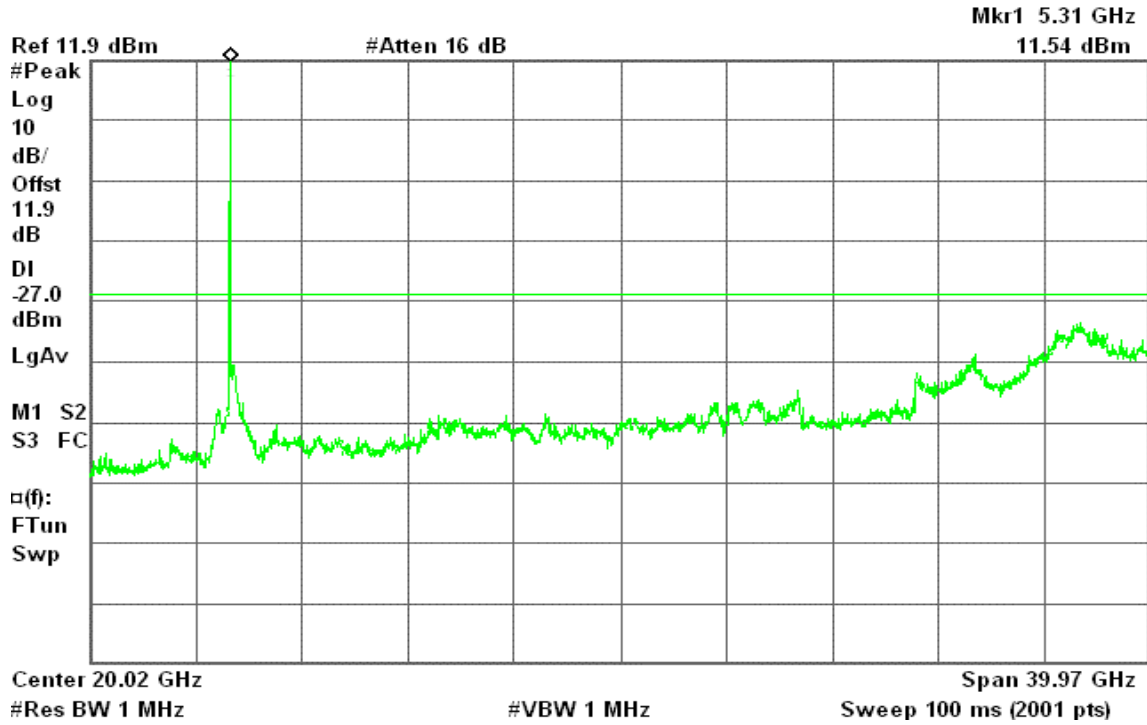
Sweep 100 ms (2001 pts)



CH High 30MHz ~ 40GHz

Agilent 23:12:11 Sep 27, 2005

L





7.8 POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Test Data

Operation Mode: Normal Link **Test Date:** September 22, 2005
Temperature: 25°C **Tested by:** Steven Yang
Humidity: 55% RH

Freq. (MHz)	QP Reading	AV Reading	Corr. factor	QP Result	AV Result	QP Limit	AV Limit	QP Margin	AV Margin	Note
0.275	37.900	35.710	0.100	38.000	35.810	60.966	50.966	-22.966	-15.156	L1
0.488	35.270	35.230	0.100	35.370	35.330	56.202	46.202	-20.832	-10.872	L1
1.040	33.920	33.890	0.100	34.020	33.990	56.000	46.000	-21.980	-12.010	L1
1.524	36.090	35.650	0.100	36.190	35.750	56.000	46.000	-19.810	-10.250	L1
4.095	32.150	28.370	0.109	32.259	28.479	56.000	46.000	-23.741	-17.521	L1
12.296	26.680	24.720	0.746	27.426	25.466	60.000	50.000	-32.574	-24.534	L1
0.208	45.960	40.940	0.100	46.060	41.040	63.285	53.285	-17.225	-12.245	L2
0.346	38.930	39.070	0.100	39.030	39.170	59.058	49.058	-20.028	-9.888	L2
0.693	30.020	29.010	0.100	30.120	29.110	56.000	46.000	-25.880	-16.890	L2
1.249	33.180	32.710	0.100	33.280	32.810	56.000	46.000	-22.720	-13.190	L2
1.802	33.700	32.500	0.100	33.800	32.600	56.000	46.000	-22.200	-13.400	L2
4.030	29.400	24.550	0.103	29.503	24.653	56.000	46.000	-26.497	-21.347	L2

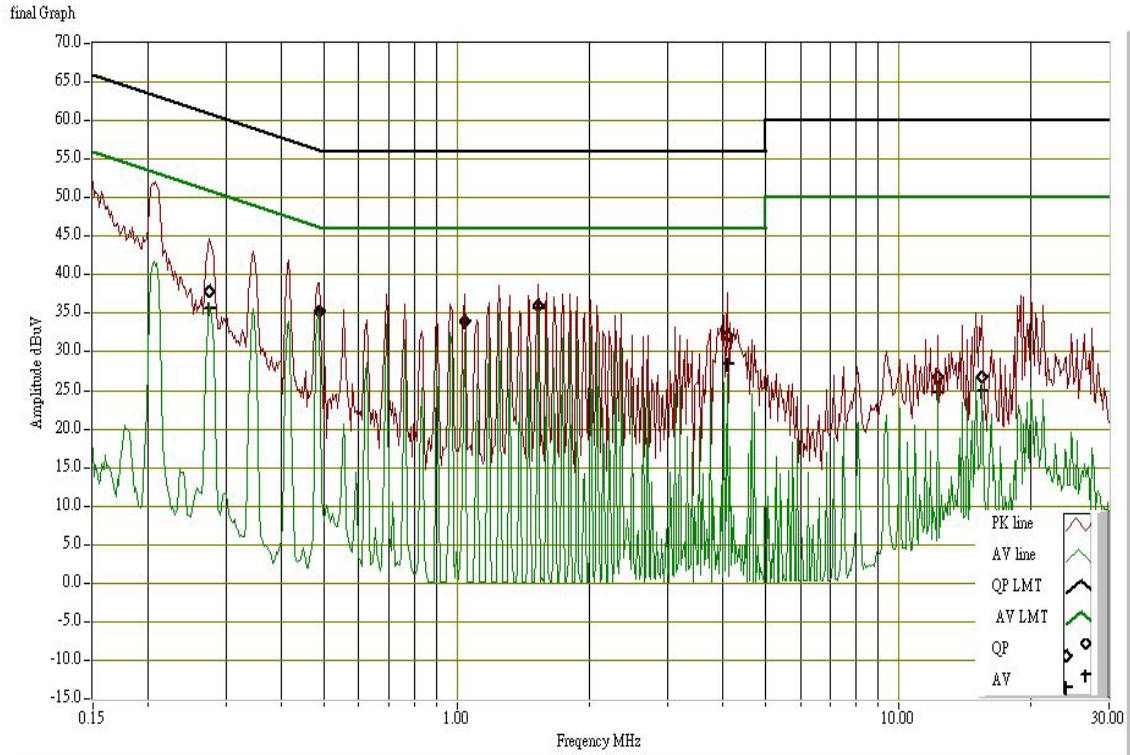
Remark:

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

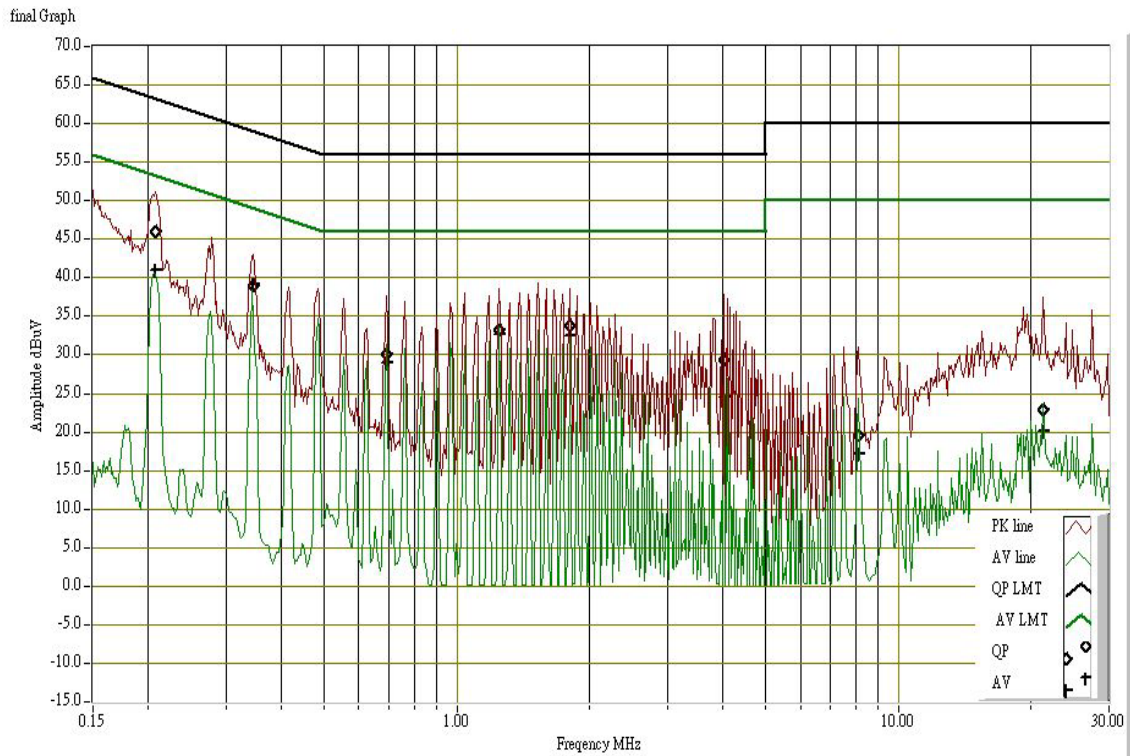


Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)





7.9 TRANSMISSION IN ABSENCE OF DATA

LIMIT

The device shall automatically discontinue transmission in case of either absence of information to transmit or operation failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

TEST RESULTS

Please refer to the operational description for details.

Remark: For the details, refer to the theory of the operation.

7.10 FREQUENCY STABILITY

LIMIT

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

TEST RESULTS

Please refer to the operational description for details.

Remark: An examination of the band-edge plots shows that the emission will stay within the authorized band over the entire temperature range.



APPENDIX II RADIO FREQUENCY EXPOSURE

LIMIT

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

EUT Specification

EUT	Tablet PC built in 5GHz Wireless LAN module
Frequency band (Operating)	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input checked="" type="checkbox"/> WLAN: 5.15GHz ~ 5.35GHz <input type="checkbox"/> WLAN: 5.725GHz ~ 5.850GHz
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others: _____
Exposure classification	General Population/Uncontrolled exposure ($S=1mW/cm^2$)
Antenna diversity	<input type="checkbox"/> Single antenna <input checked="" type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input checked="" type="checkbox"/> Tx/Rx diversity
Max. output power	15.74 dBm (37.5mW)
Antenna gain (Max)	1.91 dBi (Numeric gain: 1.55)
Evaluation applied	<input type="checkbox"/> MPE Evaluation <input checked="" type="checkbox"/> SAR Evaluation* <input type="checkbox"/> N/A
Remark: 1. The maximum output power is <u>15.74dBm (37.5mW)</u> at <u>5260MHz</u> (with <u>1.55 numeric antenna gain.</u>) 2. For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is $1.0 mW/cm^2$ even if the calculation indicates that the power density would be larger.	

TEST RESULTS

No non-compliance noted.

Remark: Please refer to the separated SAR report

MPE evaluation

Not applicable