



FCC 47 CFR PART 15 SUBPART C

TEST REPORT

For

**5.7" QVGA STN LCD Display Touch Panel Computer
with IEEE802.11b Wireless LAN support**

Model: TPC-61SN-x1

Trade Name: ADVANTECH

Issued to

Advantech Co. Ltd.

**No.1, Alley 20, Lane 26, Rueiguang Road, Neihu District,
Taipei 114, 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.**

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1. TEST RESULT CERTIFICATION

Applicant: Advantech Co. Ltd.
 No.1, Alley 20,Lane 26, Rueiguang Road, Neihu District,
 Taipei 114, R.O.C.

Equipment Under Test: 5.7" QVGA STN LCD Display Touch Panel Computer
 with IEEE802.11b Wireless LAN support

Trade Name: ADVANTECH

Model: TPC-61SN-x1

Date of Test: September 2 ~ 13, 2005

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

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. 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 the requirements of FCC Rules Part 15.207, 15.209, 15.247.

The test results of this report relate only to the tested sample EUT 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	5.7" QVGA STN LCD Display Touch Panel Computer with IEEE802.11b Wireless LAN support
Trade Name	ADVANTECH
Model Number	TPC-61SN-x1
Model Discrepancy	N/A
Power Supply	Model Number: HEC-AP065-19V I/P: 100-240V, 50-60Hz, 1.5A O/P: 19V, 3.42A
Frequency Range	2412 ~ 2462 MHz
Transmit Power	8.00 dBm
Modulation Technique	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
Transmit Data Rate	IEEE 802.11b Mode: 11, 5.5, 2, 1 Mbps
Number of Channels	11 Channels
Antenna Specification	FLEX Antenna / Gain: 2.2 dBi

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: M82-TPC-61S filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*
- 3. The suffix of TPC-61SN-x1, (x=windows CE language version) on model number is just for marketing purpose only.*
- 4. Client consigns only one sample to test (model number: TPC-61SN-x1). Therefore, the testing Lab. just guarantees the unit, which has been tested.*



3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. 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: TPC-61SN-x1) 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 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 11Mbps data rate were chosen for the final 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 lie-down position (X axis) 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	09/23/2005
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	09/24/2005
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, Chunghsen 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	 0 3 6 3 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.	Modem	Hayes	231AA	A08431083982	BFJ9D93108US	Shielded, 1.2m	Unshielded, 1.8m
2.	Modem	Hayes	231AA	A26931083831	BFJ9D93108US	Shielded, 1.2m	Unshielded, 1.8m
3.	Modem	Hayes	231AA	A14731083021	BFJ9D93108US	Shielded, 1.2m	Unshielded, 1.8m
4.	USB Keyboard	Compaq	KU-9978	B463AOAGALT097	FCC DoC	Shielded, 1.8m	N/A
5.	Wireless Router (Remote)	ASUS	WL-500g	471GA12838	MSQWL500G	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.*



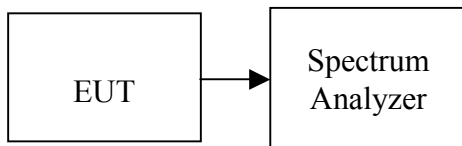
7. FCC PART 15.247 REQUIREMENTS

7.1 6dB BANDWIDTH

LIMIT

According to §15.247(a)(2), systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

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 = 100kHz, VBW = RBW, Span = 50MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

TEST RESULTS

No non-compliance noted

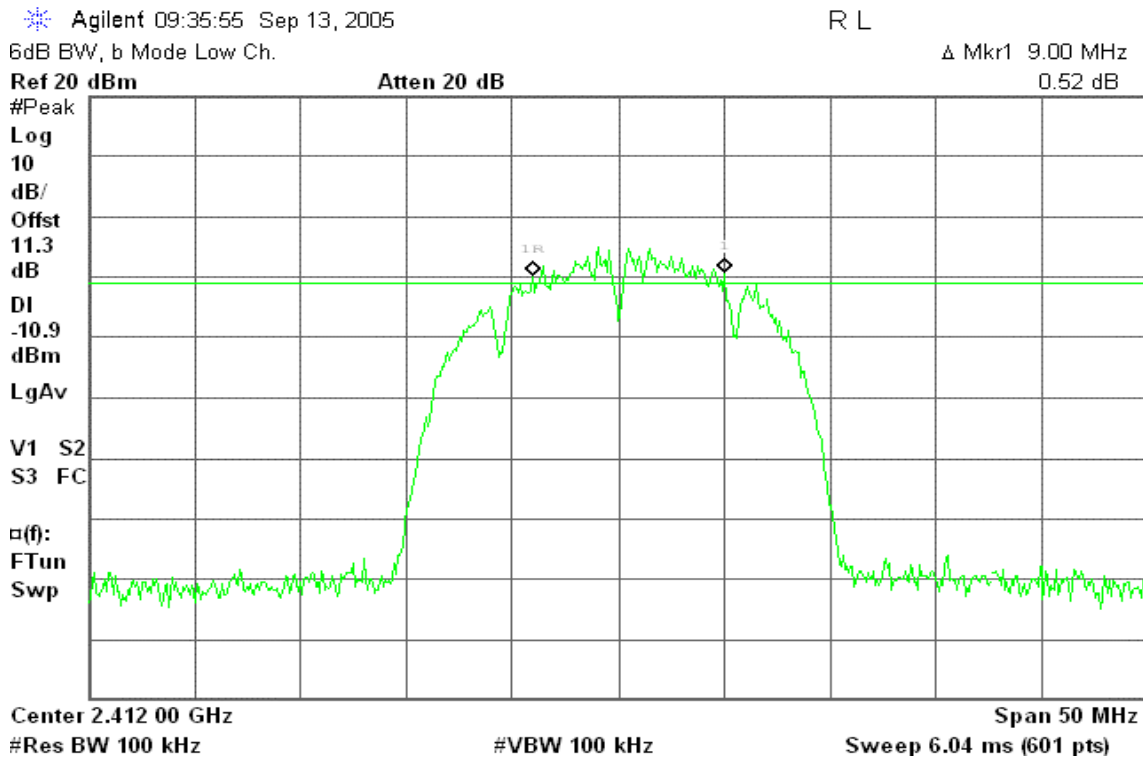
Test Data

Channel	Frequency (MHz)	Bandwidth (kHz)	Limit (kHz)	Test Result
Low	2412	9000	>500	PASS
Mid	2437	11830		PASS
High	2462	8080		PASS

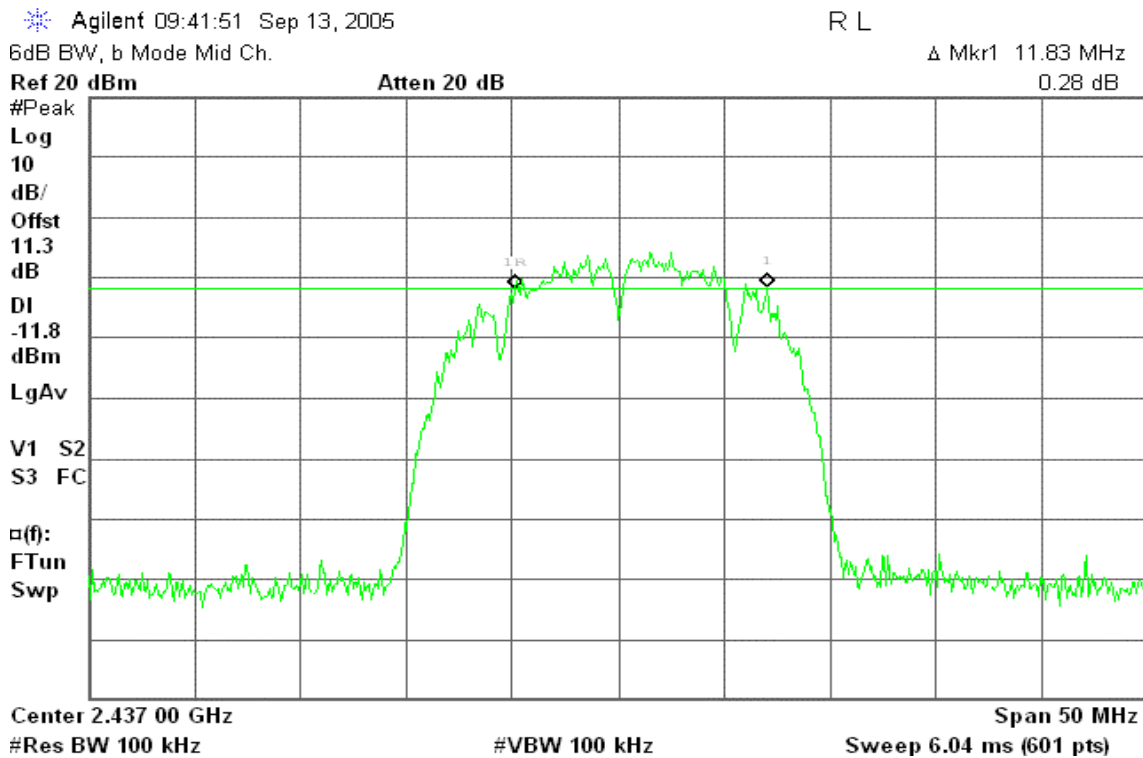


Test Plot

6dB Bandwidth (CH Low)



6dB Bandwidth (CH Mid)





6dB Bandwidth (CH High)

Agilent 09:52:56 Sep 13, 2005

R L

6dB BW, b Mode High Ch.

Δ Mkr1 8.08 MHz

Ref 20 dBm

Atten 20 dB

-0.21 dB

#Peak

Log

10

dB/

Offst

11.3

dB

DI

-9.6

dBm

LgAv

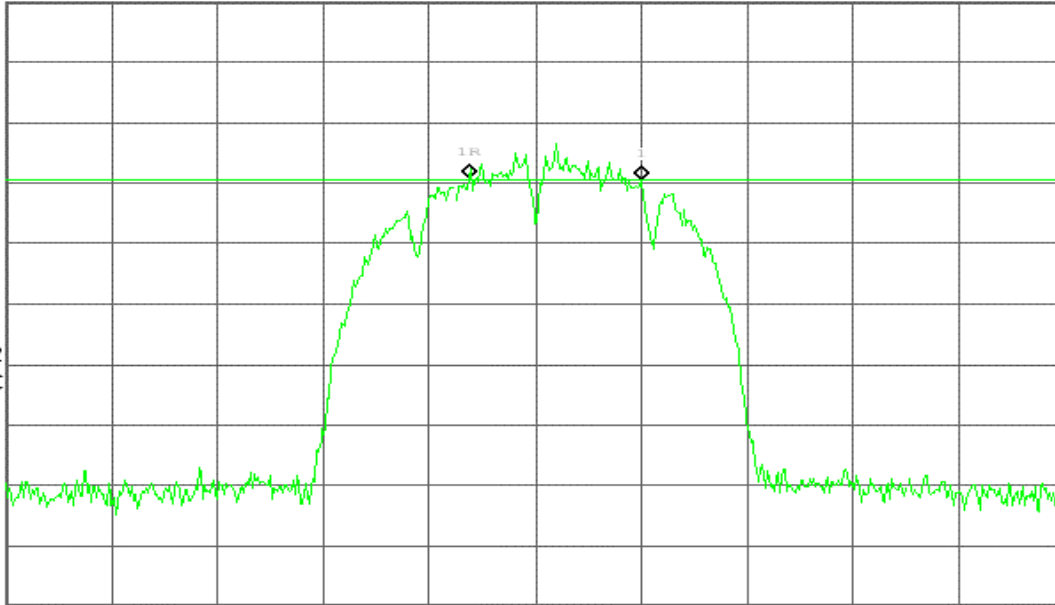
V1 S2

S3 FC

α(f):

FTun

Swp



Center 2.462 00 GHz

Span 50 MHz

#Res BW 100 kHz

#VBW 100 kHz

Sweep 6.04 ms (601 pts)



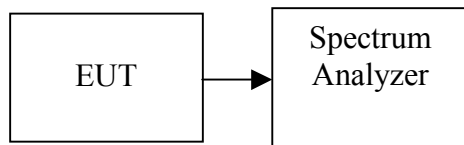
7.2 PEAK POWER

LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Test Configuration



TEST PROCEDURE

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

TEST RESULTS

No non-compliance noted

Test Data

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	7.83	0.00607	1	PASS
Mid	2437	8.00	0.00631		PASS
High	2462	7.99	0.00630		PASS



Test Plot

Peak Power (CH Low)

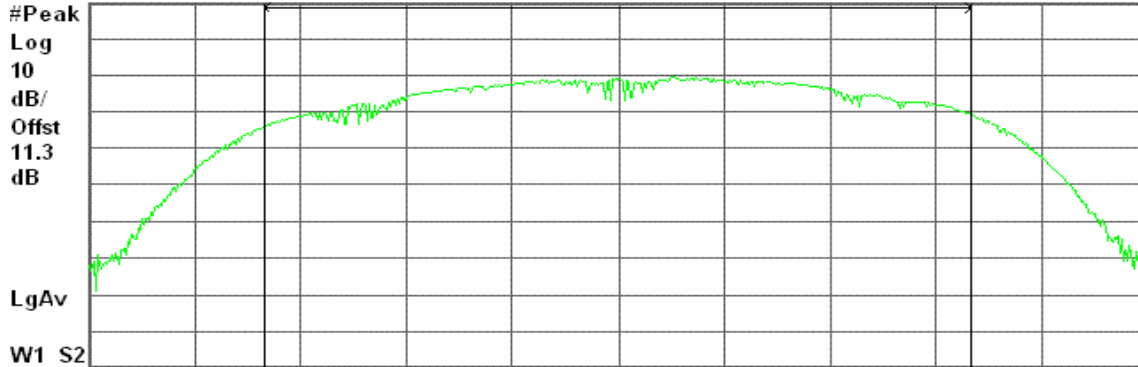
Agilent 09:36:38 Sep 13, 2005

R L

Peak Output Power , b Mode Low Ch.

Ref 20 dBm

Atten 20 dB



Center 2.412 00 GHz

Span 22.68 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

7.83 dBm / 15.1230 MHz

-63.97 dBm/Hz

Peak Power (CH Mid)

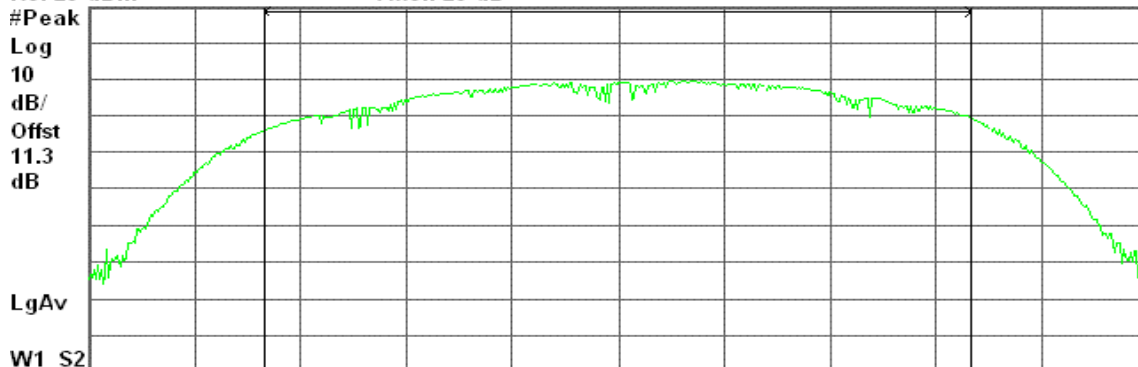
Agilent 09:42:28 Sep 13, 2005

R L

Peak Output Power , b Mode Mid Ch.

Ref 20 dBm

Atten 20 dB



Center 2.437 00 GHz

Span 22.7 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

8.00 dBm / 15.1310 MHz

-63.80 dBm/Hz



Peak Power (CH High)

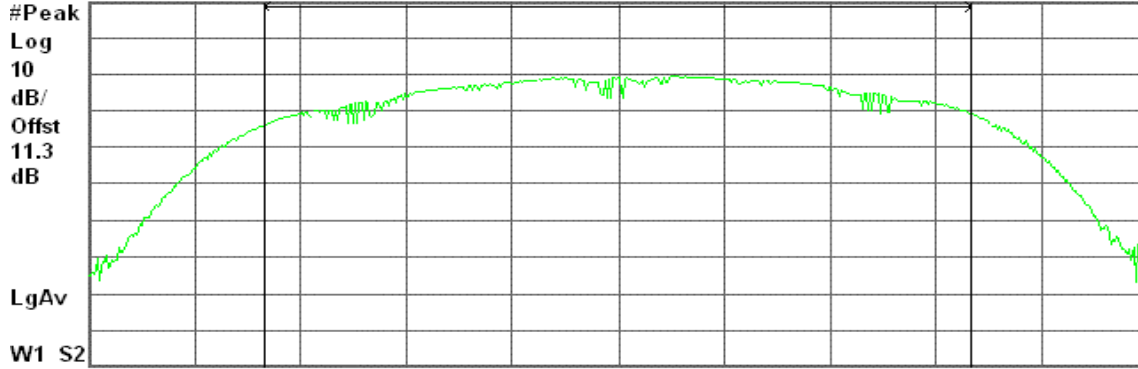
Agilent 09:53:35 Sep 13, 2005

R T

Peak Output Power , b Mode High Ch.

Ref 20 dBm

Atten 20 dB



W1 S2

Center 2.462 00 GHz

Span 22.69 MHz

#Res BW 1 MHz

#VBW 3 MHz

Sweep 1 ms (601 pts)

Channel Power

Power Spectral Density

7.99 dBm / 15.1250 MHz

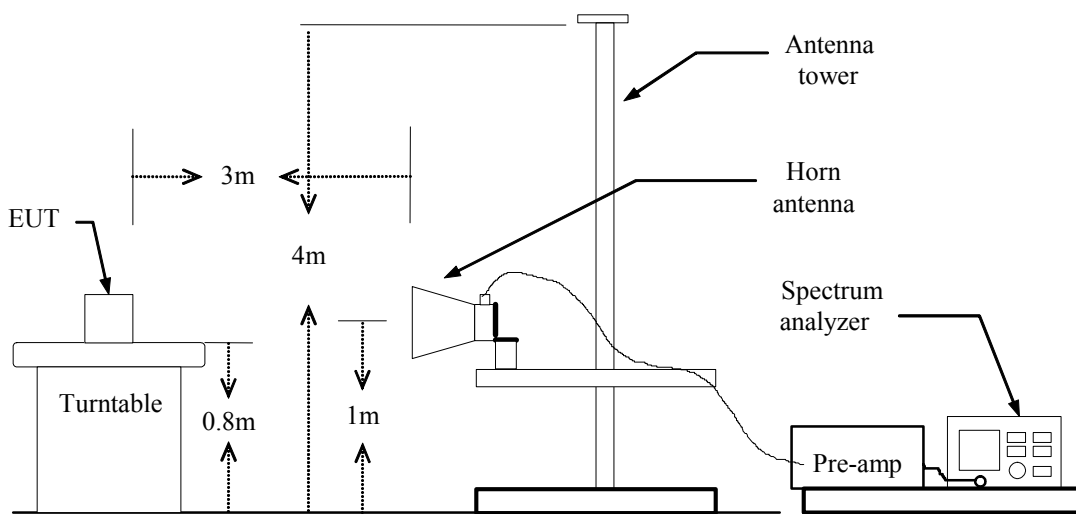
-63.80 dBm/Hz

7.3 BAND EDGES MEASUREMENT

LIMIT

According to §15.247(d), 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

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)

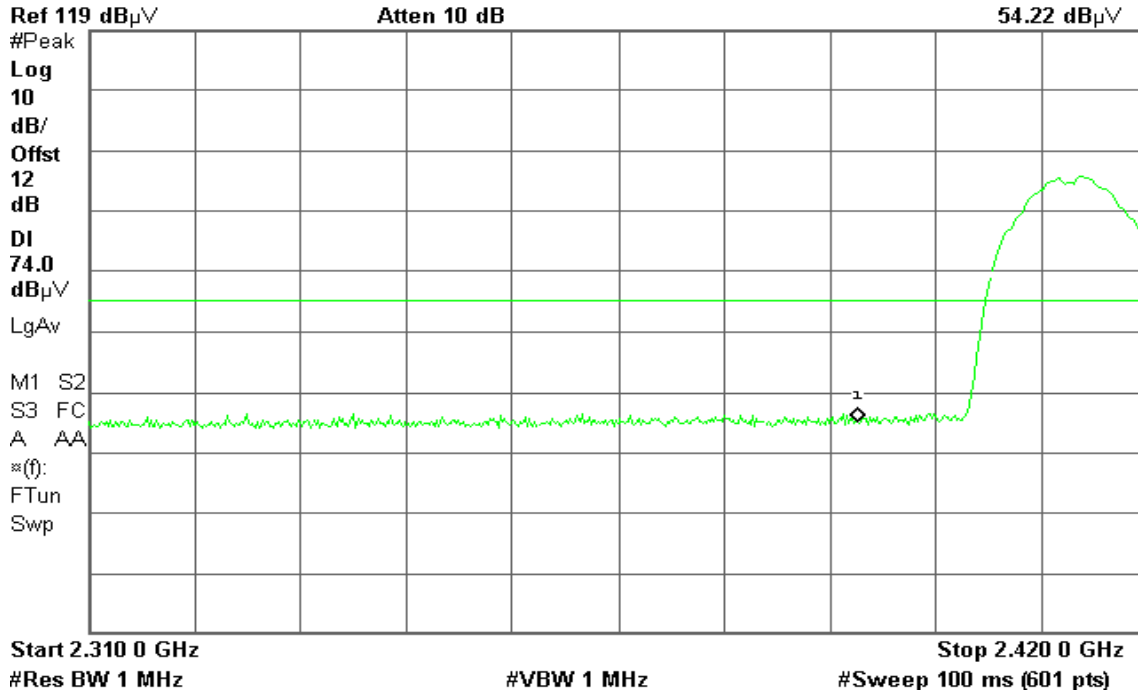
Detector mode: Peak

Polarity: Vertical

Agilent 15:00:09 Sep 2, 2005

R L

Mkr1 2.390 0 GHz
54.22 dB μ V



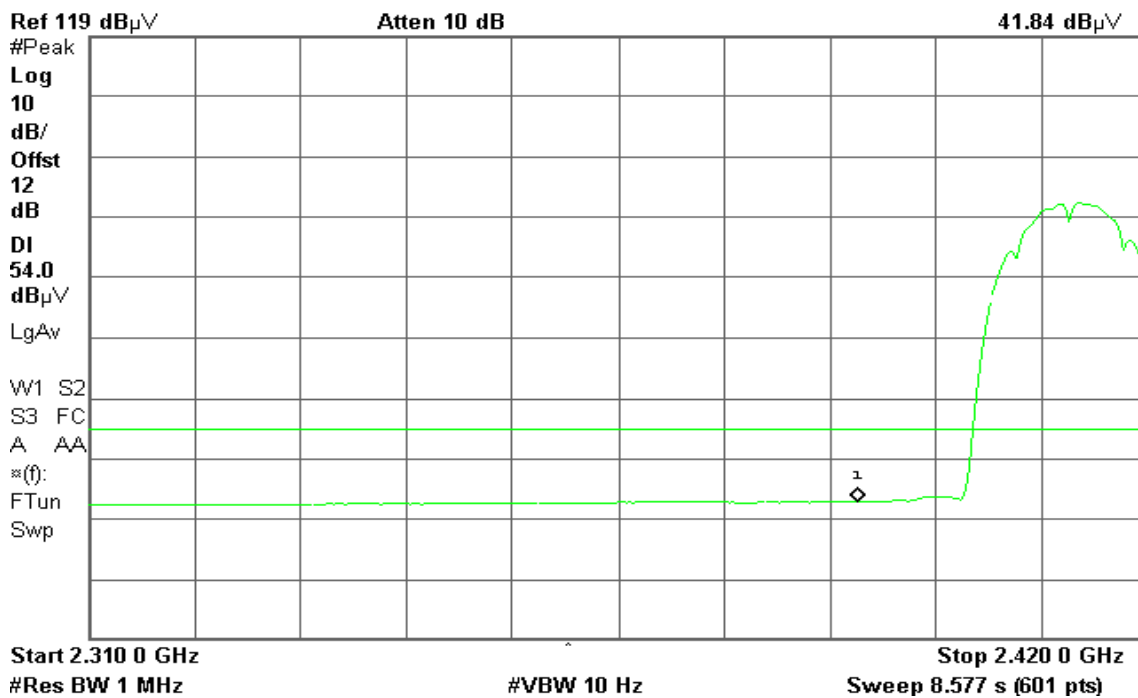
Detector mode: Average

Polarity: Vertical

Agilent 15:00:30 Sep 2, 2005

T

Mkr1 2.390 0 GHz
41.84 dB μ V



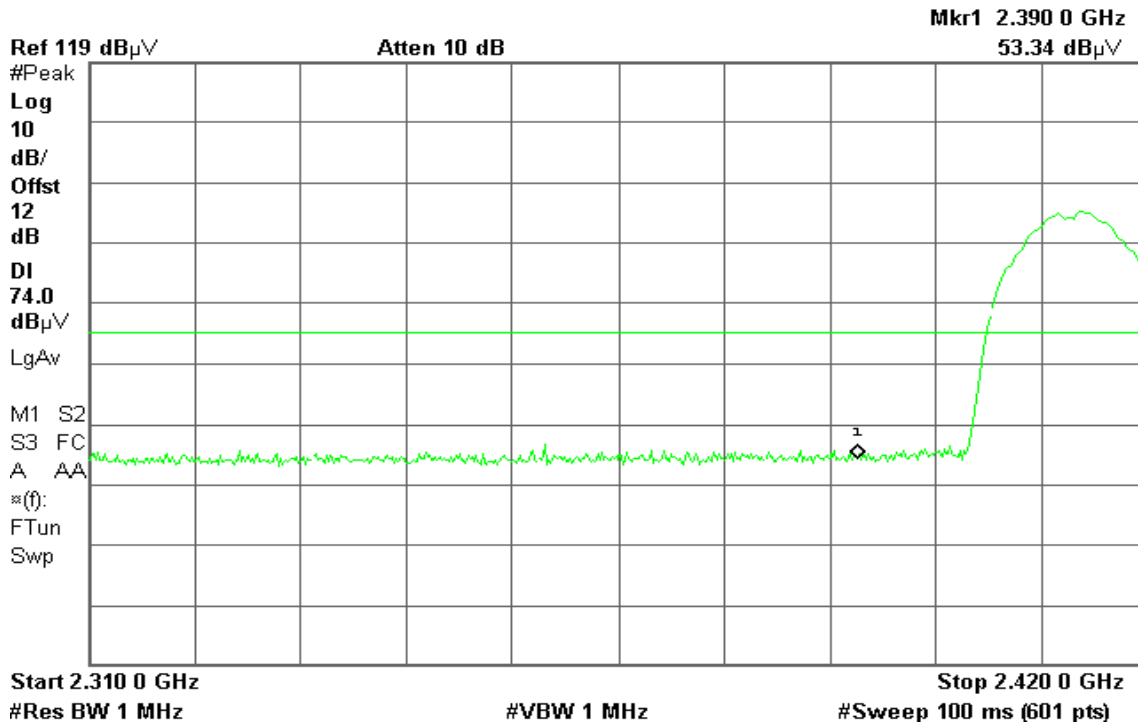


Detector mode: Peak

Polarity: Horizontal

Agilent 15:03:28 Sep 2, 2005

T

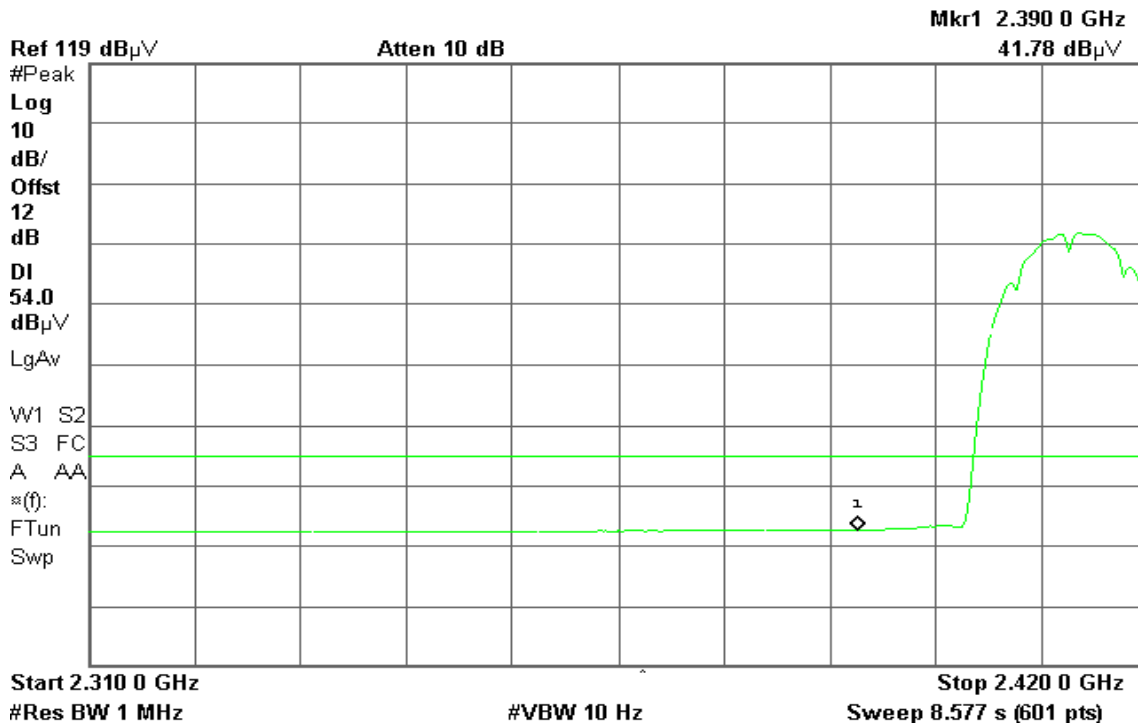


Detector mode: Average

Polarity: Horizontal

Agilent 15:03:14 Sep 2, 2005

R L





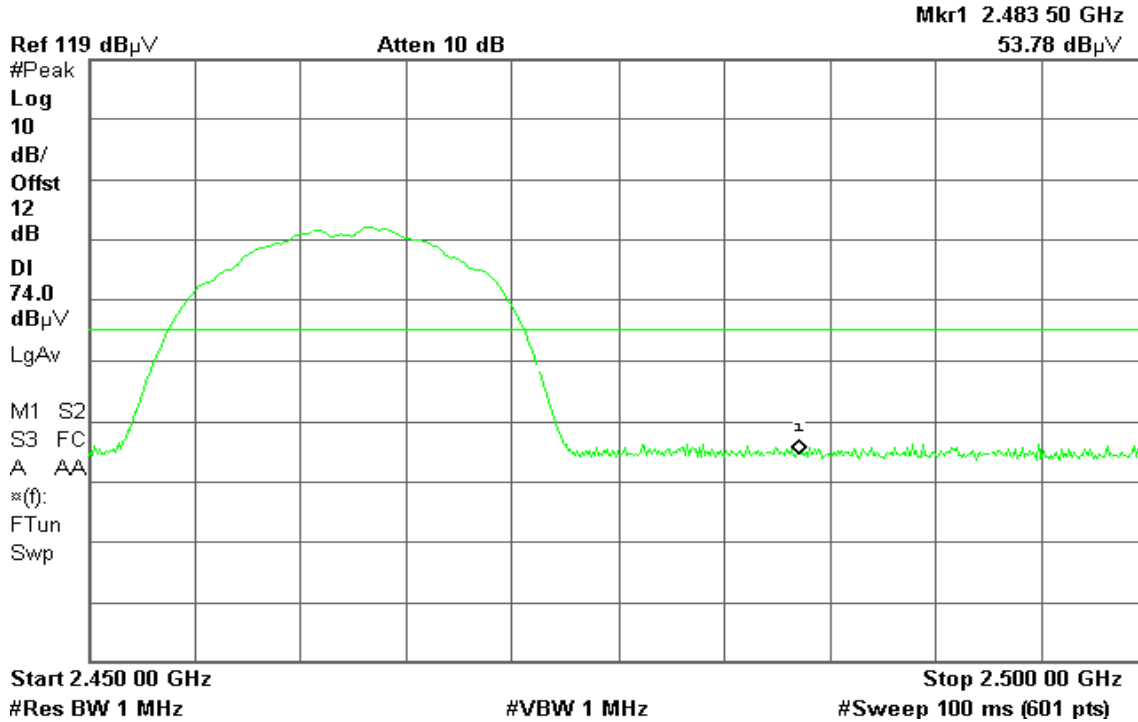
Band Edges (CH High)

Detector mode: Peak

Polarity: Vertical

Agilent 15:09:30 Sep 2, 2005

T

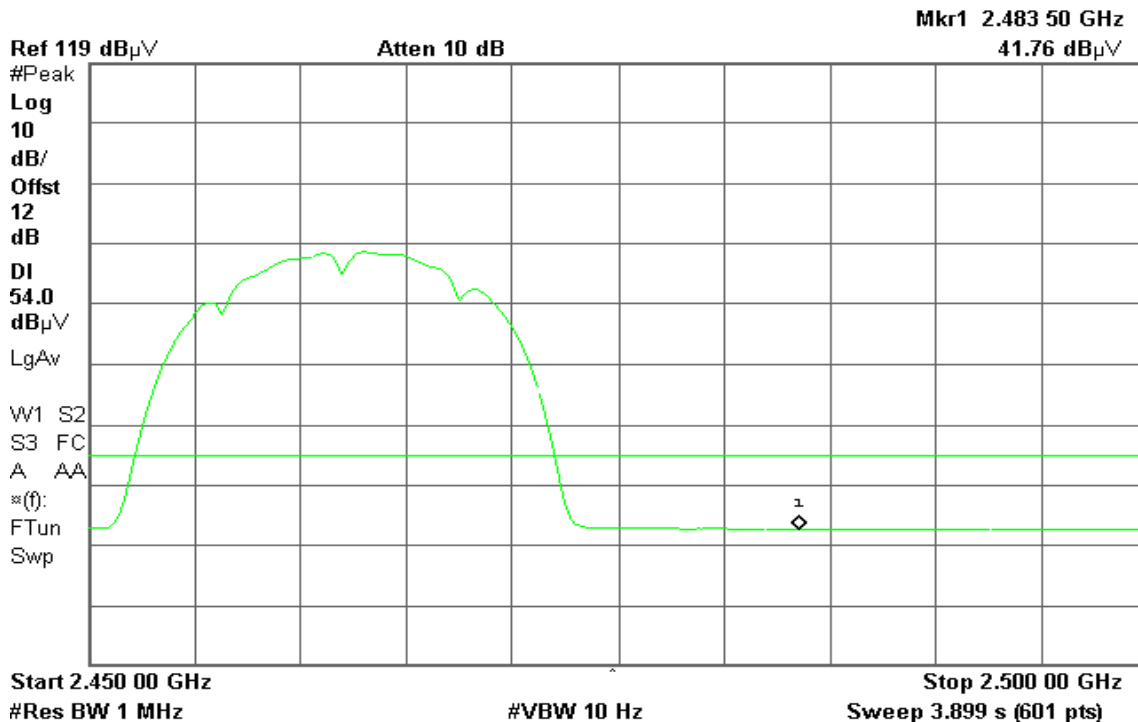


Detector mode: Average

Polarity: Vertical

Agilent 15:09:11 Sep 2, 2005

T





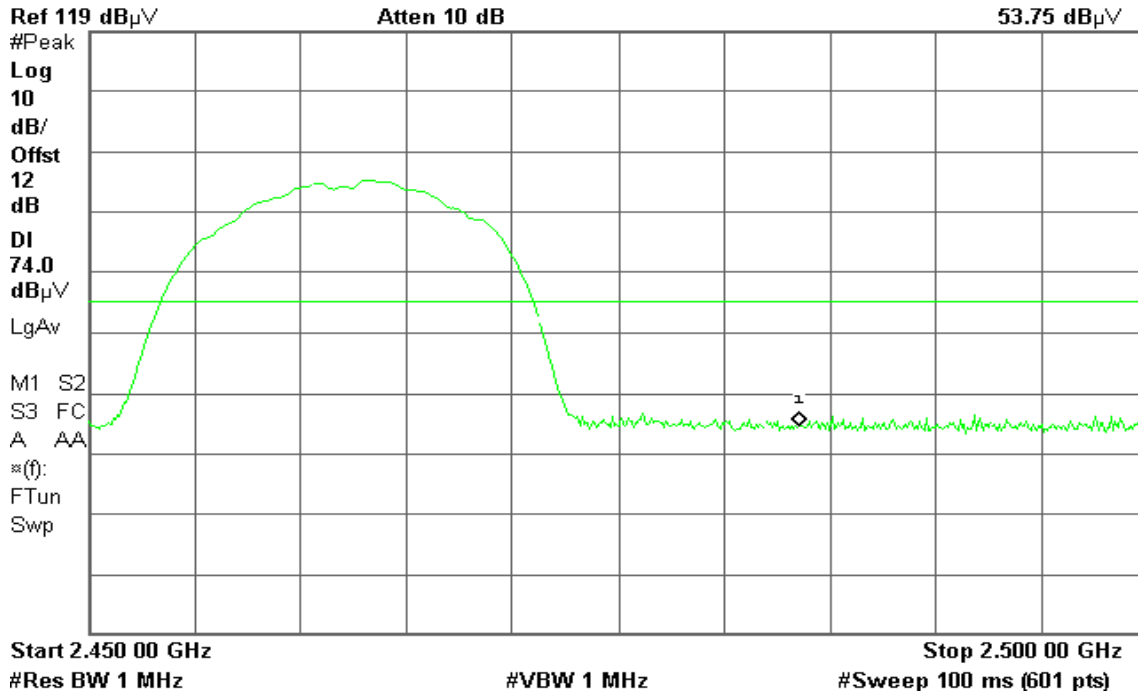
Detector mode: Peak

Polarity: Horizontal

Agilent 15:06:54 Sep 2, 2005

T

Mkr1 2.483 50 GHz
53.75 dB μ V



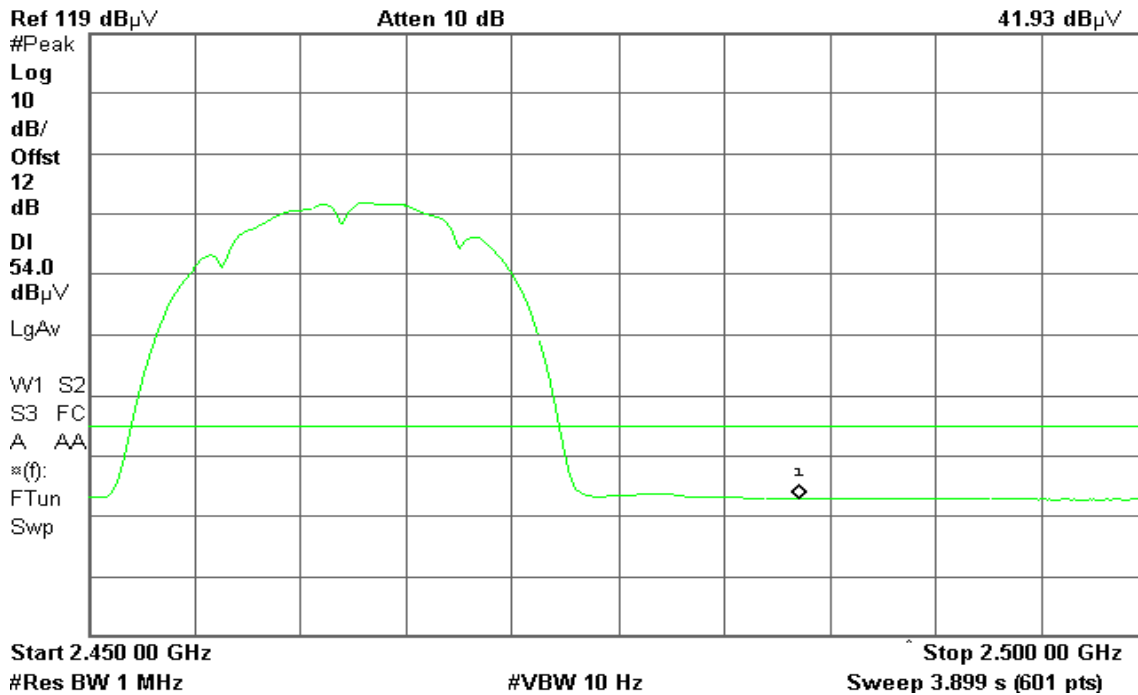
Detector mode: Average

Polarity: Horizontal

Agilent 15:06:41 Sep 2, 2005

T

Mkr1 2.483 50 GHz
41.93 dB μ V



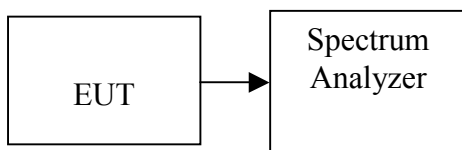


7.4 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e), for digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

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 = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

TEST RESULTS

No non-compliance noted

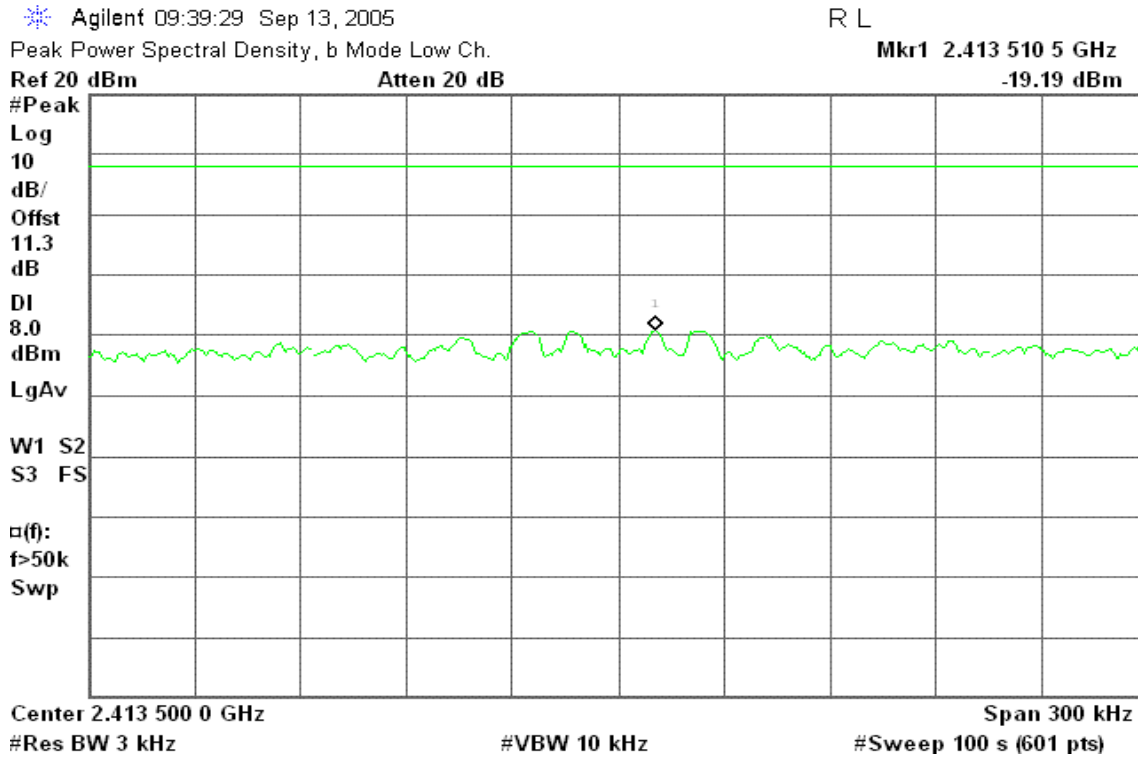
Test Data

Channel	Frequency	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-19.19	8.00	PASS
Mid	2437	-18.85		PASS
High	2462	-18.95		PASS

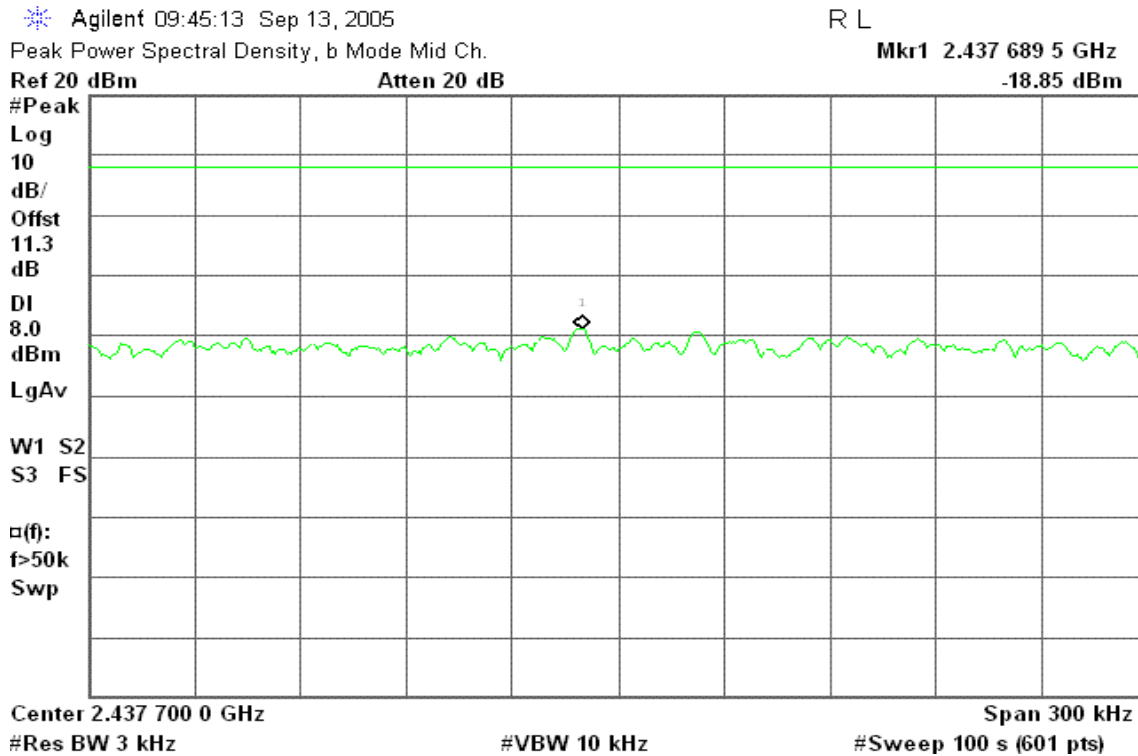


Test Plot

PPSD (CH Low)



PPSD (CH Mid)





PPSD (CH High)

Agilent 09:56:44 Sep 13, 2005

R L

Peak Power Spectral Density, b Mode High Ch.

Mkr1 2.462 689 0 GHz

Ref 20 dBm

Atten 20 dB

-18.95 dBm

#Peak

Log

10

dB/

Offst

11.3

dB

DI

8.0

dBm

LgAv

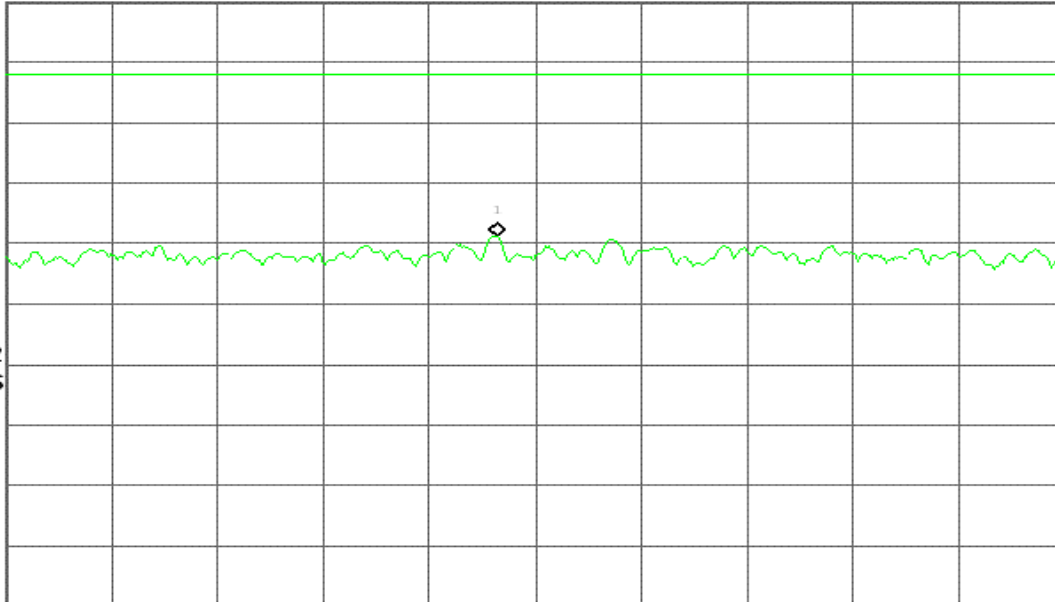
W1 S2

S3 FS

□(f):

f>50k

Swp



Center 2.462 700 0 GHz

Span 300 kHz

#Res BW 3 kHz

#VBW 10 kHz

#Sweep 100 s (601 pts)



7.5 RADIO FREQUENCY EXPOSURE

LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §15.247(i) and §1.1307(b)(1) of this chapter.

EUT Specification

EUT	5.7" QVGA STN LCD Display Touch Panel Computer with IEEE802.11b Wireless LAN support
Frequency band (Operating)	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
Device category	<input checked="" type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm2) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
Max. output power	IEEE 802.11b: 8.00 dBm (6.31mW)
Antenna gain (Max)	2.2 dBi (Numeric gain: 1.66)
Evaluation applied	<input type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation <input checked="" type="checkbox"/> N/A

Remark:

- The maximum output power is 8.00dBm (6.31mW) at 2437MHz (with 1.66 numeric antenna gain.)
- DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.
- 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.

(SAR evaluation is not required for the PORTABLE device while its maximum output power is lower than the general population low threshold: $60/f_{(GHz)}=60/2.441=24.58mW$)

MPE evaluation

Not applicable.



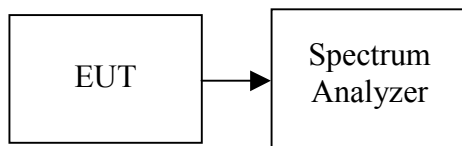
7.6 SPURIOUS EMISSIONS

7.6.1 Conducted Measurement

LIMIT

According to §15.247(d), 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

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 100 kHz. The video bandwidth is set to 300 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

TEST RESULTS

No non-compliance noted



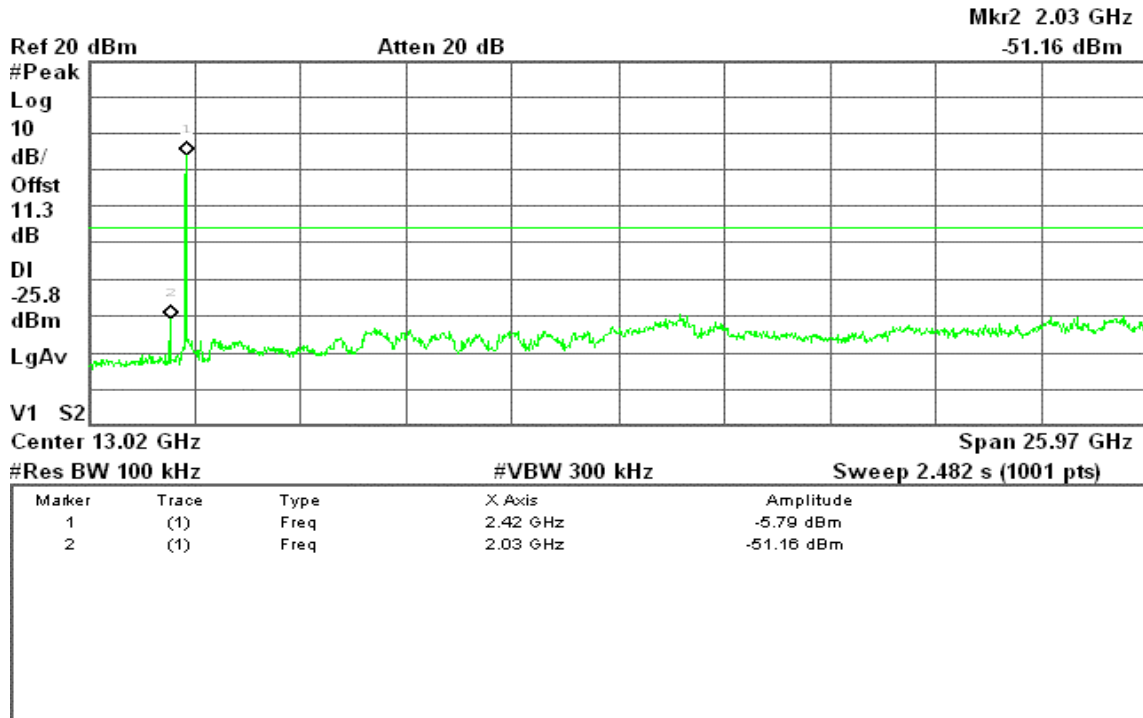
Test Plot

IEEE 802.11b mode

CH Low

Agilent 09:40:54 Sep 13, 2005

L

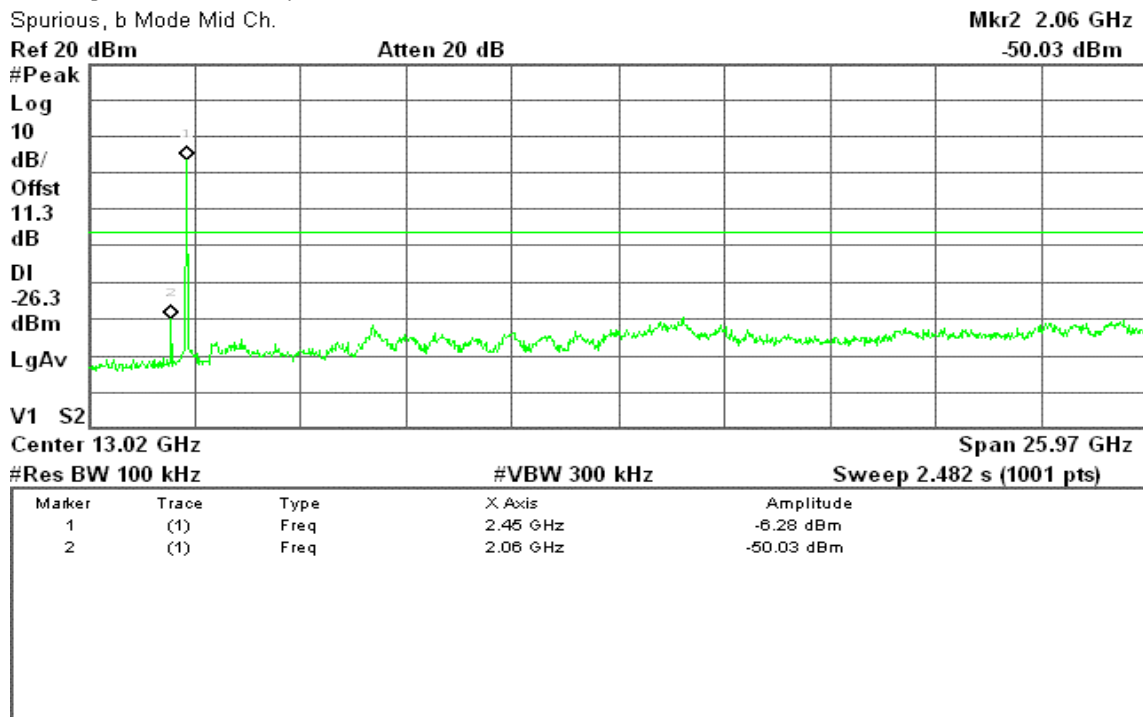


CH Mid

Agilent 09:46:26 Sep 13, 2005

L

Spurious, b Mode Mid Ch.





CH High

Agilent 09:58:12 Sep 13, 2005

L

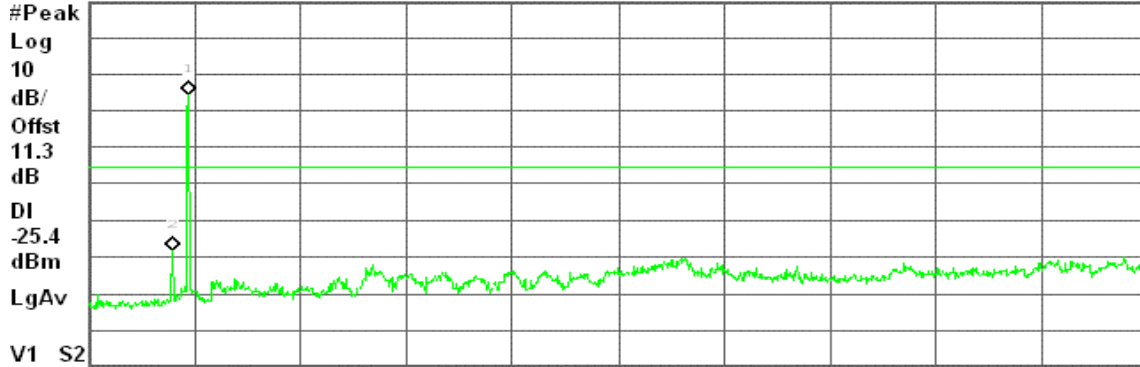
Spurious, b Mode High Ch.

Mkr2 2.08 GHz

Ref 20 dBm

Atten 20 dB

-48.22 dBm



Center 13.02 GHz

Span 25.97 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 2.482 s (1001 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.47 GHz	-5.44 dBm
2	(1)	Freq	2.08 GHz	-48.22 dBm



7.6.2 Radiated Emissions

LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

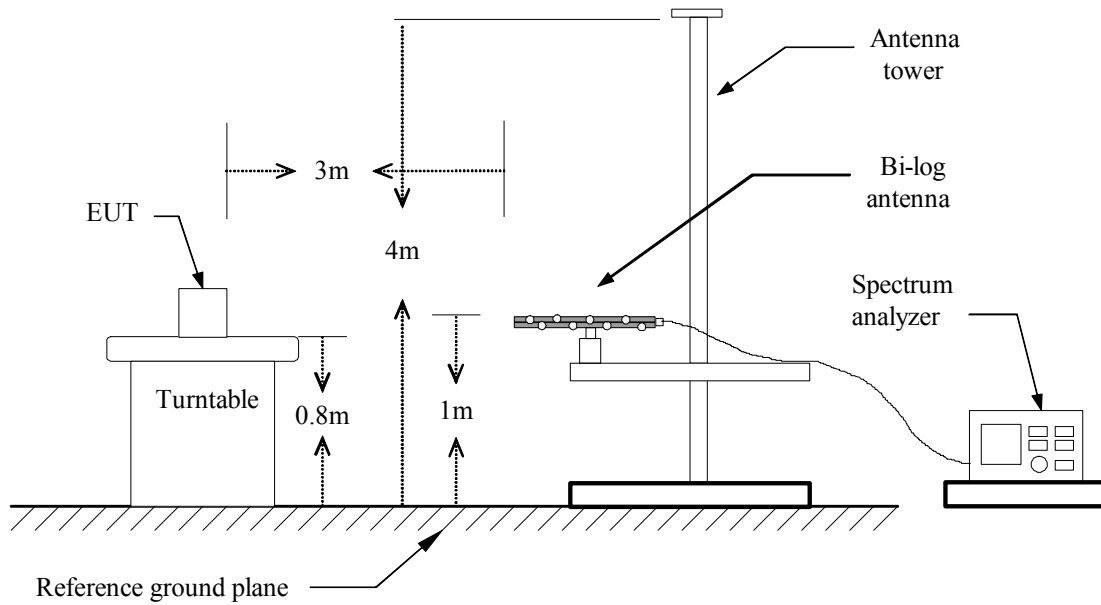
Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

2. In the emission table above, the tighter limit applies at the band edges.

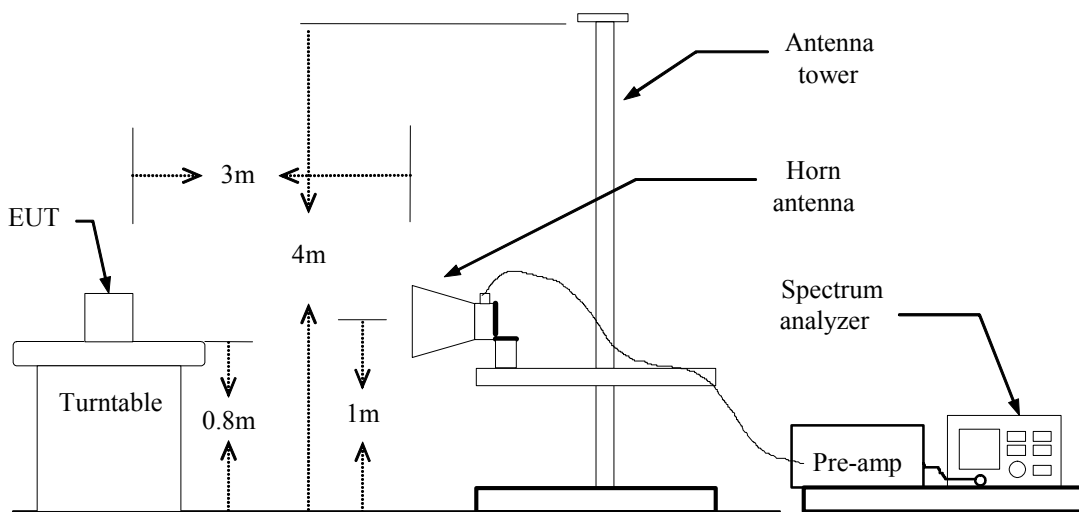
Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$ at 3-meter)	Field Strength (dB $\mu\text{V}/\text{m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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 9, 2005

Temperature: 25°C

Tested by: Ryan Chen

Humidity: 58 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBUV)	Factor (dB/m)	Actual FS (dBUV/m)	Limit 3m (dBUV/m)	Safe Margin (dB)
304.25	V	PK	8.40	16.20	24.60	46.00	-21.40
405.94	V	PK	4.80	17.00	21.80	46.00	-24.20
506.78	V	PK	1.40	21.30	22.70	46.00	-23.30
608.66	V	PK	2.90	23.00	25.90	46.00	-20.10
709.66	V	PK	-3.40	24.20	20.80	46.00	-25.20
811.55	V	PK	-2.30	24.50	22.20	46.00	-23.80
304.20	H	PK	8.40	16.20	24.60	46.00	-21.40
354.97	H	PK	6.80	16.10	22.90	46.00	-23.10
405.85	H	PK	10.20	17.00	27.20	46.00	-18.80
608.20	H	PK	0.90	23.00	23.90	46.00	-22.10
660.02	H	PK	0.10	24.70	24.80	46.00	-21.20
811.17	H	PK	-1.20	24.50	23.30	46.00	-22.70

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 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 to 1GHz was 100kHz.



Above 1 GHz

Operation Mode: TX / CH Low

Test Date: September 12, 2005

Temperature: 20°C

Tested by: Ryan Chen

Humidity: 70 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB/m)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
5390.00	V	50.14	---	0.89	51.03	---	74.00	54.00	-2.97	Peak
6090.00	V	50.84	---	1.50	52.34	---	74.00	54.00	-1.66	Peak
N/A										
5390.00	H	51.24	---	0.89	52.13	---	74.00	54.00	-1.87	Peak
6090.00	H	50.87	---	1.50	52.37	---	74.00	54.00	-1.63	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. 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.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
5. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX / CH Mid

Test Date: September 12, 2005

Temperature: 20°C

Tested by: Ryan Chen

Humidity: 70 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB/m)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
5390.00	V	49.54	---	0.89	50.43	---	74.00	54.00	-3.57	Peak
6090.00	V	50.41	---	1.50	51.91	---	74.00	54.00	-2.09	Peak
N/A										
5390.00	H	50.48	---	0.89	51.37	---	74.00	54.00	-2.63	Peak
6090.00	H	50.80	---	1.50	52.30	---	74.00	54.00	-1.70	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. 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.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
5. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



Operation Mode: TX / CH High

Test Date: September 12, 2005

Temperature: 20°C

Tested by: Ryan Chen

Humidity: 70 % RH

Polarity: Ver. / Hor.

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB/m)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
5390.00	V	49.18	---	0.89	50.07	---	74.00	54.00	-3.93	Peak
6090.00	V	50.37	---	1.50	51.87	---	74.00	54.00	-2.13	Peak
N/A										
5390.00	H	50.84	---	0.89	51.73	---	74.00	54.00	-2.27	Peak
6090.00	H	51.39	---	1.50	52.89	---	74.00	54.00	-1.11	Peak
N/A										

Remark:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. 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.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
5. Spectrum setting:
 - a. Peak Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 1MHz, Sweep time = Auto.
 - b. AV Setting 1GHz to 10th harmonics of fundamental, RBW = 1MHz, VBW = 10Hz, Sweep time = Auto.



7.7 POWERLINE CONDUCTED EMISSIONS

LIMIT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that 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 the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dBμV)	
	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

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 7, 2005
Temperature: 25°C **Tested by:** Steven Young
Humidity: 55% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.201	42.420	40.200	0.100	42.520	40.300	63.569	53.569	-21.049	-13.269	L1
0.335	34.580	30.690	0.100	34.680	30.790	59.326	49.326	-24.646	-18.536	L1
0.476	32.250	26.620	0.100	32.350	26.720	56.409	46.409	-24.059	-19.689	L1
0.687	36.710	28.840	0.100	36.810	28.940	56.000	46.000	-19.190	-17.060	L1
0.787	42.320	33.820	0.100	42.420	33.920	56.000	46.000	-13.580	-12.080	L1
2.080	34.170	26.090	0.100	34.270	26.190	56.000	46.000	-21.730	-19.810	L1
16.912	34.370	32.040	0.953	35.323	32.993	60.000	50.000	-24.677	-17.007	L1
0.273	37.240	33.100	0.100	37.340	33.200	61.026	51.026	-23.686	-17.826	L2
0.397	28.680	24.310	0.100	28.780	24.410	57.916	47.916	-29.136	-23.506	L2
0.537	33.400	27.000	0.100	33.500	27.100	56.000	46.000	-22.500	-18.900	L2
0.787	42.180	33.430	0.100	42.280	33.530	56.000	46.000	-13.720	-12.470	L2
2.080	33.210	24.670	0.100	33.310	24.770	56.000	46.000	-22.690	-21.230	L2
17.047	31.160	28.830	0.964	32.124	29.794	60.000	50.000	-27.876	-20.206	L2
27.497	25.150	22.960	1.300	26.450	24.260	60.000	50.000	-33.550	-25.740	L2

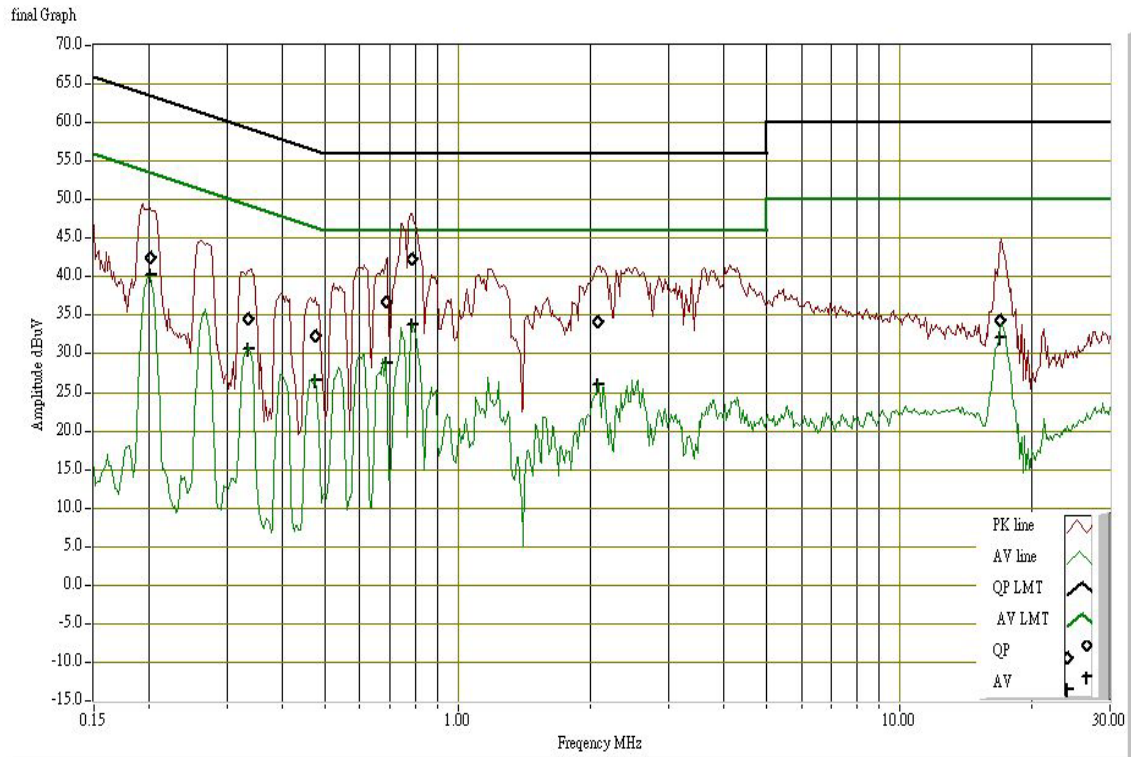
Remark:

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 and 30MHz was 9kHz.
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)



Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)

