ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART E REQUIREMENT

OF

802.11a/g mini PCI Card

Model No.: BCM94309MP

Trade Name: Quanta

FCC ID: HFS-BCM94309MP

Report No: B30624201-RP

Issue Date: July 8, 2003

Prepared for

Quanta Computer Company Ltd.
No. 188, Wen Hwa 2nd Rd., Kuei Shan Hsiang,
Taoyuan Hsien, Taiwan, R.O.C.

Prepared by

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VERIFICATION OF COMPLIANCE

Applicant:	Quanta Computer Company Ltd. No. 188, Wen Hwa 2nd Rd., Kuei Shan Hsiang, Taoyuan Hsien, Taiwan, R.O.C.
Product Description:	802.11a/g mini PCI Card
Model No.:	BCM94309MP
Serial Number:	N/A
File Number:	B30624201-RP
Date of test:	June 30 ~ July 7, 2003

We hereby certify that:

The above equipment was tested by C&C Laboratory Co., Ltd. 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 (1992) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements set forth in CFR 47, Part 15, Subpart E. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.
The test results of this report relate only to the tested sample identified in this report.

Approved By ***Reviewed By***

Jonson Lee / Director ***Eric Wong / Section Manager***
C&C Laboratory Co., Ltd. ***C&C Laboratory Co., Ltd.***

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1. GENERAL INFORMATION

1.1 Product Description

The Quanta Computer Company Ltd., Model: BCM94309MP (referred to as the EUT in this report) is 802.11a/g mini PCI Card.

Notebook		Antenna		Panel
Trade Name	**Model No.**	**Trade Name**	**Model No.**	
Gateway	450ROG	Fonconn	OA2	14.1”
Gateway	450ROG	Fonconn	OA2	15”
Gateway	M305CRV	Fonconn	OA5L	14.1”
Gateway	M305CRV	Fonconn	OA5L	15”
Gateway	M350WVN	Fonconn	OA6L	14.1”
Gateway	M350WVN	Fonconn	OA6L	15”
Gateway	600YG2	Quanta	YA1A	15”
Gateway	600YG2	Quanta	YA1A	15.7”
Gateway	600PIR	Fonconn	PA1	15.4”
Gateway	600PIR	Fonconn	PA1	17”
Gateway	600PIR	Hannstar	PA-1	15.4”
Gateway	600PIR	Hannstar	PA-1	17”

A major technical descriptions of EUT is described as following:

A). Operation Frequency:

2400~2483.5 IEEE802.11g				**5.15 – 5.35 IEEE802.11a**	
1	2412	7	2442	1	5180
2	2417	8	2447	2	5200
3	2422	9	2452	3	5220
4	2427	10	2457	4	5240
5	2432	11	2462	5	5260
6	2437			6	5280
				7	5300
				8	5320

B). Transmit Power: 13dBm
C). Modulation type: OFDM
D). Transition Speed: up to 54Mbps
E). Antenna Designation: 1. PIFA Antenna; Non-User Replaceable (Fixed), two provided. one for Tx, another for Rx.
2. Metal Antenna; Non-User Replaceable (Fixed), two provided. one for Tx, another for Rx.
F). Power Supply: from Notebook system

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: HFS-BCM94309MP filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules.

1.3 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (1992) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 2.407.

1.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of C&C Laboratory, Co., Ltd. No. 81-1, 210 Lane, Pa-de 2nd Road, Lu-Chu Hsiang, Taoyuan, Taiwan, R.O.C.. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 1992 and CISPR 22/EN 55022 requirements.

1.5 Measurement Uncertainty

All the measurement equipments and accessories have been carefully selected to meet the maximum measurement uncertainty specified below:

Radiated Emission, valid up to 1GHz	+/- 2.16 dB
Radiated Emission, valid up to 26GHz	+/- 3.5 dB
Power Line Conducted Emission, valid up to 30MHz	+/- 2.8 dB
RF Frequency	+/- 2 X 10^-6
RF Peak Power (Conducted)	+/- 0.221 dB
Power Density (Conducted)	+/- 2.0022 dB
Frequency Stability V.S. Voltage	+/- 0.3538 %
Frequency Stability V.S. temperature	+/- 1.8974 %

P.S. Uncertainty figures are valid to confidence level of 95% calculated according to the methods described in the ETR 028[7]

1.6 Special Accessories

Not available for this EUT intended for grant.

1.7 Equipment Modifications

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 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.

2.2 EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table 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 max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-1992.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System

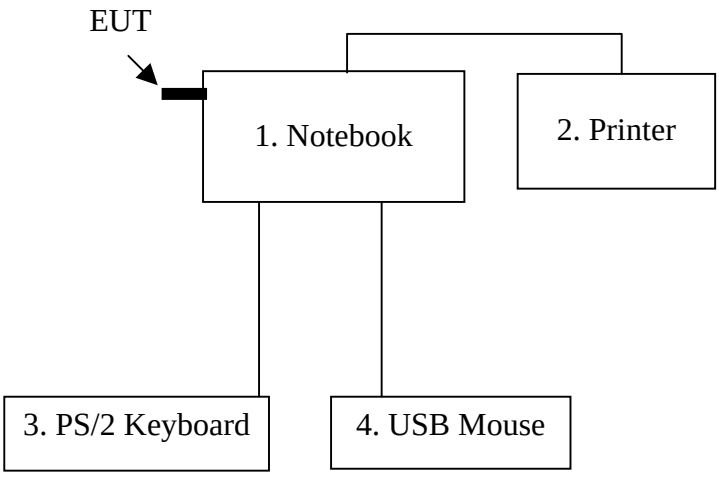


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	Notebook	Compaq	PP2150	DoC	N/A	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m
2.	Printer	EPSON	EPSON STYLUS C20SX	N/A	DW4E130542	Shielded, 1.8m	Unshielded, 1.8m
3.	PS/2 Keyboard	Compaq	SK-2800C	GYUR79SK	B1C790BCPJ73JQ	Shielded, 1.8m	N/A
4.	USB Mouse	Logitech	M-BB48	FCC DoC	LZE92250259	Shielded, 1.8m	N/A

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.205	Restrict Band Emission	Compliant
§15.207	AC Power Line Conducted Emission	Compliant
§15.403(c)	Emission Bandwidth	Compliant
§15.407(a)	Power Measurement	Compliant
§15.407(a)	Peak Power Spectral Density Measurement	Compliant
§15.407(a)	Peak Excursion Measurement	Compliant
§15.407(b)	Undesirable Emission – Conducted Measurement	Compliant
§15.407(b)	Undesirable Emission – Radiated Measurement	Compliant
§15.407(c)	Transmission in case of Absence of Information	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.4079d)	Antenna Requirement	Compliant
§1.1310 and §2.1093	RF exposures	Compliant

4. DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test mode. Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Base mode of frequency band 5.15GHz – 5.35GHz: Channel 1(5180MHz)、4(5240MHz)、5(5260MHz) and 8(5320MHz) with 54Mbps which is the highest and worst-case data rate are chosen for full testing.

5. AC POWER LINE CONDUCTED EMISSION TEST

5.1. Standard Applicable

Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.According to §15.207 frequency within 150kHz to 30MHz shall not exceed

Frequency range (MHz)	Limits (dBuV)	
	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
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

5.2. EUT Setup

1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was plug-in the host Notebook via PCMCIA / MiniPCI testing platform. The host Notebook system was placed on the center of the back edge on the test table. The peripherals like printer, K/B, and mouse were placed on the side of the host Notebook system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the Notebook, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host Notebook system was connected with 110Vac/60Hz power source.

5.3. Measurement 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.

5.4. Measurement Equipment Used:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESHS30	828144/003	08/08/2002	08/07/2003
LISN	R&S	ESH2-Z5	843285/010	10/17/2002	10/16/2003
LISN	EMCO	3825/2	9003-1628	07/26/2002	07/25/2003
2X2 WIRE ISN	R&S	ENY22	100020	06/20/2003	06/19/2004
FOUR WIRE ISN	R&S	ENY41	100006	06/20/2003	06/19/2004

5.5. Measurement Result

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.

AC POWER LINE CONDUCTED EMISSION TEST

Operation Mode:	TX + RX Mode			Test Date:	June 30, 2003
Temperature:	30°C	Humidity:	70%	Test By:	Jacky

FREQ MHz	Q.P. Raw dBuV	AVG Raw dBuV	Q.P. Limit dBuV	AVG Limit dBuV	Q.P. Margin dB	AVG Margin dB	NOTE
0.220	47.51	---	62.82	52.82	-15.31	---	L1
0.322	43.85	---	59.66	49.66	-15.81	---	L1
0.387	46.00	---	58.13	48.13	-12.13	---	L1
0.612	41.23	---	56.00	46.00	-14.77	---	L1
4.106	43.85	---	56.00	46.00	-12.15	---	L1
4.720	42.88	---	56.00	46.00	-13.12	---	L1
0.220	47.35	---	62.82	52.82	-15.47	---	L2
0.529	42.85	---	56.00	46.00	-13.15	---	L2
0.871	41.85	---	56.00	46.00	-14.15	---	L2
1.133	42.95	---	56.00	46.00	-13.05	---	L2
1.482	41.85	---	56.00	46.00	-14.15	---	L2
4.720	40.95	---	56.00	46.00	-15.05	---	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) **"**---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.

(4) 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;

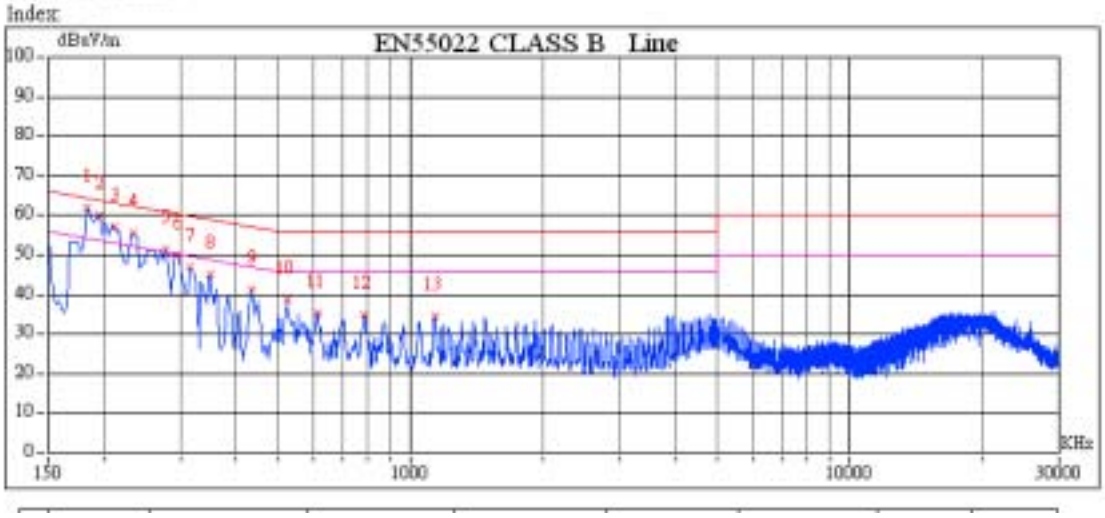
(5) L1 = Line One (Live Line side) / L2 = Line Two (Neutral Line side)

Conducted Emission Test Data L1

程智科技股份有限公司
C&C LABORATORY CO., LTD.
Tel: 886-3-3245966
Fax: 886-3-3245235

Test Mode:

Customer Name: 廣達
Model Name: BMC94309MP
Project No.:
Engineer Name:
Index:

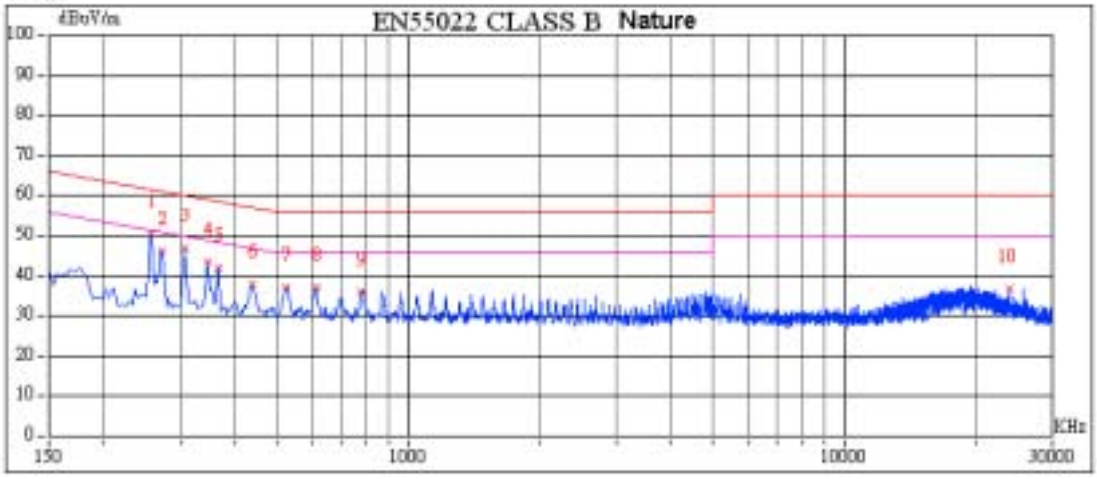


Conducted Emission Test Data L2

程智科技股份有限公司
C&C LABORATORY CO., LTD.
Tel: 886-3-3245966
Fax: 886-3-3245235

Test Mode:

Customer Name: 廣達
Model Name: BMC94309MP
Project No.:
Engineer Name:
Index:



6. 26 dB Bandwidth Measurement

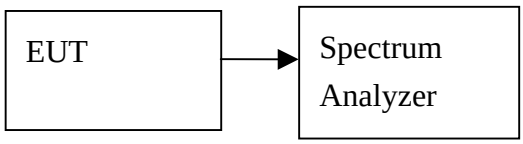
6.1. Standard Applicable

According to §15.403(C). No Limit required.

6.2. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004

6.3. Test Set-up:



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

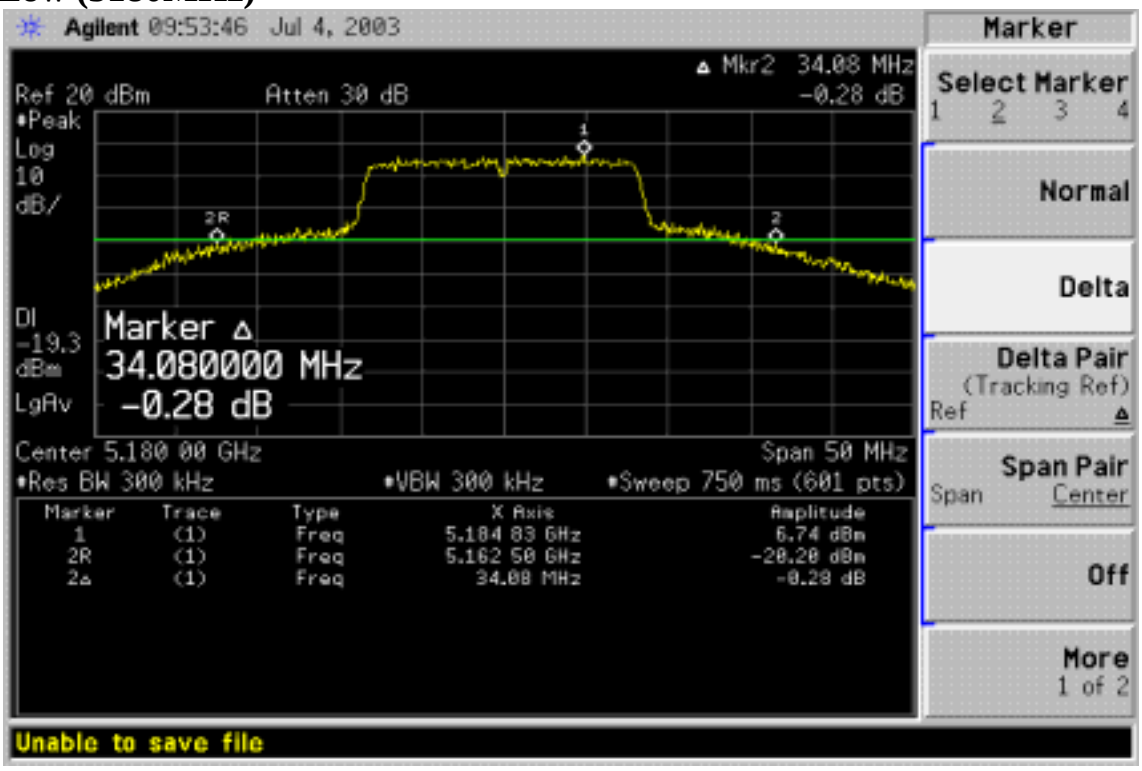
6.4. Measurement Procedure

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 the spectrum analyzer.
3. Set the spectrum analyzer as RBW=1%EBW, VBW = RBW, Span=50MHz/100MHz(Turbo Mode), Sweep=auto.
4. Mark the peak frequency and –26dBc (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

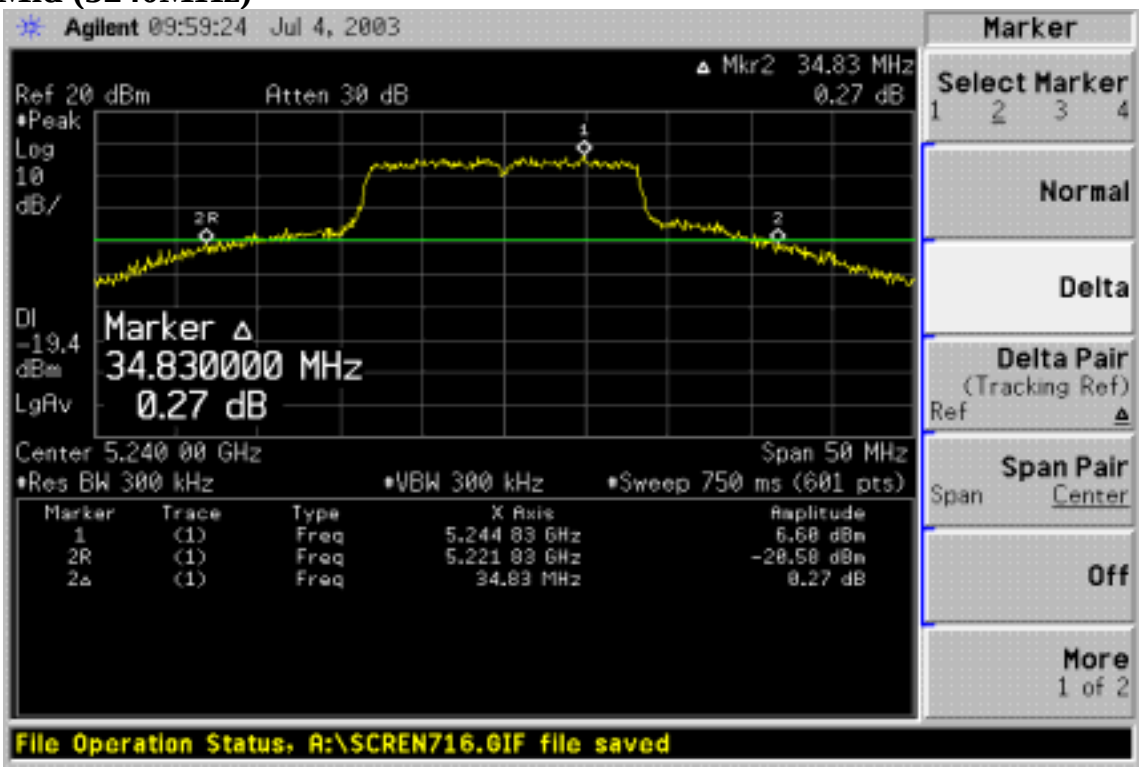
6.5. Measurement Result

Channel	Frequency (MHz)	Bandwidth (B) (MHz)	10 Log B (dB)
Low	5180	34.08	15.32
Mid	5240	34.83	15.42
Mid	5260	33.58	15.26
High	5320	33.58	15.26

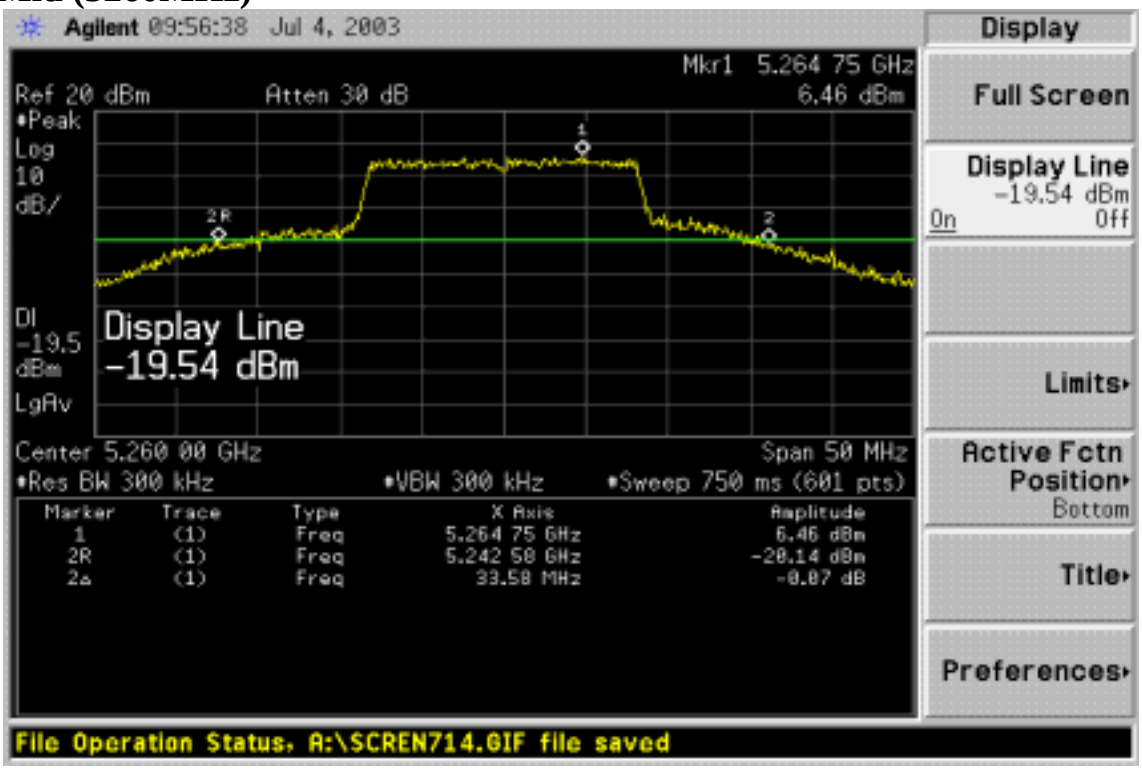
CH-Low (5180MHz)



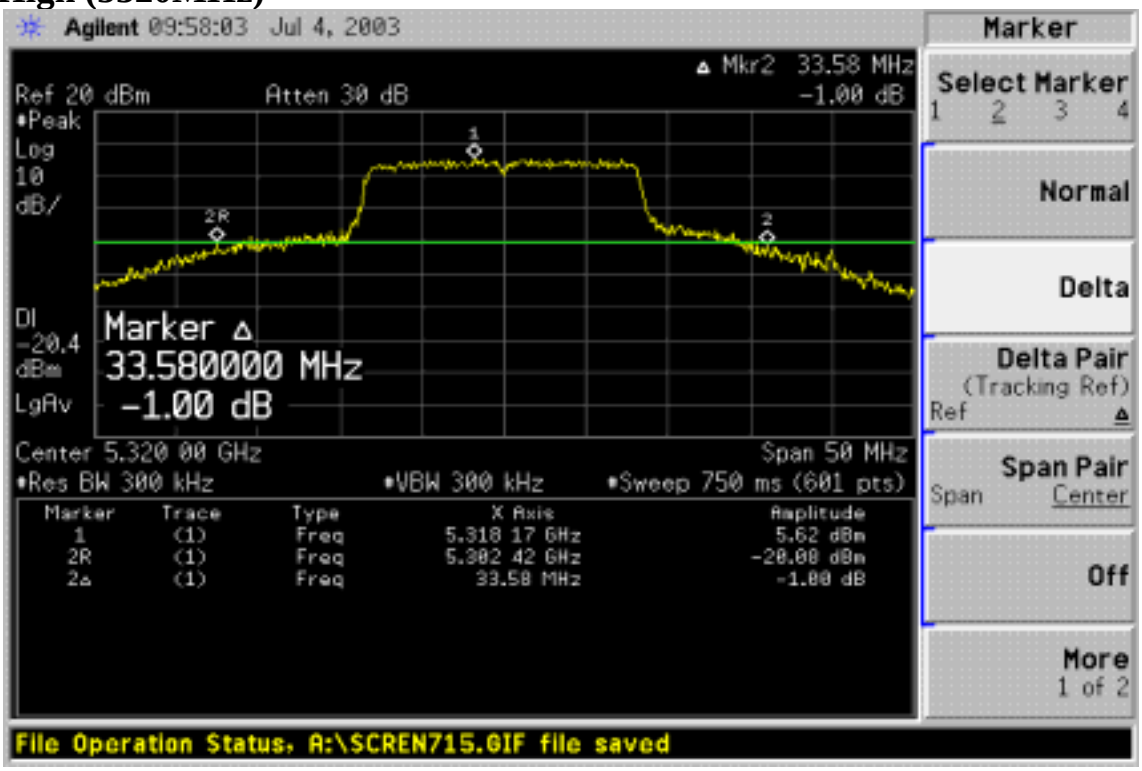
CH-Mid (5240MHz)



CH-Mid (5260MHz)



CH-High (5320MHz)



7. PEAK OUTPUT POWER MEASUREMENT

7.1. Standard Applicable

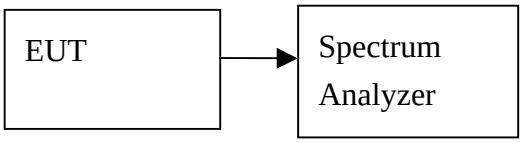
(1) For the band 5.15-5.25 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.

(2) For the band 5.25-5.35 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.

(3) For the band 5.725-5.825 GHz, the peak transmit power over the frequency band of operation shall not exceed the lesser of 1W (30dBm) or 17 dBm + 10log B.

Where B is the -26dBc emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

7.2. Test Set-up:



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

7.3. Measurement Procedure

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 the power meter or spectrum. (Channel Power Function, RBW=1MHz,VBW=3MHz, CP Bandwidth =26dB Emission Bandwidth)

3. Record the max. reading.

4. Repeat above procedures until all frequency measured were complete.

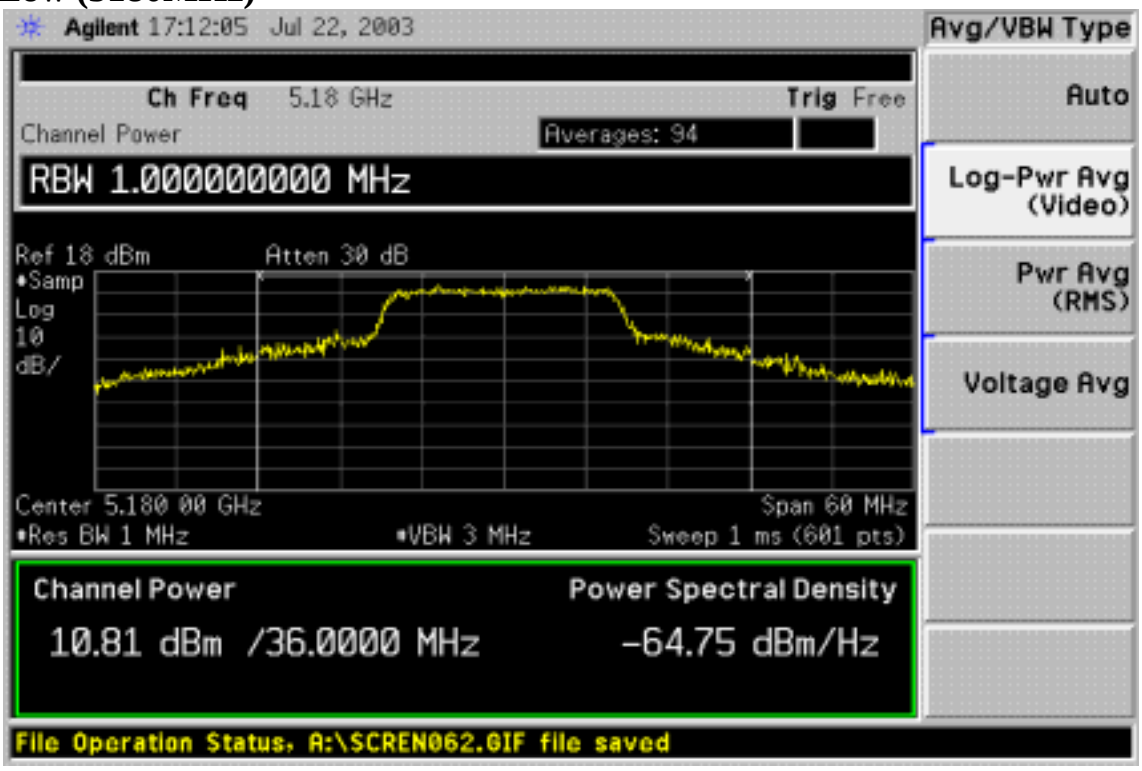
7.4. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004

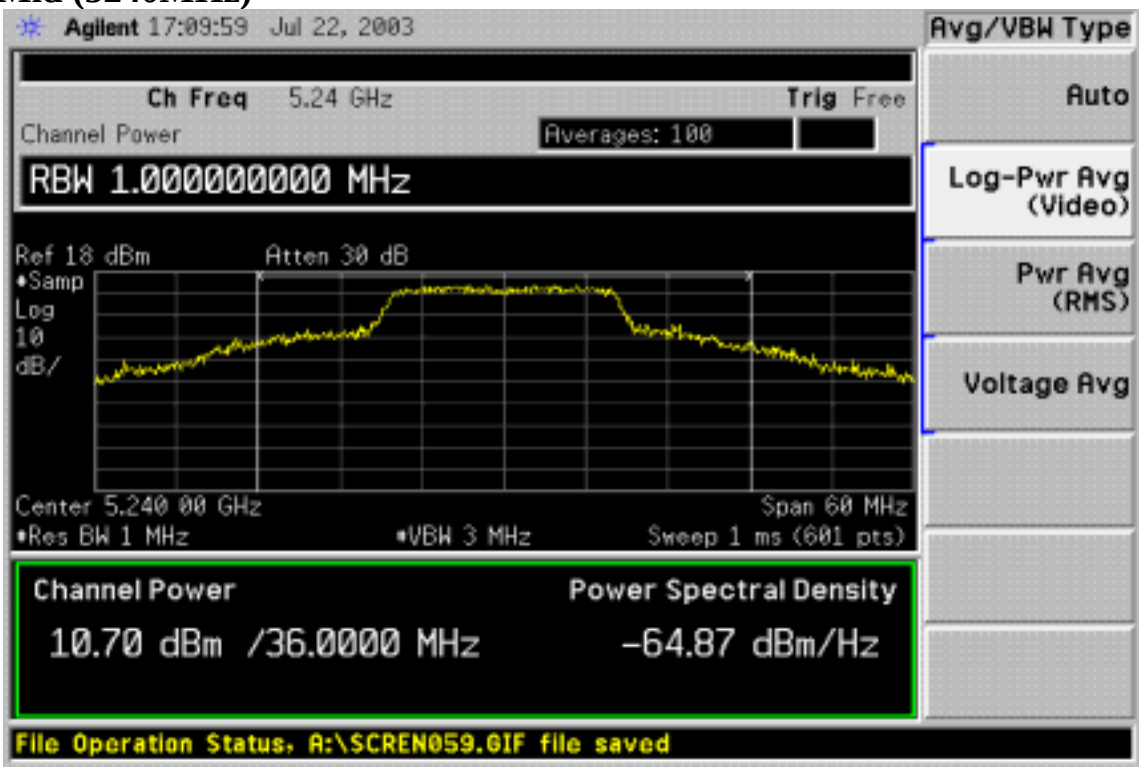
7.5. Test Results:

Channel	Frequency (MHz)	Reading (dBm)	Cable Loss	Limit (dBm)	Output Power(dBm)
Low	5180	10.81	2.70	17	13.51
Mid	5240	10.70	2.70	17	13.4
Mid	5260	10.18	2.70	24	12.88
High	5320	10.14	2.70	24	12.84

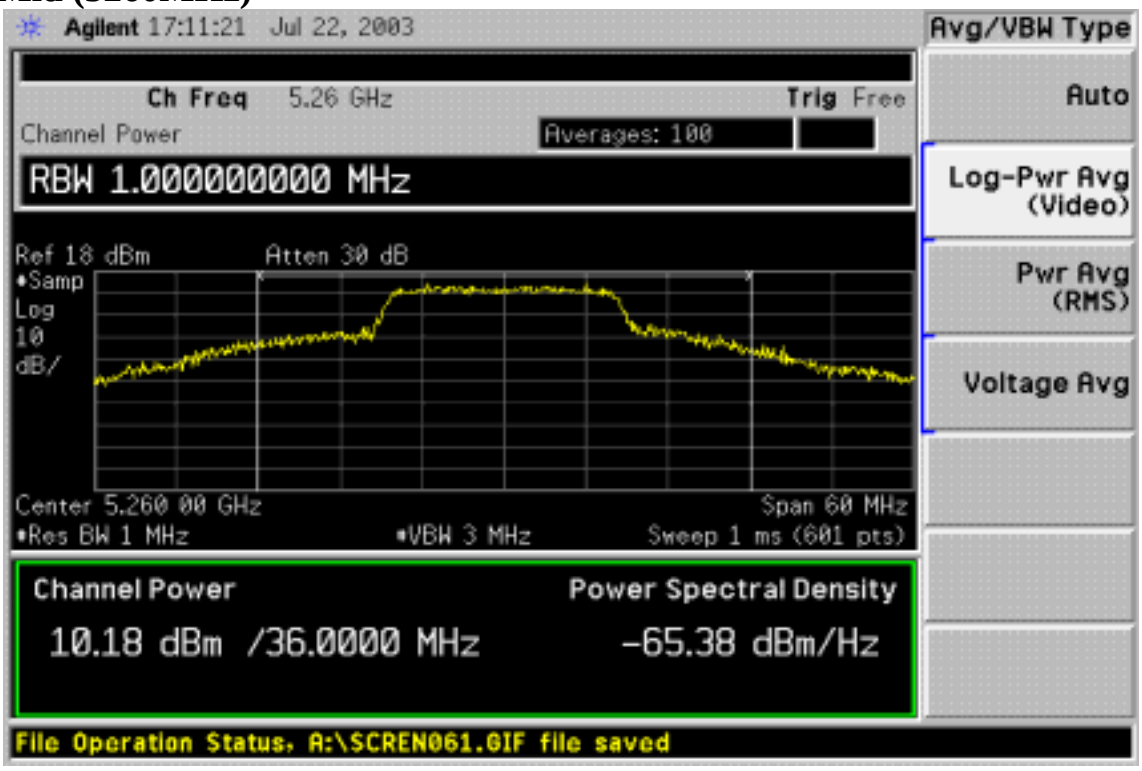
CH-Low (5180MHz)



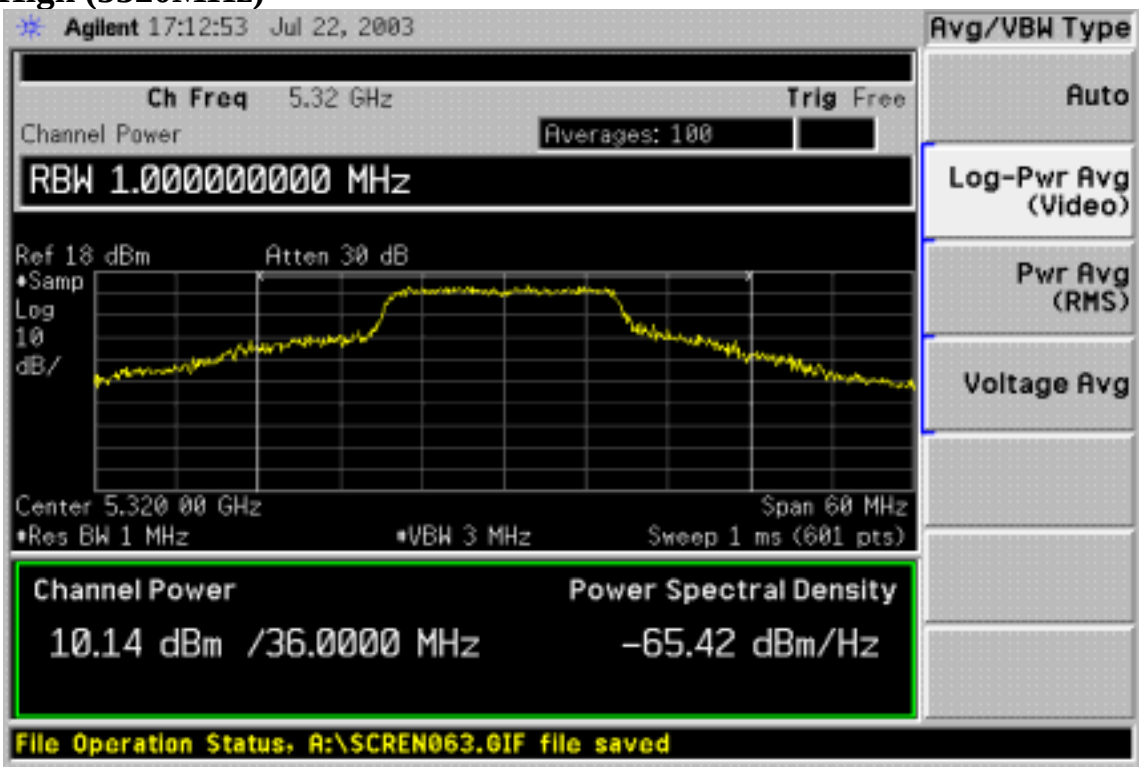
CH-Mid (5240MHz)



CH-Mid (5260MHz)



CH-High (5320MHz)



8. PEAK POWER SPECTRAL DENSITY MEASUREMENT

8.1. Standard Applicable

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

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

(3) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

Where B is the -26dBc emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi 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 6 dBi.

8.2. Measurement Procedure

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. Set RBW=1MHz,VBW=3MHz, Span=30MHz (Base Mode)/ 50MHz (Turbo Mode), Sweep time = Auto.
4. Record the max. reading.
5. Repeat above procedures until all frequency measured were complete.

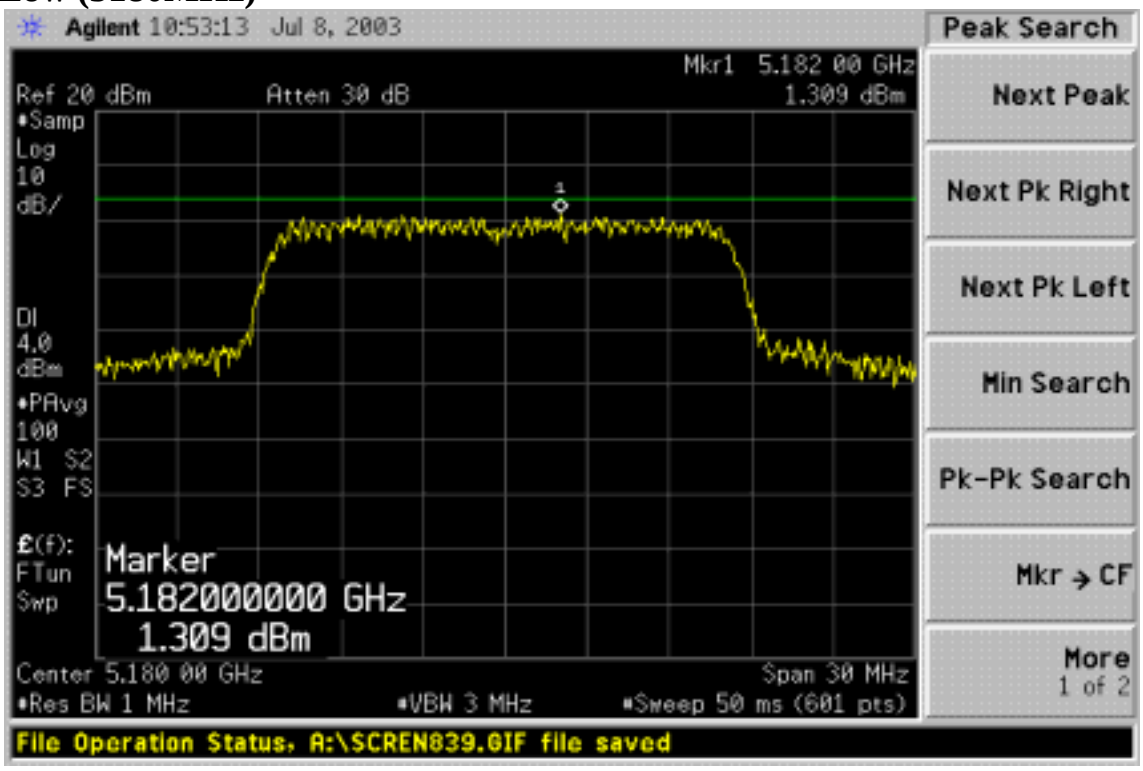
8.3. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004

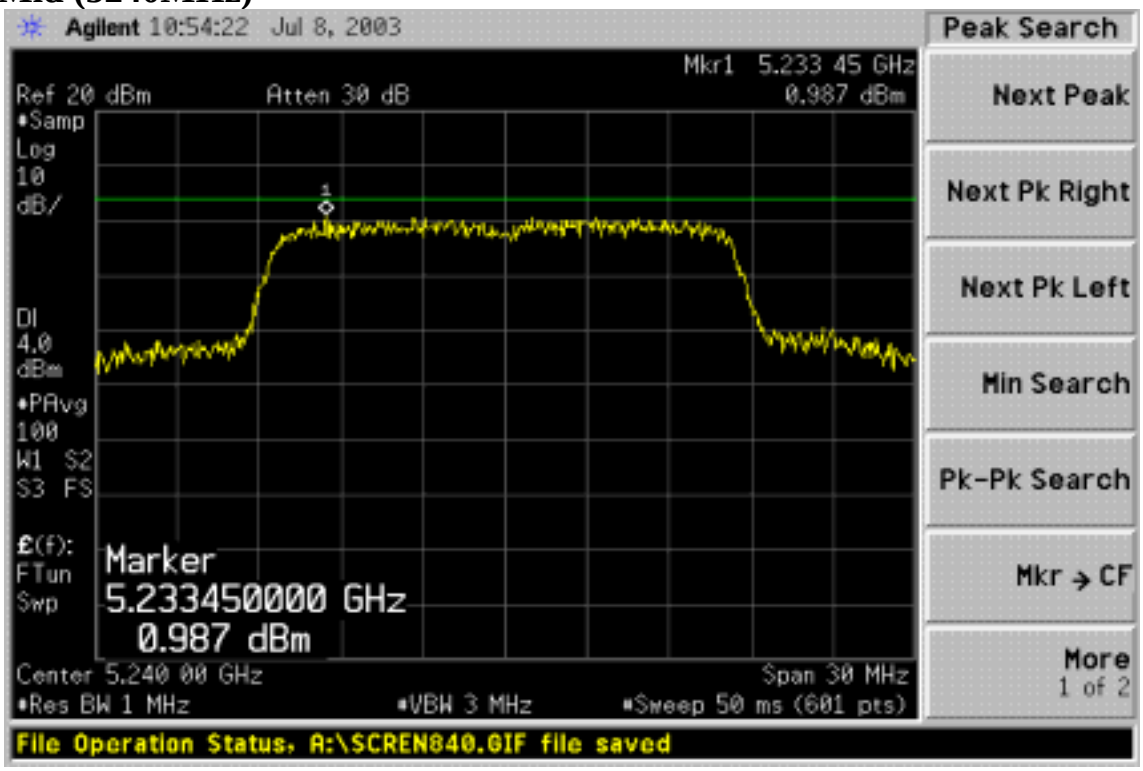
8.4. Test Results:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	1.309	4	-2.691
Mid	5240	0.987	4	-3.013
Mid	5260	0.751	11	-10.249
High	5320	0.280	11	-10.720

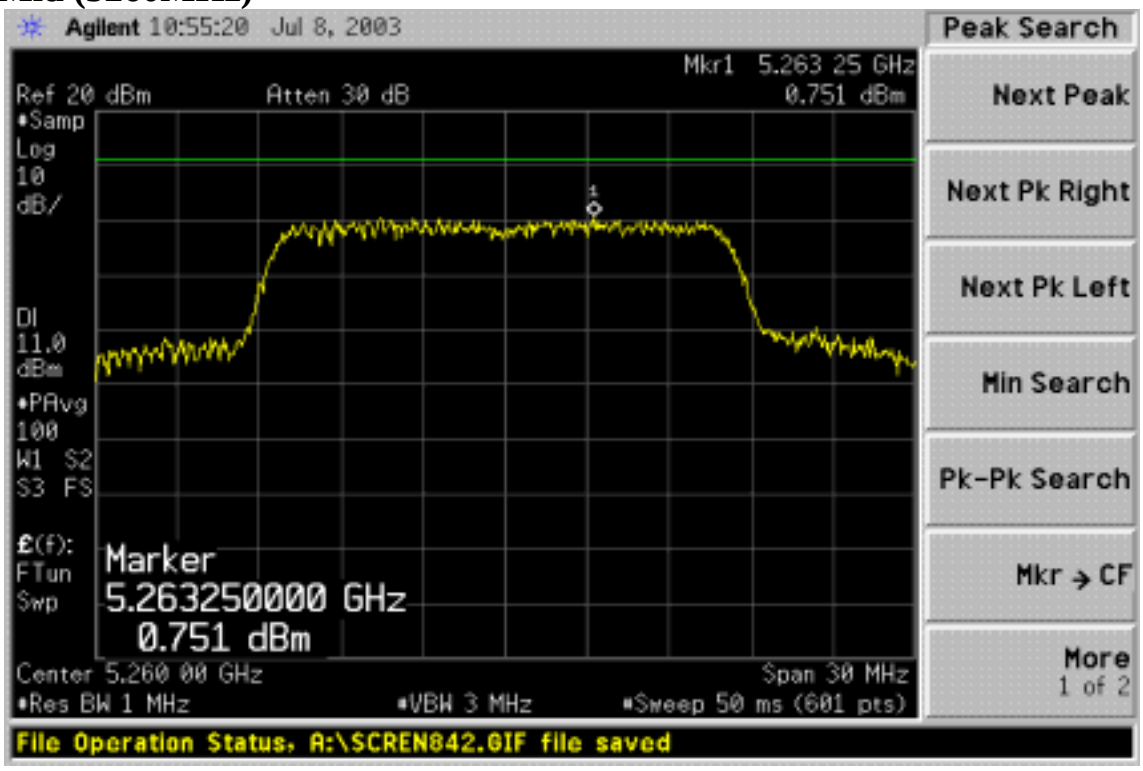
CH-Low (5180MHz)



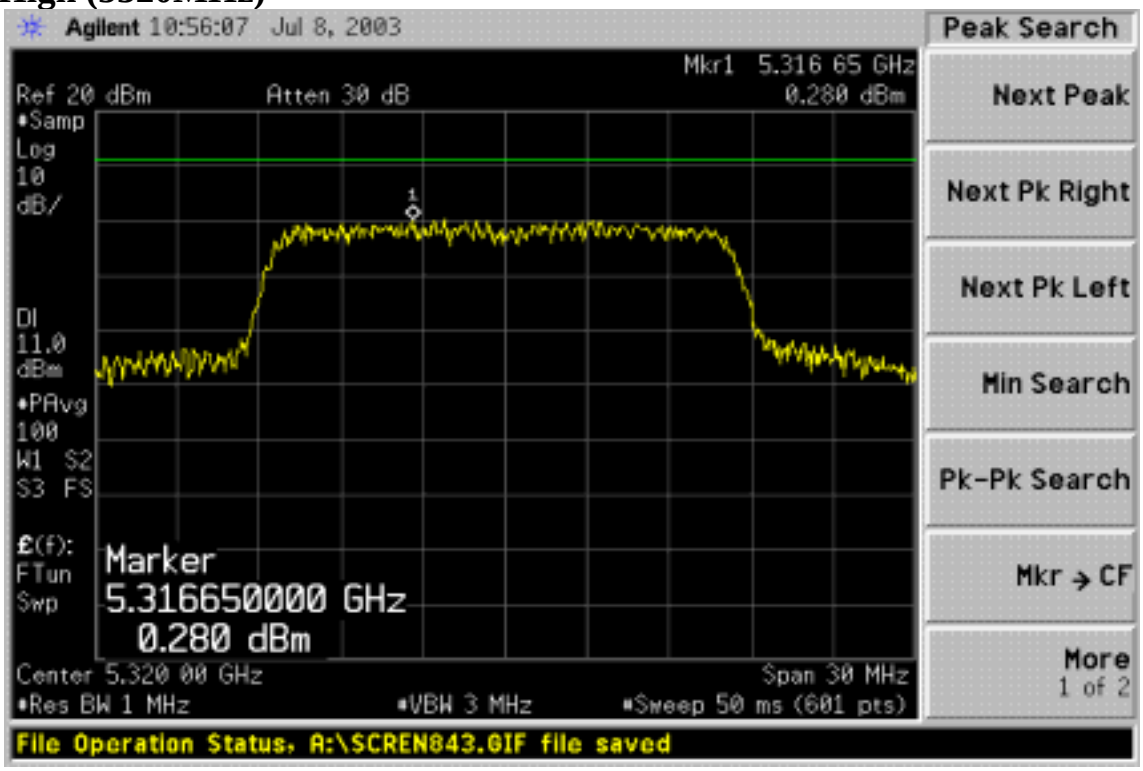
CH-Mid (5240MHz)



CH-Mid (5260MHz)



CH-High (5320MHz)



9. PEAK EXCURSION MEASUREMENT

10.1. Standard Applicable

15.407(a)(6) 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.

10.2. Measurement Procedure

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 = 3MHz, Span = 25MHz(Base Mode)/50MHz(Turbo Mode), Max. hold.
4. Trace B, Set RBW=1MHz, VBW = 30kHz, Span =25MHz(Base Mode)/50MHz(Turbo Mode), Max. hold..
5. Delta Mark trace A Maximum frequency and trace B same frequency.
6. Repeat above procedures until all frequency measured were complete.

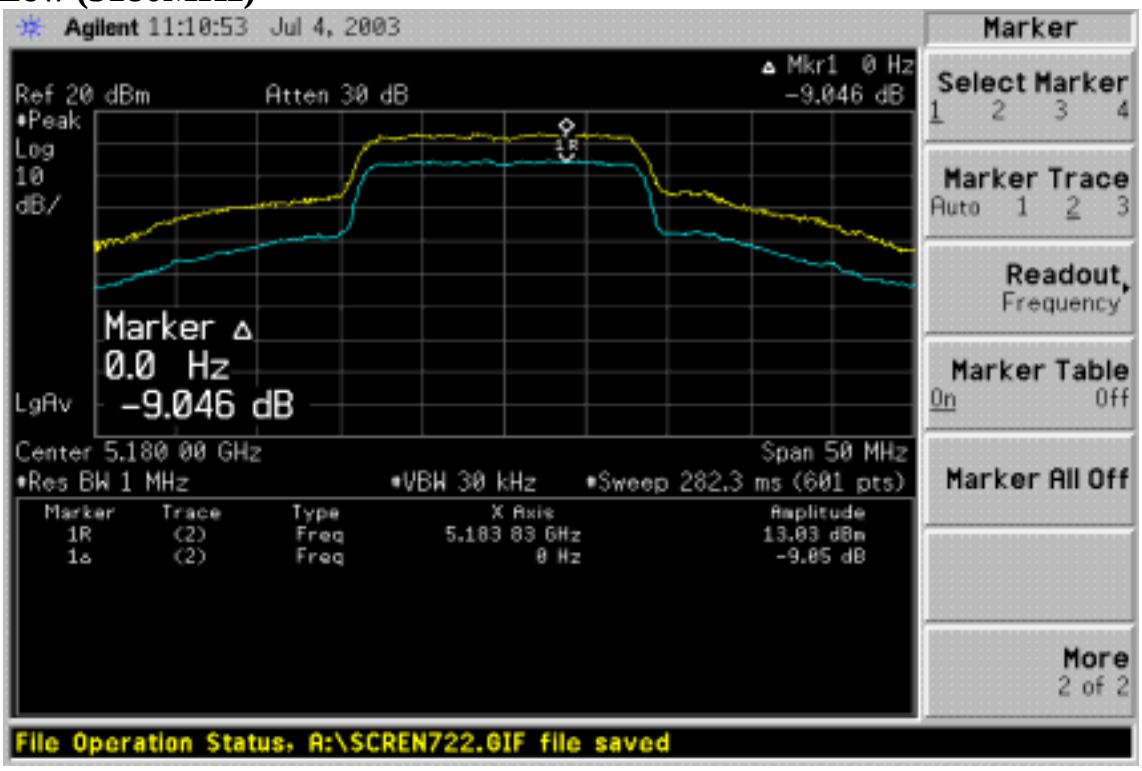
10.3. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004

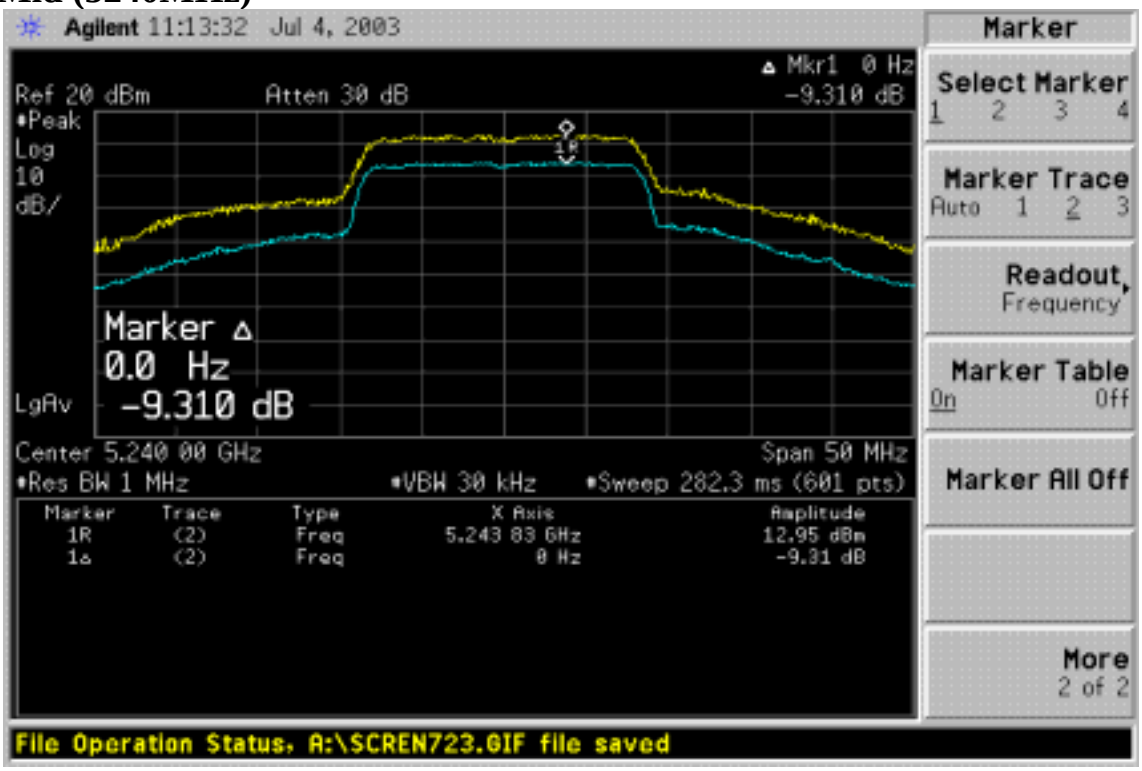
10.4.Test Results:

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	9.046	13	-3.954
Mid	5240	9.310	13	-3.690
Mid	5260	9.245	13	-3.755
High	5320	9.166	13	-3.834

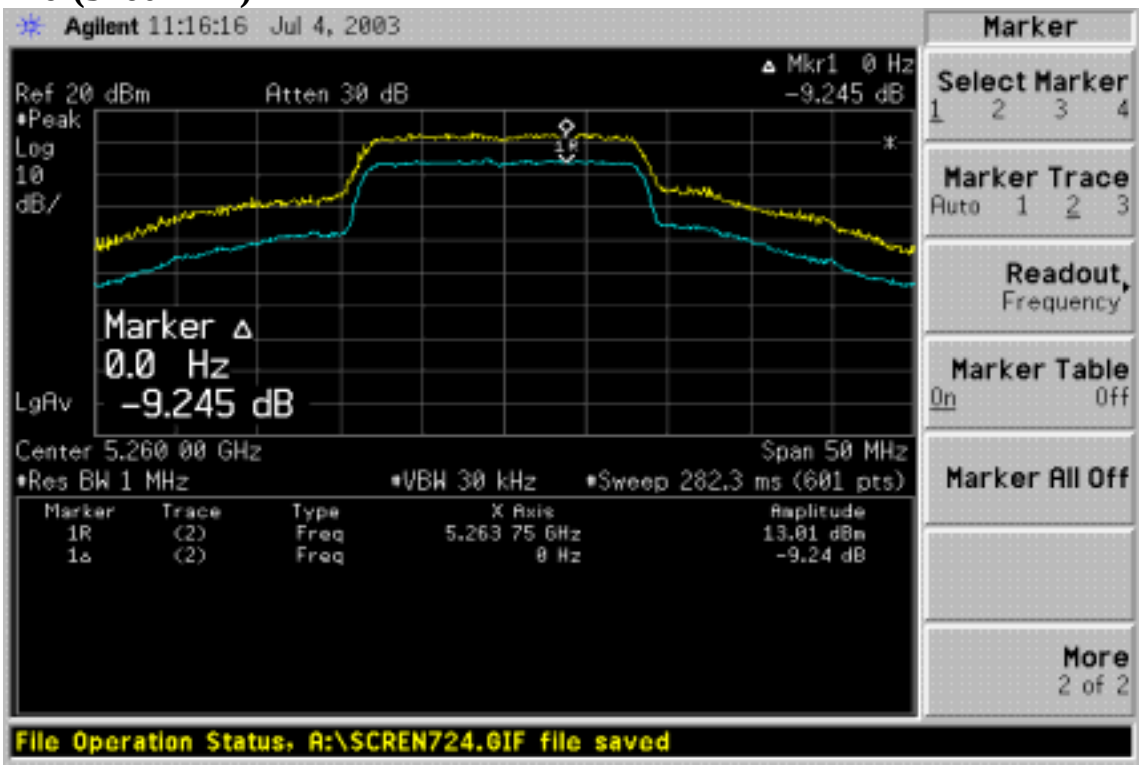
CH-Low (5180MHz)



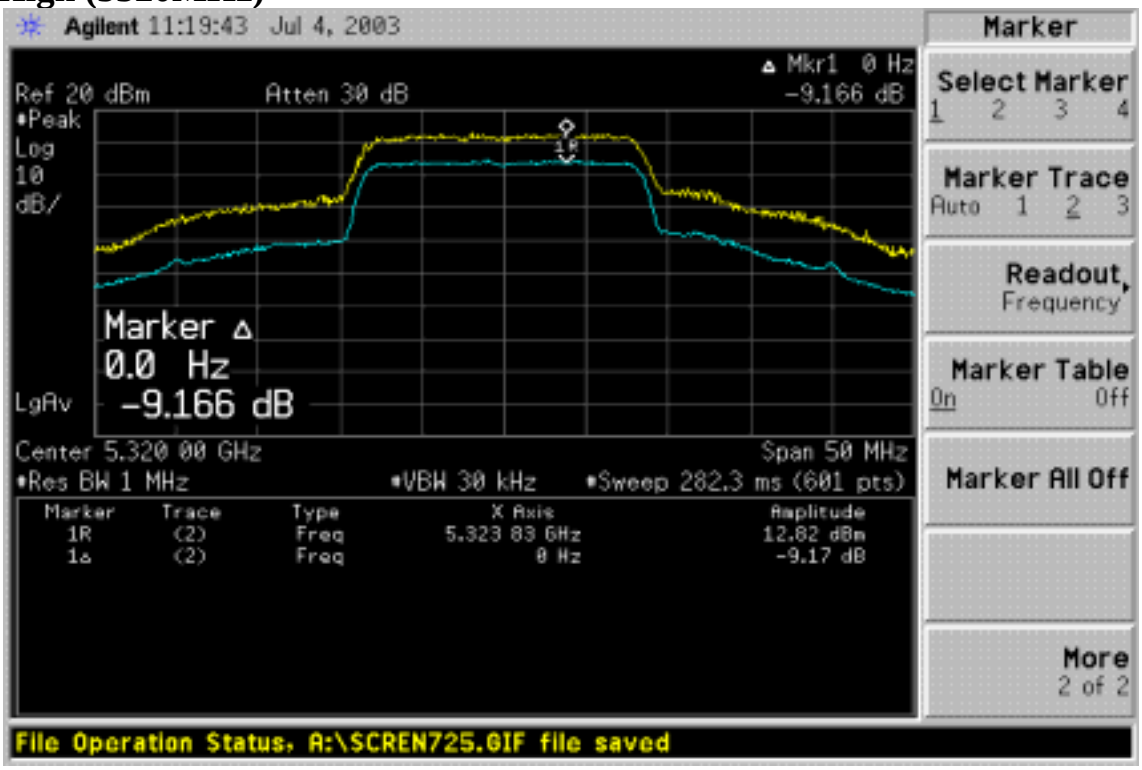
CH-Mid (5240MHz)



CH-Mid (5260MHz)



CH-High (5320MHz)

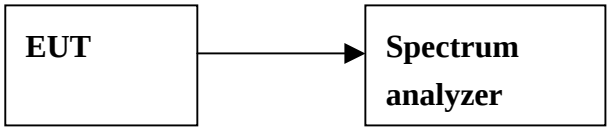


10. BAND EDGES MEASUREMENT

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 and measurements on the radiated emissions site.

10.1. Test Setup

1. Conducted test



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

2. Radiation test

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4/1992.

10.2. Measurement Procedure

1. Conducted test:

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1MHz and the VBW is set to 1MHz for peak measurements. The RBW is set to 1MHz and the VBW is set to 10Hz for average measurements. The sweep time is coupled.

2. Radiation test

For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

10.3. Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/18/2003	03/17/2004
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
EMI Test Receiver	R&S	ESVS20	838804/004	01/04/2003	01/03/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bi-log Antenna	SCHWAZBECK	VULB9163	145	07/06/2003	07/05/2004
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2002	11/16/2003
Horn antenna	EMCO	3116	2487	11/11/2002	11/10/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2002	10/02/2003

10.4. Measurement Result

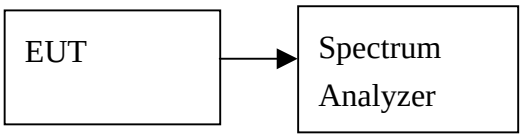
Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)		Factor (dB)	Emission (dBuV/m)		Limit Line (dBuV/m)		Margin (dBuV/m)	
		PK	AV		PK	AV	PK	AV	PK	AV
5150	H	46.33	37.00	4.00	50.33	41.00	74	54	-23.67	-13.00
5350	H	46.17	35.50	4.36	50.53	39.86	74	54	-23.47	-14.14
5150	V	47.83	37.35	4.00	51.83	41.35	74	54	-22.17	-12.65
5350	V	46.67	36.83	4.36	51.03	41.19	74	54	-22.97	-12.81

11. UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT

Conducted RF measurements of the transmitter output were made at the band edges and the adjacent restricted bands.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 40 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

11.1. Test setup



The EUT was connected to a power meter through a 50Ω RF cable.

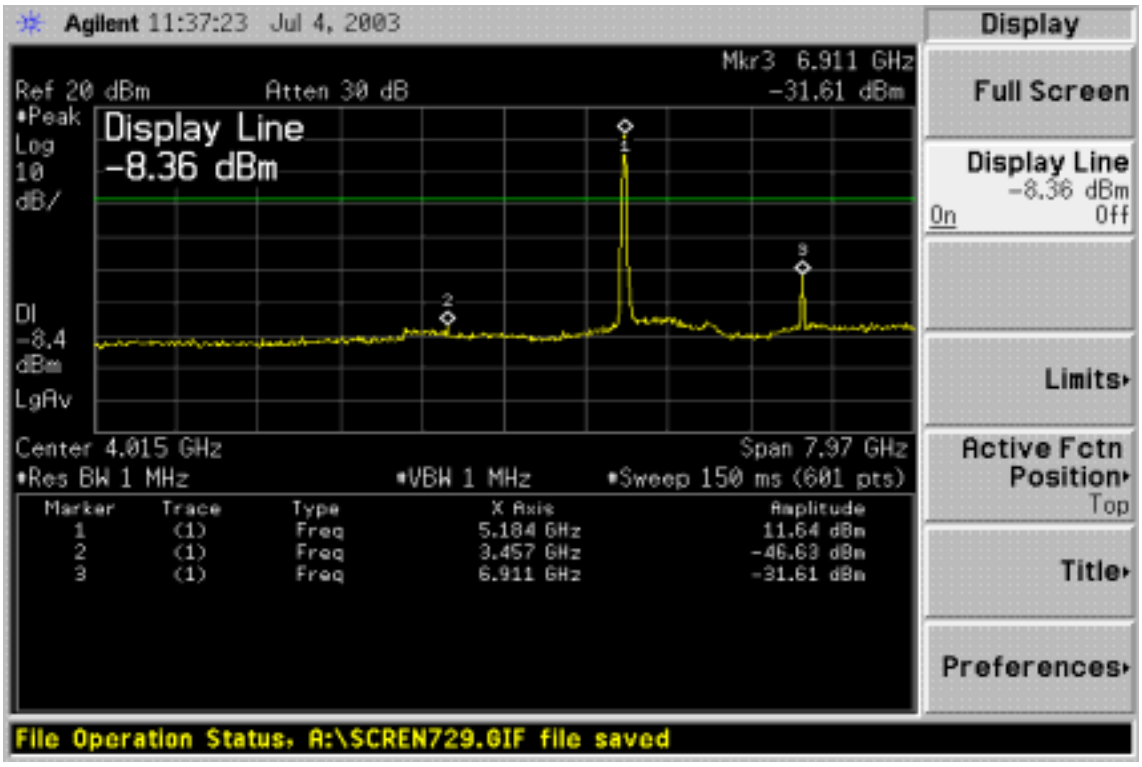
11.2. Measurement Procedure

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. Set Spectrum RBW=1MHz, VBW = 1MHz for peak measurement.
4. Set Spectrum over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

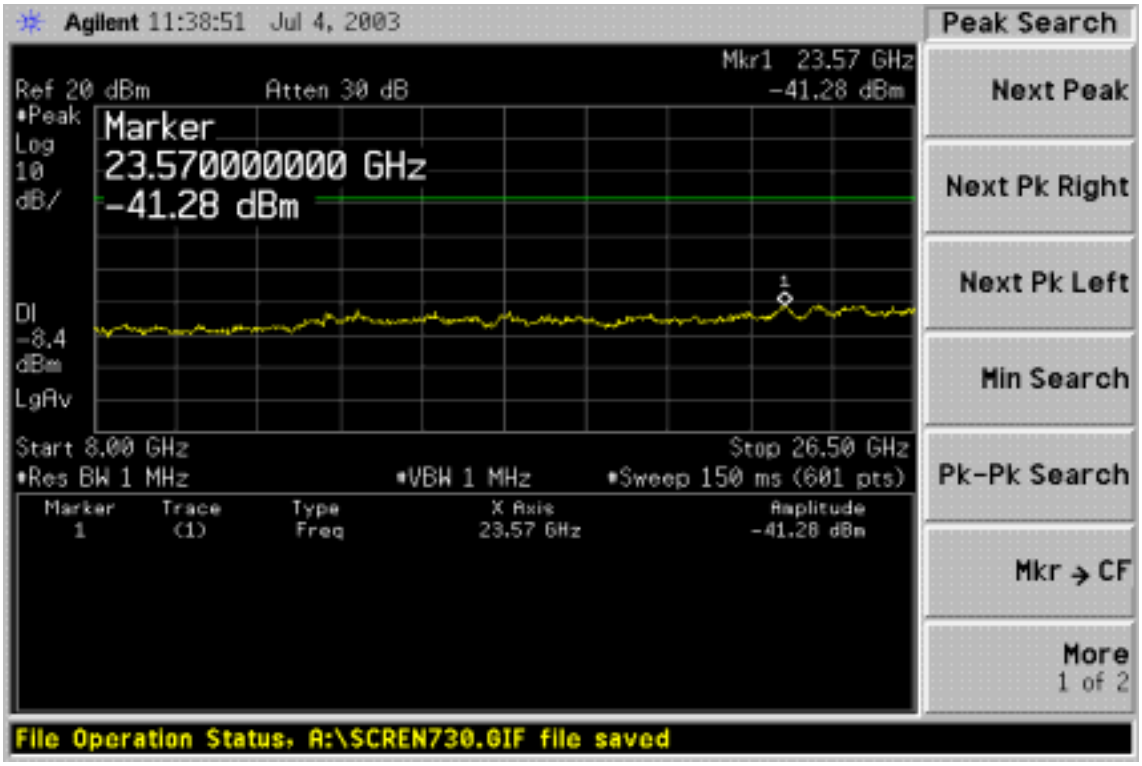
11.3. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	Model No.	Serial No.	LAST CAL.	Cal. Due.
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004

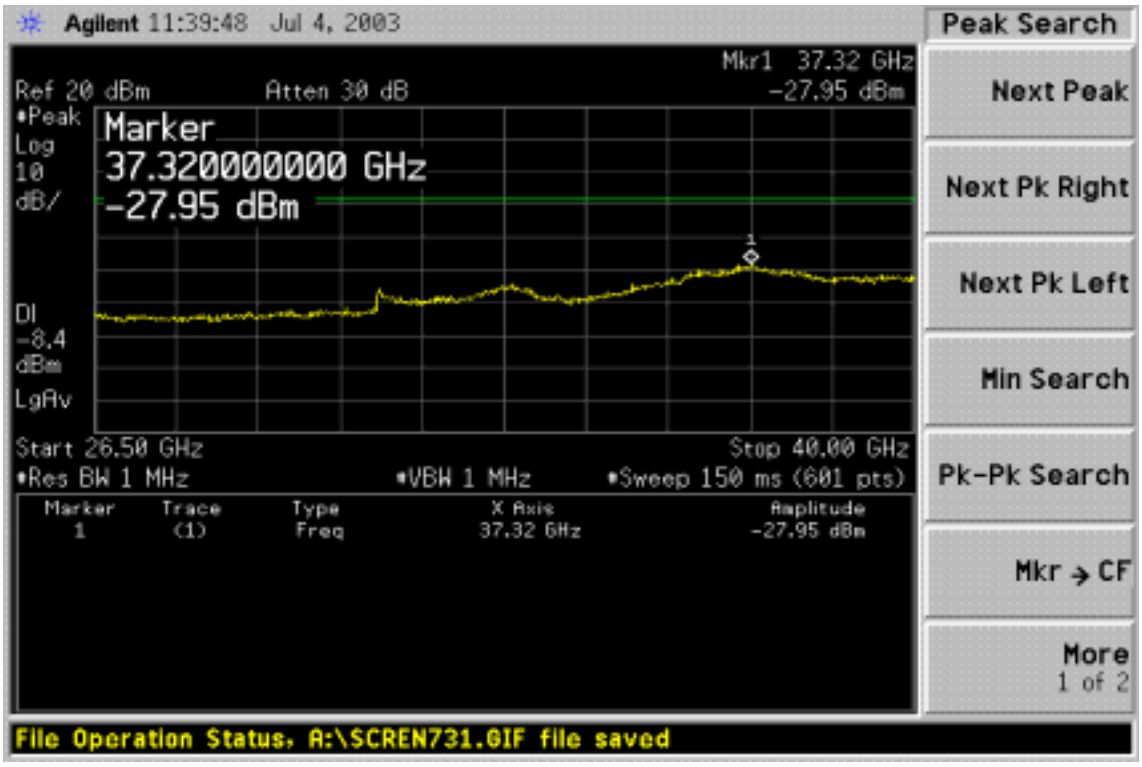
CH Low 30MHz – 8GHz



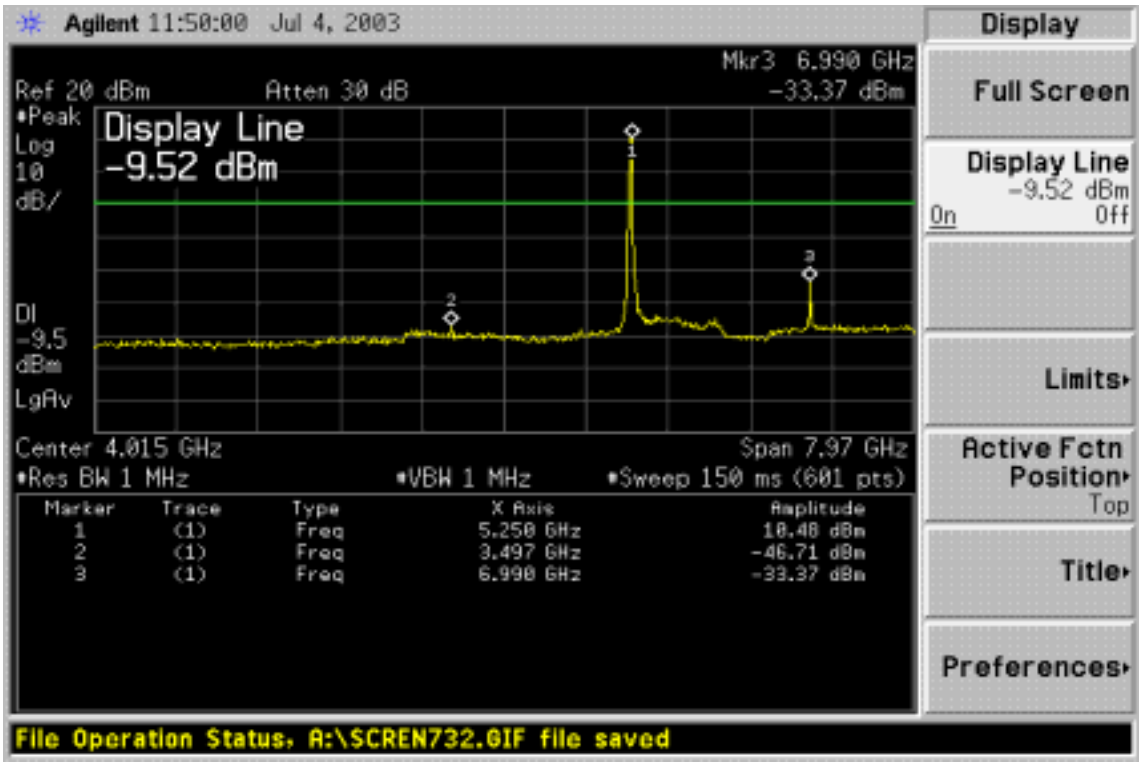
CH Low 8GHz – 26.5GHz



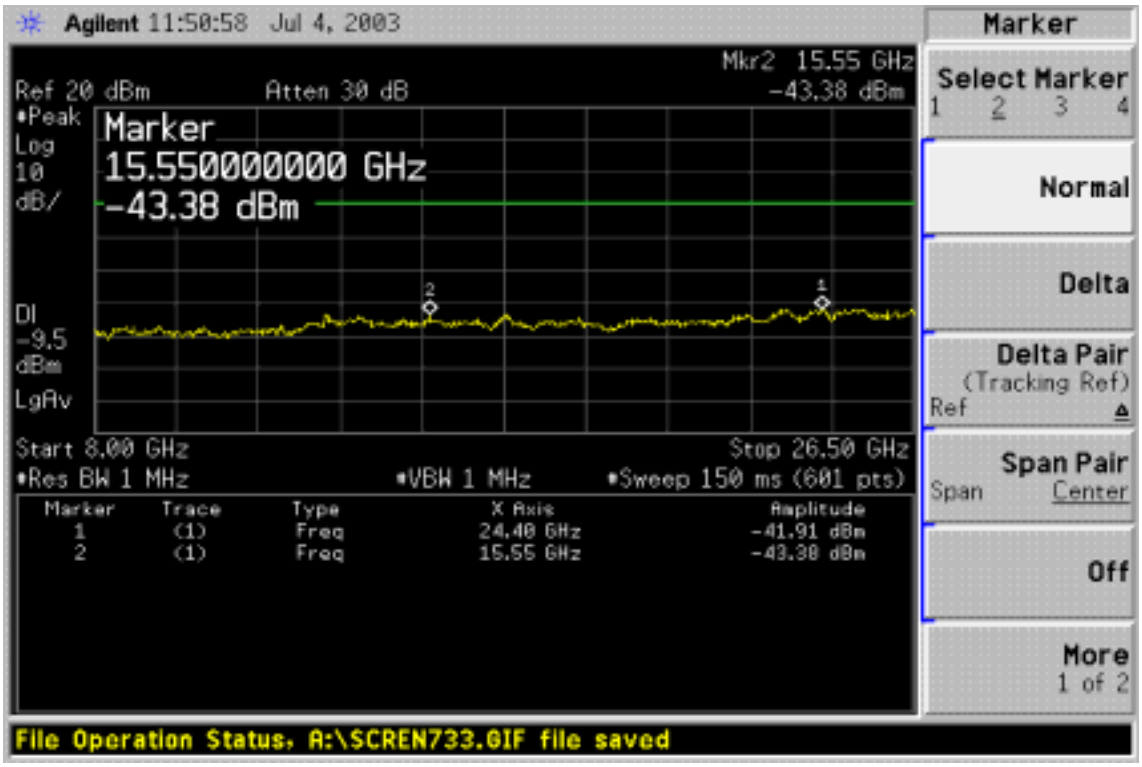
CH Low 26.5GHz – 40GHz



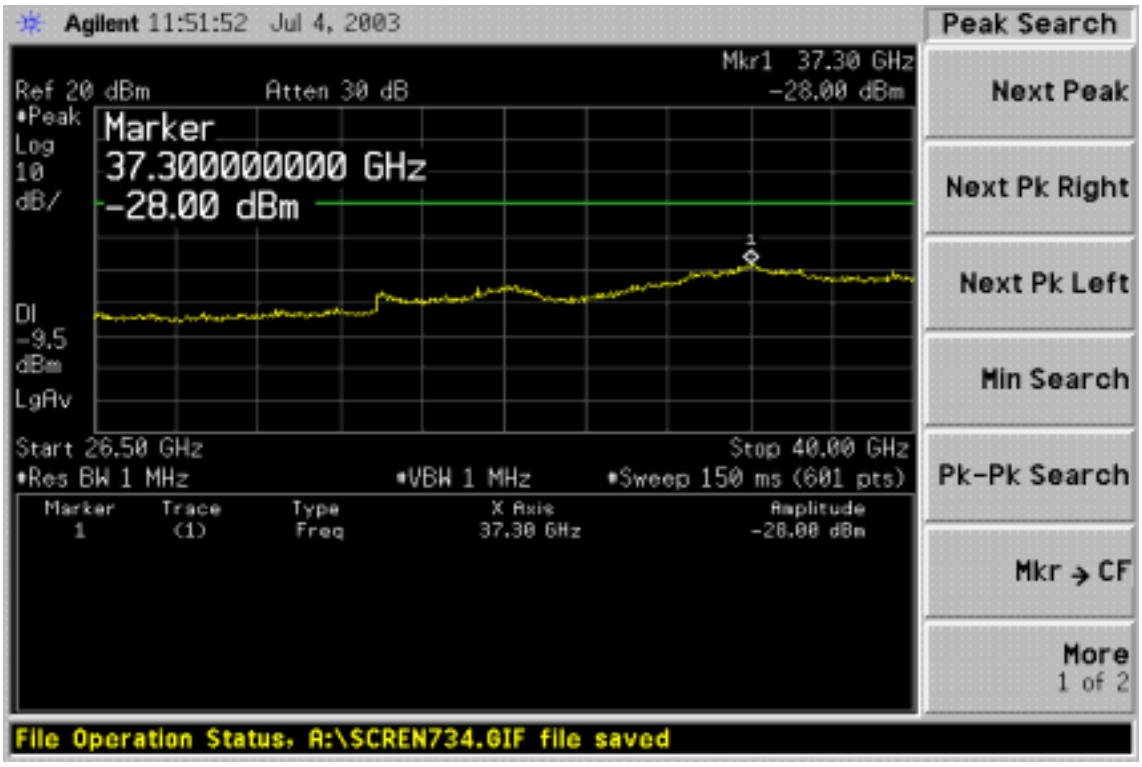
CH Mid 30MHz – 8GHz



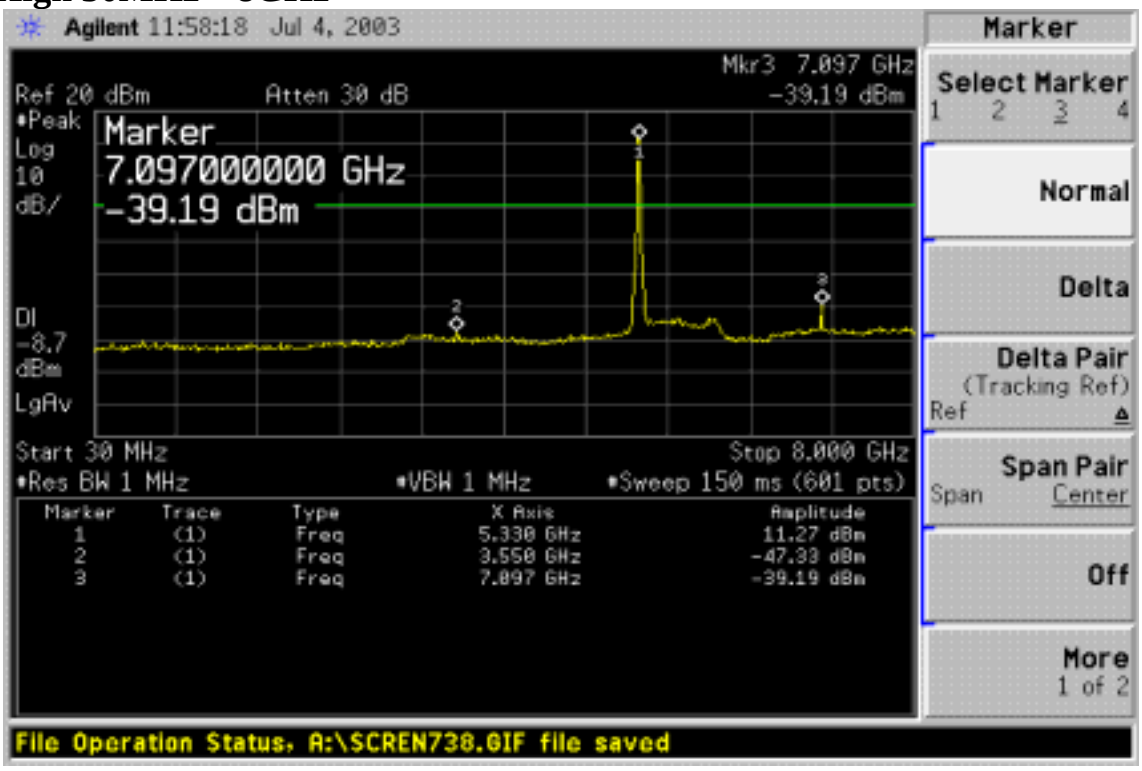
CH Mid 8GHz – 26.5GHz



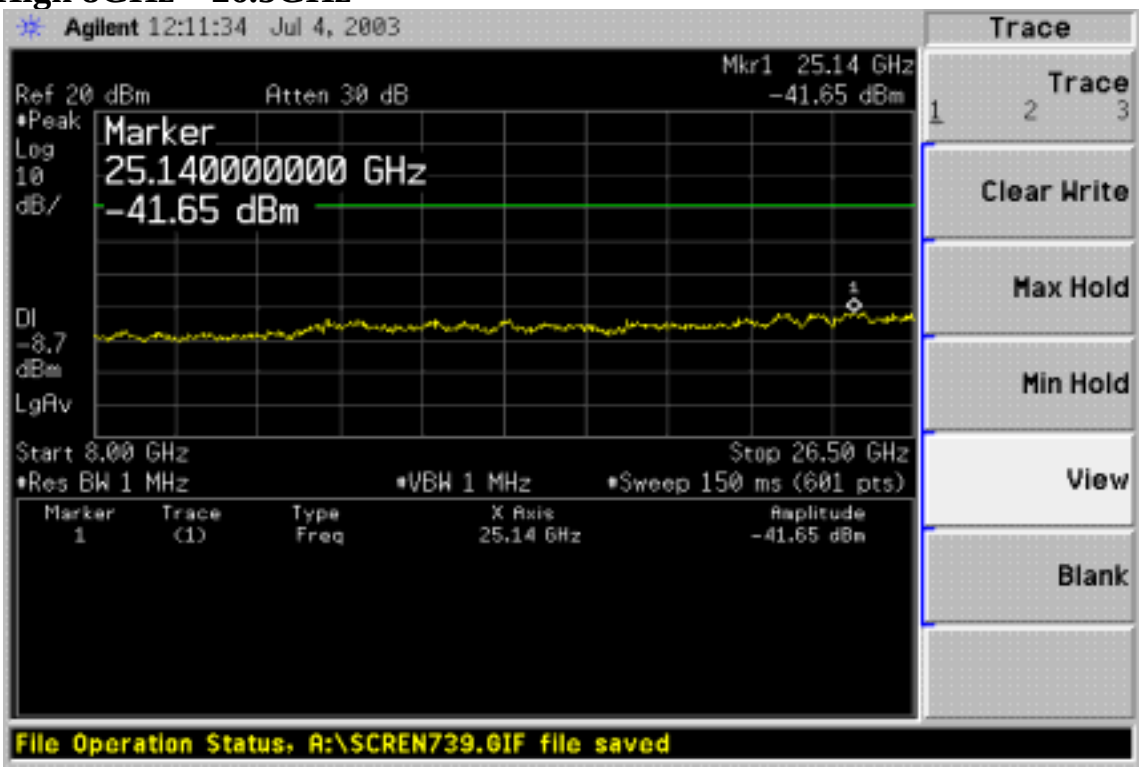
CH Mid 26.5GHz – 40GHz



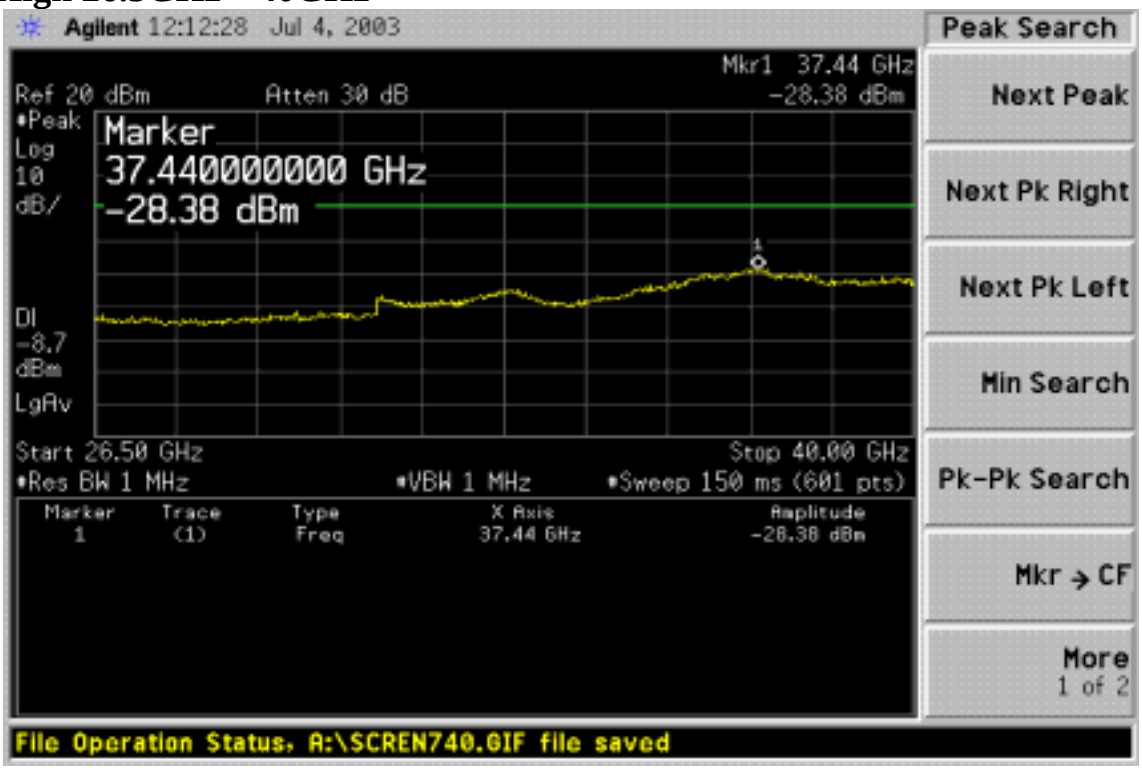
CH High 30MHz – 8GHz



CH High 8GHz – 26.5GHz



CH High 26.5GHz – 40GHz



12. UNDESIRABLE EMISSION - RADIATED MEASUREMENT

12.1 Standard Applicable

(1) 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.

(2) 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.

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

§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.

§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS

FCC PART 15.209

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	**FIELD STRENGTH (Microvolts/m)**	**FIELD STRENGTH (dBuV/m)**
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

12.2 EUT Setup

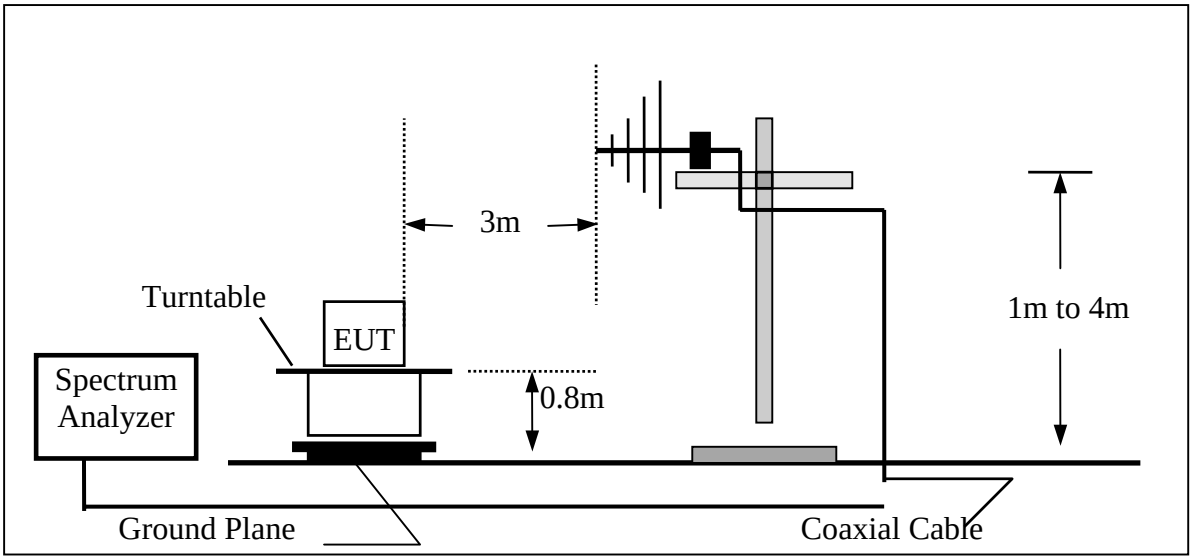
1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
2. The EUT was plug-in the host Notebook via PCMCIA port. The host Notebook system was placed on the center of the back edge on the test table. The peripherals like printer, K/B, and mouse were placed on the side of the host Notebook system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
3. The keyboard was placed directly in the front of the Notebook, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
4. The spacing between the peripherals was 10 centimeters.
5. External I/O cables were draped along the edge of the test table and bundle when necessary.
6. The host Notebook system was connected with 110Vac/60Hz power source.

12.3 Measurement Procedure

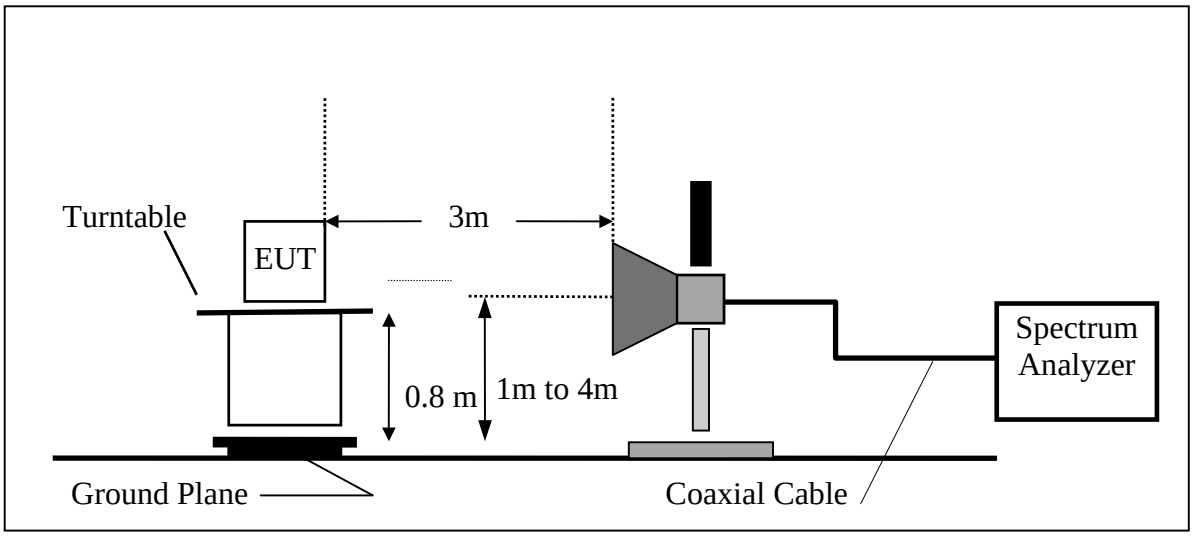
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was 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. Repeat above procedures until all frequency measured were complete.

12.4 Test Set-up (Block Diagram of Configuration)

(A) Radiated Emission Test Set-up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-up Frequency Over 1 GHz



12.5 Measurement Equipment Used:

Open Area Test Site # 3					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
Spectrum Analyzer	ADVANTEST	R3261A	N/A	03/18/2003	03/17/2004
Spectrum Analyzer	Advantest	R3182	110600647	11/16/2002	11/15/2003
Spectrum Analyzer	Agilent	E4446A	US42510252	04/28/2003	04/27/2004
EMI Test Receiver	R&S	ESVS20	838804/004	01/04/2003	01/03/2004
Pre-Amplifier	HP	8447D	2944A09173	03/03/2003	03/02/2004
Bi-log Antenna	SCHWAZBECK	VULB9163	145	07/06/2003	07/05/2004
Turn Table	EMCO	2081-1.21	9709-1885	N.C.R	N.C.R
Antenna Tower	EMCO	2075-2	9707-2060	N.C.R	N.C.R
Controller	EMCO	2090	9709-1256	N.C.R	N.C.R
RF Switch	ANRITSU	MP59B	M53867	N.C.R	N.C.R
Site NSA	C&C	N/A	N/A	11/17/2002	11/16/2003
Horn antenna	EMCO	3116	2487	11/11/2002	11/10/2003
Pre-Amplifier	HP	8449B	3008B00965	10/01/2002	10/02/2003

Factor Calculation

The Factor is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

F=AF + CL - AG

Where F = Factor	CL = Cable Attenuation Factor (Cable Loss)
AF = Antenna Factor	AG = Amplifier Gain

12.6 Measurement Result

Refer to attach tabular data sheets.

NOTE: *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.*

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH Low Mode	Test Date:	July 7, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
195.15	V	Peak	18.51	14.44	32.95	43.50	-10.55
259.95	V	Peak	17.66	16.07	33.73	46.00	-12.27
283.80	V	Peak	19.94	16.05	35.99	46.00	-10.01
520.50	V	Peak	17.21	23.24	40.45	46.00	-5.55
650.00	V	Peak	8.54	24.88	33.42	46.00	-12.58
863.50	V	Peak	4.76	27.51	32.27	46.00	-13.73
126.75	H	Peak	22.53	11.33	33.86	43.50	-9.64
164.10	H	Peak	23.29	11.70	34.99	43.50	-8.51
283.80	H	Peak	24.94	16.05	40.99	46.00	-5.01
389.30	H	Peak	19.37	20.17	39.54	46.00	-6.46
455.16	H	Peak	20.45	20.41	40.86	46.00	-5.14
519.30	H	Peak	18.91	23.19	42.10	46.00	-3.90

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH Mid Mode	Test Date:	July 7, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
156.45	V	Peak	19.47	11.29	30.76	43.50	-12.74
283.80	V	Peak	21.44	16.05	37.49	46.00	-8.51
519.30	V	Peak	16.74	23.19	39.93	46.00	-6.07
567.16	V	Peak	12.15	24.65	36.80	46.00	-9.20
767.83	V	Peak	8.87	25.97	34.84	46.00	-11.16
791.16	V	Peak	9.05	26.09	35.14	46.00	-10.86
283.80	H	Peak	19.94	16.05	35.99	46.00	-10.01
389.83	H	Peak	18.20	20.17	38.37	46.00	-7.63
455.16	H	Peak	21.79	20.41	42.20	46.00	-3.80
520.50	H	Peak	20.71	23.24	43.95	46.00	-2.05
567.16	H	Peak	15.65	24.65	40.30	46.00	-5.70
792.33	H	Peak	12.22	26.10	38.32	46.00	-7.68

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH High Mode	Test Date:	July 7, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
154.20	V	Peak	20.63	11.23	31.86	43.50	-11.64
283.80	V	Peak	21.77	16.05	37.82	46.00	-8.18
519.33	V	Peak	17.24	23.19	40.43	46.00	-5.57
767.83	V	Peak	9.53	25.97	35.50	46.00	-10.50
792.33	V	Peak	9.39	26.10	35.49	46.00	-10.51
863.50	V	Peak	5.93	27.51	33.44	46.00	-12.56
185.25	H	Peak	19.89	13.45	33.34	43.50	-10.16
283.80	H	Peak	21.77	16.05	37.82	46.00	-8.18
455.16	H	Peak	22.29	20.41	42.70	46.00	-3.30
520.50	H	Peak	20.88	23.24	44.12	46.00	-1.88
767.83	H	Peak	12.70	25.97	38.67	46.00	-7.33
792.33	H	Peak	11.89	26.10	37.99	46.00	-8.01

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH Low Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
94.80	V	Peak	19.50	13.07	32.57	43.50	-10.93
220.80	V	Peak	26.52	15.25	41.77	46.00	-4.23
283.80	V	Peak	25.44	16.05	41.49	46.00	-4.51
455.16	V	Peak	22.29	20.41	42.70	46.00	-3.30
56.7.16	V	Peak	15.99	24.65	40.64	54.00	-13.36
767.83	V	Peak	10.20	25.97	36.17	46.00	-9.83
156.45	H	Peak	27.81	11.29	39.10	43.50	-4.40
220.35	H	Peak	25.02	15.25	40.27	46.00	-5.73
283.35	H	Peak	24.77	16.03	40.80	46.00	-5.20
422.50	H	Peak	18.21	20.47	38.68	46.00	-7.32
567.16	H	Peak	20.65	24.65	45.30	46.00	-0.70
767.83	H	Peak	11.87	25.97	37.84	46.00	-8.16

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH Mid Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
185.70	V	Peak	22.24	13.50	35.74	43.50	-7.76
219.90	V	Peak	27.19	15.24	42.43	46.00	-3.57
279.75	V	Peak	24.27	15.89	40.16	46.00	-5.84
401.50	V	Peak	16.67	20.70	37.37	46.00	-8.63
455.16	V	Peak	17.95	20.41	38.36	46.00	-7.64
567.16	V	Peak	11.49	24.65	36.14	46.00	-9.86
220.35	H	Peak	25.52	15.25	40.77	46.00	-5.23
283.80	H	Peak	25.27	16.05	41.32	46.00	-4.68
455.16	H	Peak	19.95	20.41	40.36	46.00	-5.64
567.16	H	Peak	13.65	24.65	38.30	46.00	-7.70
591.66	H	Peak	12.42	25.19	37.61	46.00	-8.39
767.83	H	Peak	11.37	25.97	37.34	46.00	-8.66

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode:	TX CH High Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Ver./Hor.
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Ant.Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
182.10	V	Peak	20.63	13.14	33.77	43.50	-9.73
220.35	V	Peak	23.14	15.25	38.39	46.00	-7.61
283.80	V	Peak	25.94	16.05	41.99	46.00	-4.01
407.33	V	Peak	16.47	20.64	37.11	46.00	-8.89
455.16	V	Peak	18.00	20.41	38.41	46.00	-7.59
567.16	V	Peak	11.99	24.65	36.64	46.00	-9.36
155.55	H	Peak	25.57	11.27	36.84	43.50	-6.66
220.80	H	Peak	23.52	15.25	38.77	46.00	-7.23
275.25	H	Peak	24.47	15.72	40.19	46.00	-5.81
398.00	H	Peak	18.72	20.61	39.33	46.00	-6.67
421.33	H	Peak	18.72	20.49	39.21	46.00	-6.79
455.16	H	Peak	20.45	20.41	40.86	46.00	-5.14

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) 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) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

(5) Emission level = Reading value + Factor

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Low Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1726.6	48.00	---	-6.11	41.89	---	74.00	54.00	-12.11	Peak
6908.3	40.17	---	6.37	46.54	---	74.00	54.00	-7.46	Peak
10360	--					74.00	54.00		
15540	--					74.00	54.00		
20720	--					74.00	54.00		
25900	--					74.00	54.00		
31080	--					74.00	54.00		
36260	--					74.00	54.00		
41440	--					74.00	54.00		
46620	--					74.00	54.00		
51800	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Low Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1726.6	48.84	---	-6.11	42.73	---	74.00	54.00	-11.27	Peak
6900	41.17	---	6.36	47.53	---	74.00	54.00	-6.47	Peak
10360	--					74.00	54.00		
15540	--					74.00	54.00		
20720	--					74.00	54.00		
25900	--					74.00	54.00		
31080	--					74.00	54.00		
36260	--					74.00	54.00		
41440	--					74.00	54.00		
46620	--					74.00	54.00		
51800	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Mid Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1706.6	48.84	---	-6.22	42.62	---	74.00	54.00	-11.38	Peak
6983.3	38.84	---	6.53	45.37	---	74.00	54.00	-8.63	Peak
10480	--					74.00	54.00		
15720	--					74.00	54.00		
20960	--					74.00	54.00		
26200	--					74.00	54.00		
31440	--					74.00	54.00		
36680	--					74.00	54.00		
41920	--					74.00	54.00		
47160	--					74.00	54.00		
52400	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Mid Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1690	50.00	---	-6.30	43.70	---	74.00	54.00	-10.30	Peak
6983.3	38.84	---	6.53	45.37	---	74.00	54.00	-8.63	Peak
10480	--					74.00	54.00		
15720	--					74.00	54.00		
20960	--					74.00	54.00		
26200	--					74.00	54.00		
31440	--					74.00	54.00		
36680	--					74.00	54.00		
41920	--					74.00	54.00		
47160	--					74.00	54.00		
52400	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX High Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
9216	40.84	---	9.81	50.65	---	74.00	54.00	-3.35	Peak
10625	41.17	---	12.01	53.18	---	74.00	54.00	-0.82	Peak
10640	--					74.00	54.00		
15960	--					74.00	54.00		
21280	--					74.00	54.00		
26600	--					74.00	54.00		
31920	--					74.00	54.00		
37240	--					74.00	54.00		
42560	--					74.00	54.00		
47880	--					74.00	54.00		
53200	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX High Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Foxconn antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
10641.6	39.17	---	12.05	51.22	---	74.00	54.00	-2.78	Peak
10640	--					74.00	54.00		
15960	--					74.00	54.00		
21280	--					74.00	54.00		
26600	--					74.00	54.00		
31920	--					74.00	54.00		
37240	--					74.00	54.00		
42560	--					74.00	54.00		
47880	--					74.00	54.00		
53200	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Low Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1690	50.84	---	-6.30	44.54	---	74.00	54.00	-9.46	Peak
6900	44.17	---	6.36	50.53	---	74.00	54.00	-3.47	Peak
10360	--					74.00	54.00		
15540	--					74.00	54.00		
20720	--					74.00	54.00		
25900	--					74.00	54.00		
31080	--					74.00	54.00		
36260	--					74.00	54.00		
41440	--					74.00	54.00		
46620	--					74.00	54.00		
51800	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Low Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1690	50.00	---	-6.30	43.70	---	74.00	54.00	-10.30	Peak
10360	--					74.00	54.00		
15540	--					74.00	54.00		
20720	--					74.00	54.00		
25900	--					74.00	54.00		
31080	--					74.00	54.00		
36260	--					74.00	54.00		
41440	--					74.00	54.00		
46620	--					74.00	54.00		
51800	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Mid Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1706	49.34	---	-6.22	43.12	---	74.00	54.00	-10.88	Peak
6983.3	38.84	---	6.53	45.37	---	74.00	54.00	-8.63	Peak
10480	--					74.00	54.00		
15720	--					74.00	54.00		
20960	--					74.00	54.00		
26200	--					74.00	54.00		
31440	--					74.00	54.00		
36680	--					74.00	54.00		
41920	--					74.00	54.00		
47160	--					74.00	54.00		
52400	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX Mid Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
6983.3	45.00	---	6.53	51.53	---	74.00	54.00	-2.47	Peak
10480	--					74.00	54.00		
15720	--					74.00	54.00		
20960	--					74.00	54.00		
26200	--					74.00	54.00		
31440	--					74.00	54.00		
36680	--					74.00	54.00		
41920	--					74.00	54.00		
47160	--					74.00	54.00		
52400	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX High Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Vertical
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
1700	50.34	---	-6.25	44.09	---	74.00	54.00	-9.91	Peak
1840	49.34	---	-5.47	43.87	---	74.00	54.00	-10.13	Peak
10640	--					74.00	54.00		
15960	--					74.00	54.00		
21280	--					74.00	54.00		
26600	--					74.00	54.00		
31920	--					74.00	54.00		
37240	--					74.00	54.00		
42560	--					74.00	54.00		
47880	--					74.00	54.00		
53200	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

Radiated Spurious Emission Measurement Result (Above 1GHz)

Operation Mode:	TX High Mode	Test Date:	July 5, 2003
Temperature:	30°C	Test By:	Jacky
Humidity:	70 %	Pol:	Horizontal
Test Mode:	w / Hannstar antenna		

Freq. (MHz)	Peak Reading (dBuV)	AV Reading (dBuV)	Ant./CL CF(dB)	Actual FS Peak (dBuV/m)	Actual FS AV (dBuV/m)	Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
7091.6	42.00	---	6.80	48.80	---	74.00	54.00	-5.20	Peak
10625	40.34	---	12.01	52.35	---	74.00	54.00	-1.65	Peak
10640	--					74.00	54.00		
15960	--					74.00	54.00		
21280	--					74.00	54.00		
26600	--					74.00	54.00		
31920	--					74.00	54.00		
37240	--					74.00	54.00		
42560	--					74.00	54.00		
47880	--					74.00	54.00		

Remark：

(1) Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

(2) 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.

(3) 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 Emission.

(4) Spectrum Peak Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, Sweep time= 200 ms.
Spectrum AV Setting 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

(5) Emission(dBuV/m)=Reading(dBuV)+Cable loss(dB)+Ant.Fact.(dB/m)-Pre-amp.(dB)

13. TRANSMISSION IN THE ABSENCE OF DATA

13.1 Standard Applicable

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling 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.

13.2 Result:

No non-compliance noted:

Refer to the theory of operation.

14. FREQUENCY STABILITY

14.1 Standard Applicable

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 users manual.

14.2 Result:

No non-compliance noted:

Referring to the theory of operation, the crystal used to set the frequency has a temperature coefficient of +/- 20 ppm. For a transmitter fundamental frequency of 5.35 GHz, this corresponds to +/- 107 kHz.

During band edge testing, it is determined that the smallest margin (along the frequency axis) to the band edge occurred at the upper band edge in the Turbo mode, using average detection, with the antenna vertically polarized. In this configuration, with the transmitter set to the highest channel, the envelope of the modulation sideband intercepted the 54 dBuV/m limit at 5,347.3 MHz. Adding the maximum peak-to-peak deviation due to the crystal (0.214 MHz) yields 5,347.514 MHz, which remains within the authorized band of 5,150 to 5,350 MHz.

At the lower band edge, the smallest margin (along the frequency axis) occurred in the Base mode, using average detection, with the antenna vertically polarized. In this configuration, with the transmitter set to the lowest channel, the envelope of the modulation sideband intercepted the 54 dBuV/m limit at 5,154 MHz. Subtracting the maximum peak-to-peak deviation due to the crystal (0.214 MHz) yields 5,153.786 MHz, which remains within the authorized band of 5,150 to 5,350 MHz.

15. ANTENNA REQUIREMENT

15.1 Standard Applicable

According to §15.407(d), Any U-NII device that operates in the 5.15-5.25 GHz band shall use a transmitting antenna that is an integral part of the device.

15.2 Antenna Connected Construction

The directional gins of antenna used for transmitting is –0.59dBi for Foxconn and 0.32dBi for Hannstar (IEEE802.11a) and one of the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

16. RF Exposure

16.1 Standard Applicable

According to §15.407(f) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

16.2 Measurement Result:

MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$S=PG/4\pi R2$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 14.07(dBm)

Maximum peak output power at antenna input terminal: 25.52 (mW)

Antenna gain (typical): 0.32 (dBi)

Maximum antenna gain: 1.07 (numeric)

Prediction distance: 20 (cm)

Prediction frequency: 5180 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)

Power density at predication frequency at 20 (cm) distance 0.005469535 mW/cm2

S	P	P	G	G	R
mW/cm^2	mW	dBm	dBi	(numeric)	cm
0.005469535	25.52701303	14.07	0.32	1.076465	20

12.1 Measurement Result

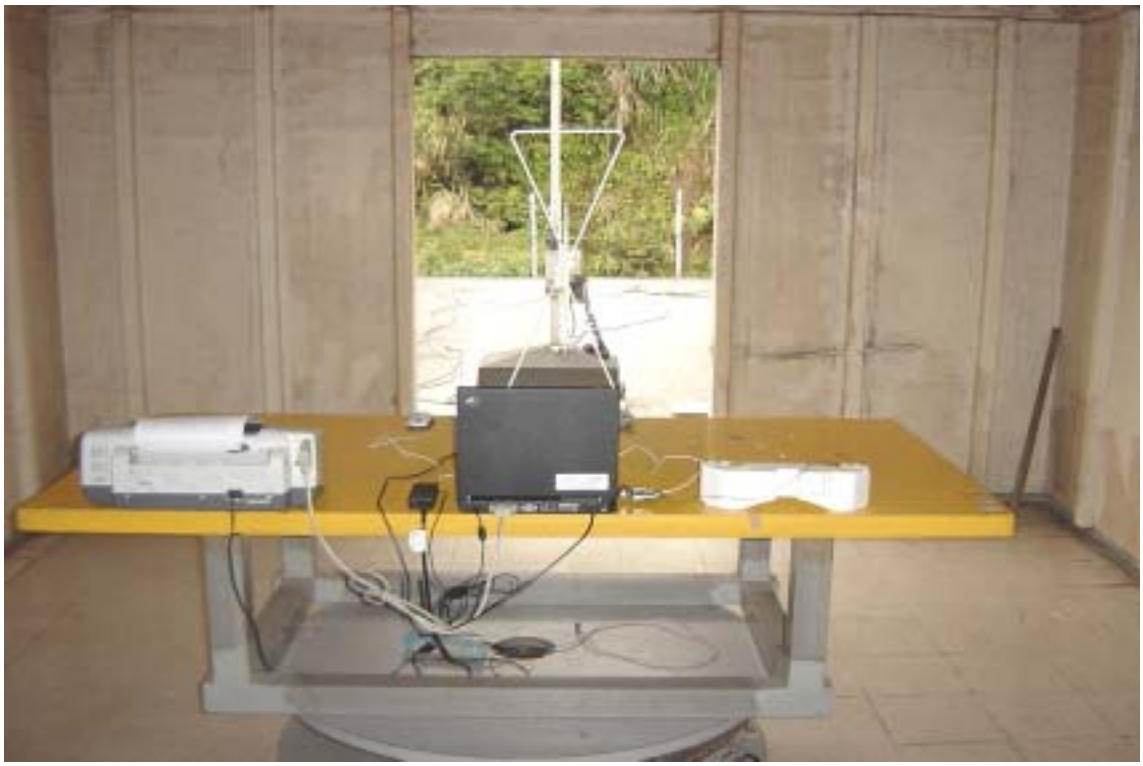
The predicted power density level at 20 cm is 0.005469535 mW/cm2. This is below the uncontrolled exposure limit of 1 mW/cm2 at 5180MHz.

17. TERMS OF ABRIVATION

ACP	**Adjecent Channel Power**
ANSI	**Americal National Standard Institute**
Ant.	**Antenna**
AV.	**Average detection**
B	**26dB down emission bandwidth**
CAL.	**Calibration**
Correct.	**Correction**
dBc	**dB relative to fundamental frequency level**
dBi	**Gain in decibels relative to an isotropic antenna**
EUT	**Equipment Under Test**
FREQ.	**Frequency**
Hor.	**Horizontal direction**
IEEE	**Institute of Electral and Electronic Engineer**
LISN	**Line Impedance Stabilization Network**
MFR	**Manufacturer**
NSA	**Normalized Site Attenuation**
OFDM	**Orthogonal Frequency Division Multiplexing**
PK	**Peak detection**
PIFA	**Printed Invert-F Antenna**
Pol.	**Polarization**
PPSD	**Peak Power Spectral Density**
Pre-amp.	**Pre-amplifier**
Q.P.	**Quasi-peak detection**
RBW	**Resolution bandwidth**
SAR	**Specific Absorption Rate**
SRA	**Spectrum analyzer**
U-NII	**Unlicense National Information Infrastructure**
VBW	**Video bandwidth**
Vert.	**Vertical direction**

APPENDIX 1 PHOTOGRPHS OF SET UP

Radiated Emission Set up Photos

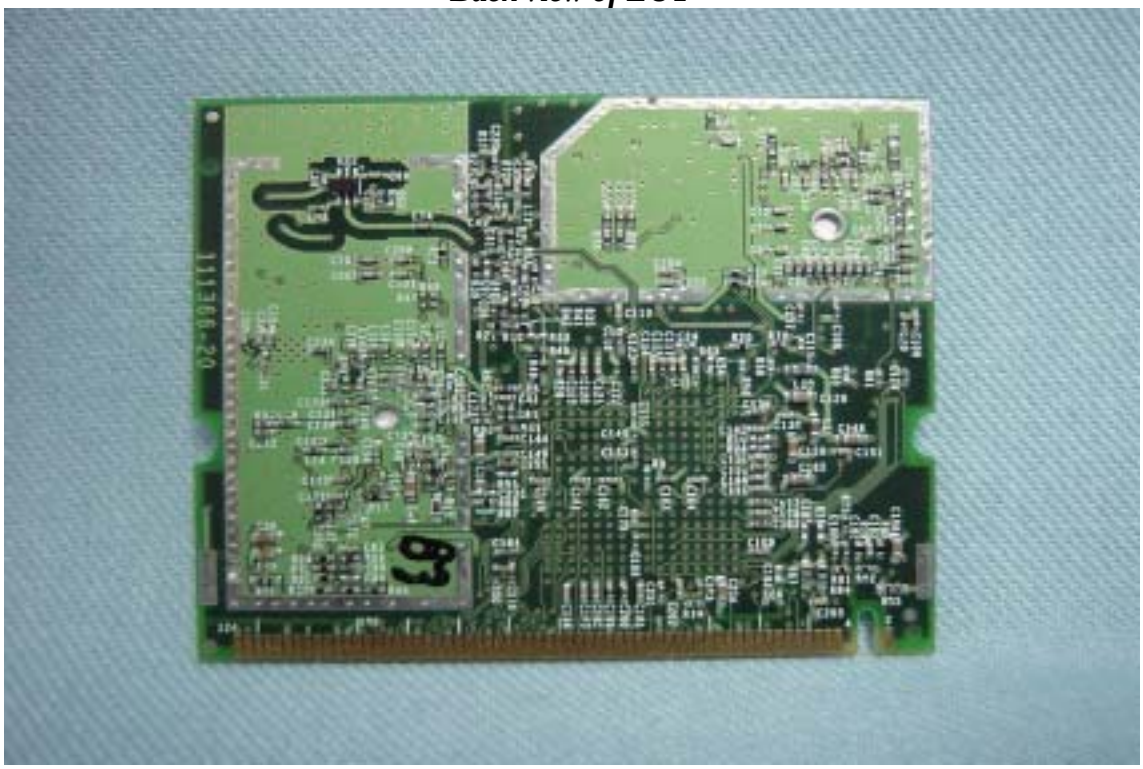


Conducted Emission Set Up Photos

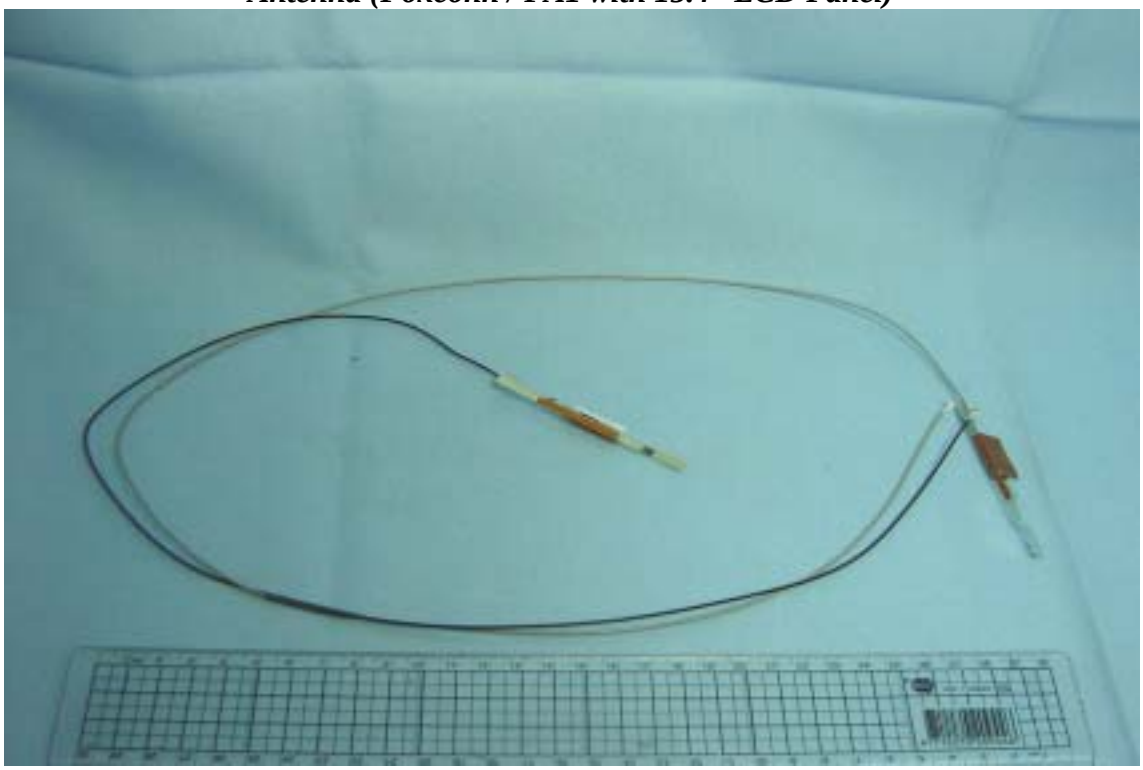
APPENDIX 2 EXTERNAL PHOTOGRPHS OF EUT

Front view of EUT

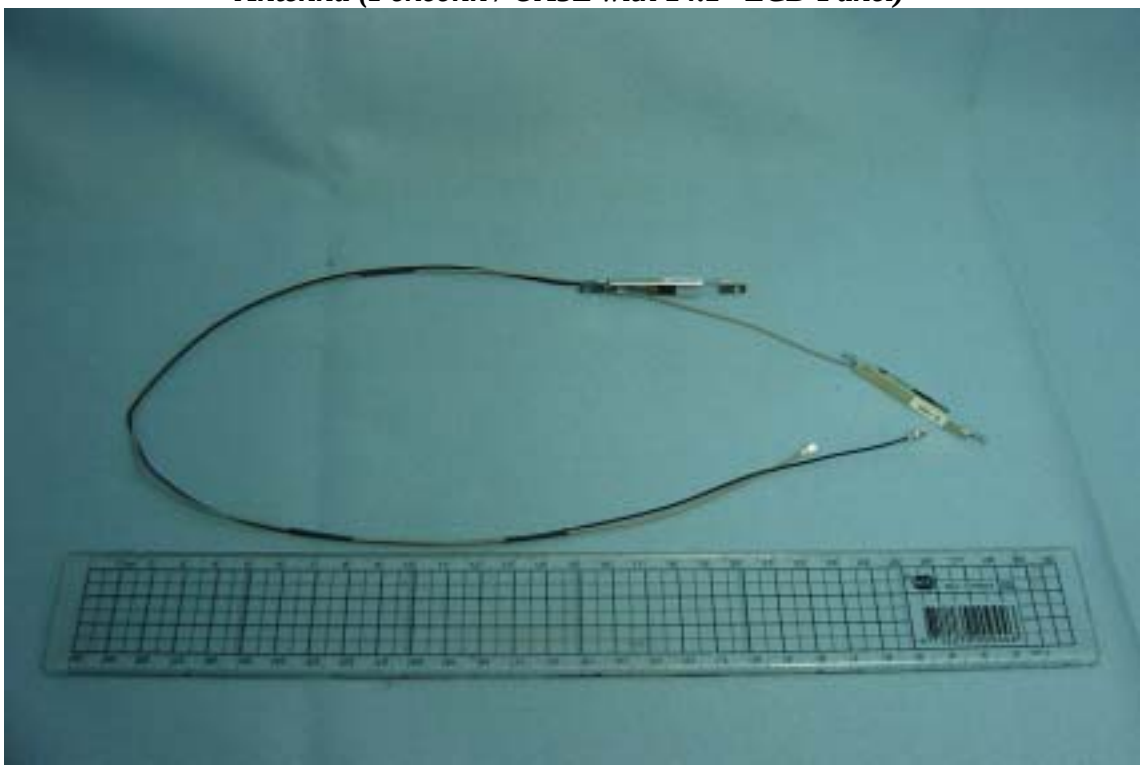
Back view of EUT



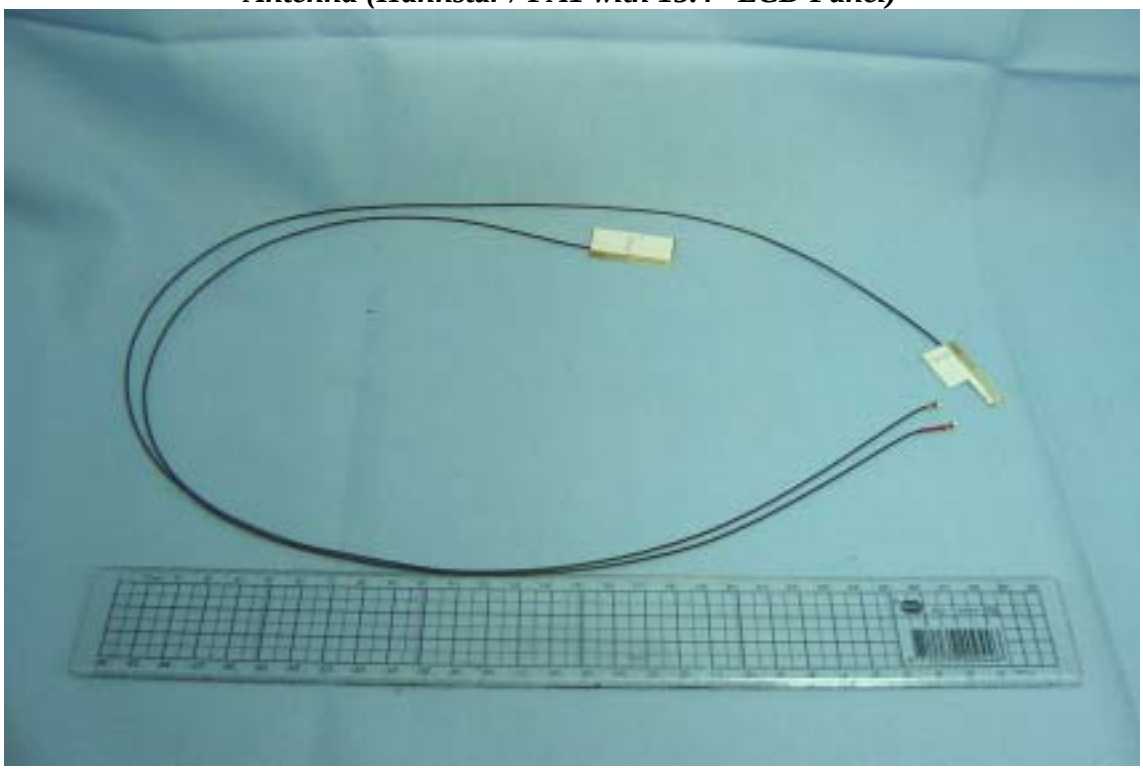
Antenna (Foxconn / PA1 with 15.4" LCD Panel)



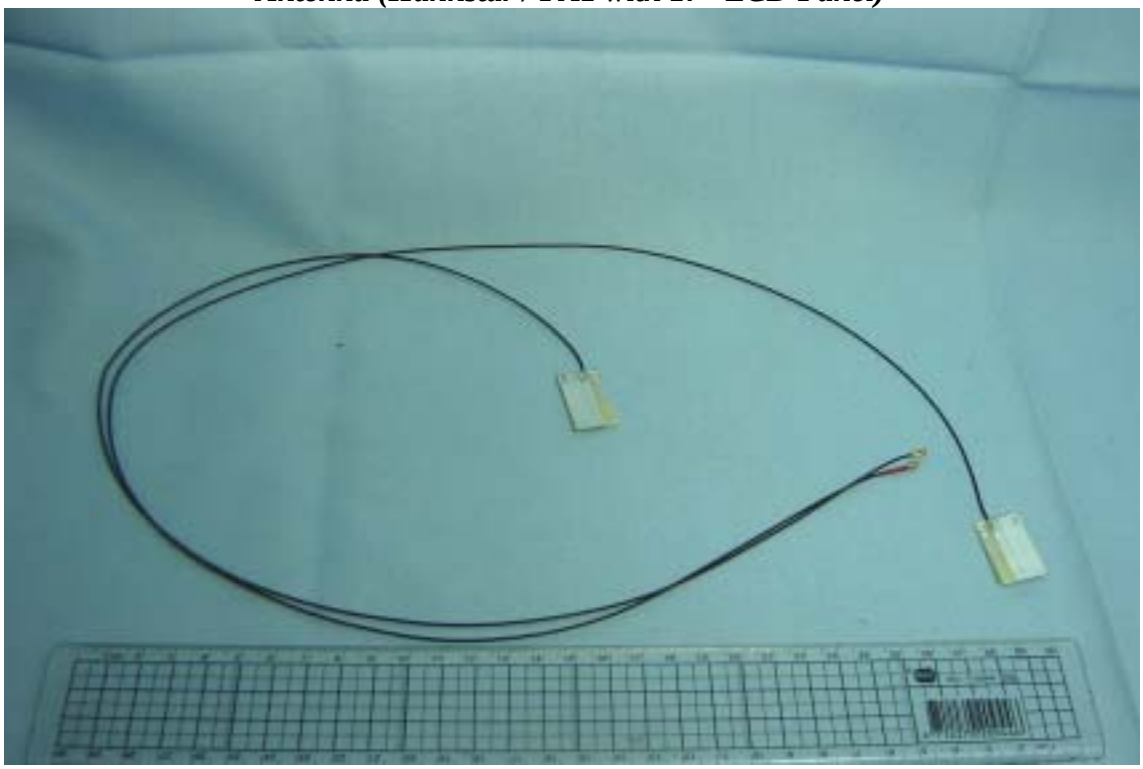
Antenna (Foxconn / OA5L with 14.1" LCD Panel)



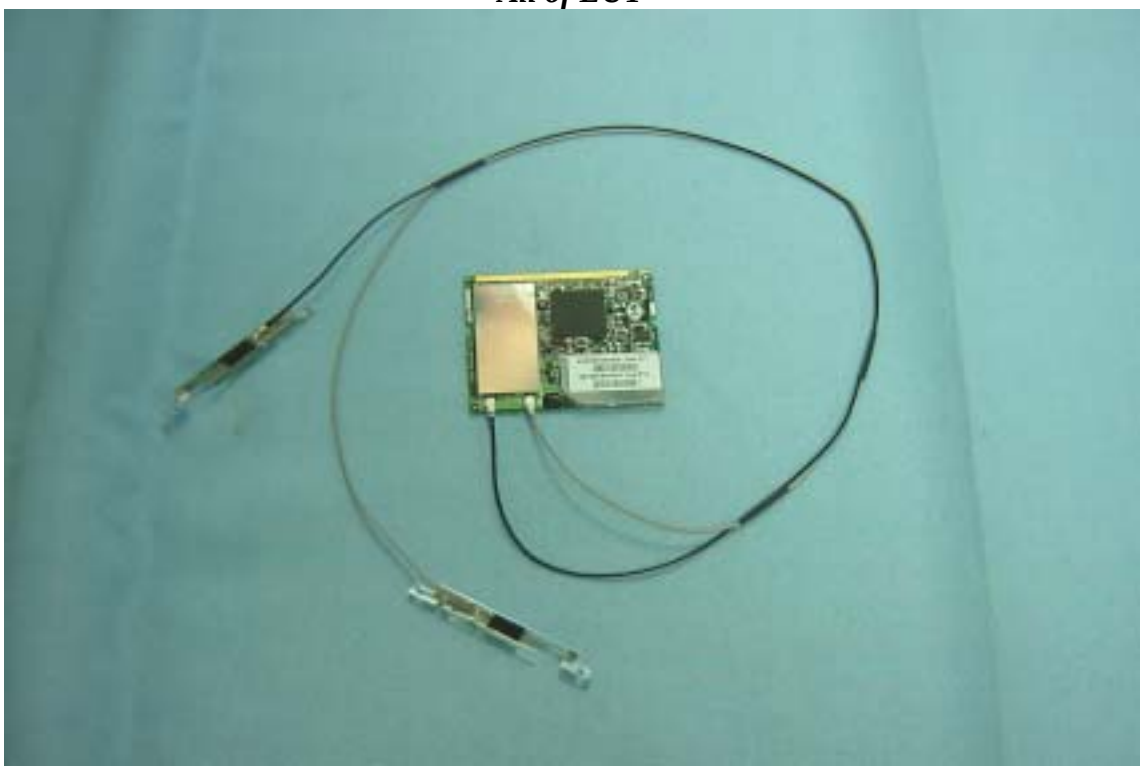
Antenna (Hannstar / PA1 with 15.4" LCD Panel)



Antenna (Hannstar / PA1 with 17" LCD Panel)



All of EUT



APPENDIX 3 INTERNAL PHOTOGRPHS OF EUT

Internal view of EUT --- 1