

**FCC CFR47 PART 15 SUBPART E
CERTIFICATION**



TEST REPORT

FOR

802.11a/b CARDBUS

MODEL NUMBER: WLC221-D4 / BCP3483U

BRAND NAME: ASKEY

FCC ID: H8NWLC221-D4

REPORT NUMBER: 02T1639-2

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Prepared for
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1. TEST RESULT CERTIFICATION

COMPANY NAME: ASKEY COMPUTER CORP.
10F, NO. 119, CHIENKANG RD.
CHUNG-HO, TAIPEI, TAIWAN, R.O.C.

EUT DESCRIPTION: 802.11A/B CARDBUS

MODEL NAME: WLC221-D4 / BCP3483U

DATE TESTED: NOVEMBER 9 – NOVEMBER 15, 2002

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	5.15 – 5.35 GHz TRANSCEIVER *
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.E

* The 5.2 GHz band is applicable to this report; other bands of operation (2.4 GHz and 5.8 GHz) are documented in a separate report

Compliance Certification Services, Inc. tested the above equipment for 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.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

Tested By:

MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

FRANK IBRAHIM
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The Askey WLAN module is an 802.11 a/b wireless Spread Spectrum transceiver. It is constructed on a printed circuit card with a PCMCIA interface and is designed to be installed in a host system.

This unit provides a peak power output of +14.6 dBm (29 mW) in the 5150 –5350 MHz band. It is designed to use two identical dielectric antennas. A single antenna is used for transmit. Both antennas are used for receive diversity. The antenna gain is 5.2 dBi in the 5.2 GHz band. Both antennas are integral to the WLAN module.

This transceiver is based on an Atheros AR5001X three-chip solution. The three chips include:

AR5211: Multiprotocol MAC/baseband processor, and CardBus/PCI bus interface.

AR5111 Radio-on-a-Chip (RoC): An all-CMOS single-chip radio transceiver that includes a power amplifier, and integrated dual conversion filters to convert signals from 5 GHz to the baseband range for use by the AR5211. The AR5111 offers fully integrated transmitter, receiver, and frequency synthesizer functions; eliminating the need for external voltage controlled oscillators (VCOs) and surface acoustic wave (SAW) filters.

AR2111 Radio-on-a-Chip (RoC): An all-CMOS single-chip radio transceiver that, when combined with the AR5111, implements a 2.4 GHz 802.11 b/g radio solution. The AR2111 offers fully integrated transmitter, receiver, and frequency synthesizer functions. Like the AR5111, the AR2111 does not require external VCOs or SAW filters.

3. MODIFICATIONS TO THE EUT

The following modifications were made to the EUT during testing:

1. A jumper was added to the 32 MHz clock distribution trace. This trace, which is primarily on the bottom layer, originally included a short section of printed trace on the top layer. The vias to the top layer section were drilled out, the top layer section was removed, and a jumper wire was soldered to the bottom side of the printed circuit board.
2. The hole in the internal shield plate was covered.
3. The internal shield plate was soldered to the internal shield side wall piece, instead of the original snap fastening. There is no change to the fastening method between the side wall piece and the printed circuit board; this was originally a solder joint and remains as such.

4. TEST METHODOLOGY

Conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and 15.407.

5. FACILITIES AND ACCREDITATION

5.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

Receiving equipment (i.e., receiver, analyzer, quasi-peak adapter, pre-selector) and LISNs conform to CISPR specifications for "Radio Interference Measuring Apparatus and Measurement Methods," Publication 16.

5.2. LABORATORY ACCREDITATIONS AND LISTINGS

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: 200065-0 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 (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2)).

5.3. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548, 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, CNS 13438	 200065-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	VCCI R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	 ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	 ELA-171
Taiwan	BSMI	CNS 13438	 SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	 IC2324 A,B,C, and F

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

6. CALIBRATION AND UNCERTAINTY

6.1. MEASURING 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.

6.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

6.3. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
Spectrum Analyzer	HP	8566B	3014A06685	6/1/03
Spectrum Display	HP	85662A	2152A03066	6/1/03
Quasi-Peak Detector	HP	85650A	3145A01654	6/1/03
Preamplifier	HP	8447D	2944A06833	8/22/03
Log Periodic Antenna	EMCO	3146	9107-3163	3/30/03
Biconical Antenna	Eaton	94455-1	1197	3/30/03
Spectrum Analyzer	HP	8564E	3943A01643	7/22/03
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/03
Preamplifier (1 - 26.5GHz)	HP	8449B	3008A00369	6/30/03
Preamplifier (1 - 26.5GHz)	Miteq	NSP10023988	646456	4/26/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6717	1/31/03
Horn Antenna (1 - 18GHz)	EMCO	3115	6739	1/31/03
Horn Antenna (18 – 26.5GHz)	ARA	MWH 1826/B	1013	1/31/03
High Pass Filter (4.57GHz)	FSY Microwave	FM-4570-9SS	003	N.C.R.
Harmonic Mixer	HP	11970A	3008A04190	10/14/05
Spectrum Analyzer	HP	E4404B	ID 963805	3/25/03
Microwave Detector	Agilent	8474C	2905A04047	6/4/03
Oscilloscope	HP	54601A	3106A00123	11/6/03

7. SETUP OF EQUIPMENT UNDER TEST

SETUP INFORMATION FOR TRANSMITTER TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Personal Computer	N340S8	PB344S811902382	DoC
AC Adapter	Lishin International	LSE9802A2060	010810241A1	N/A

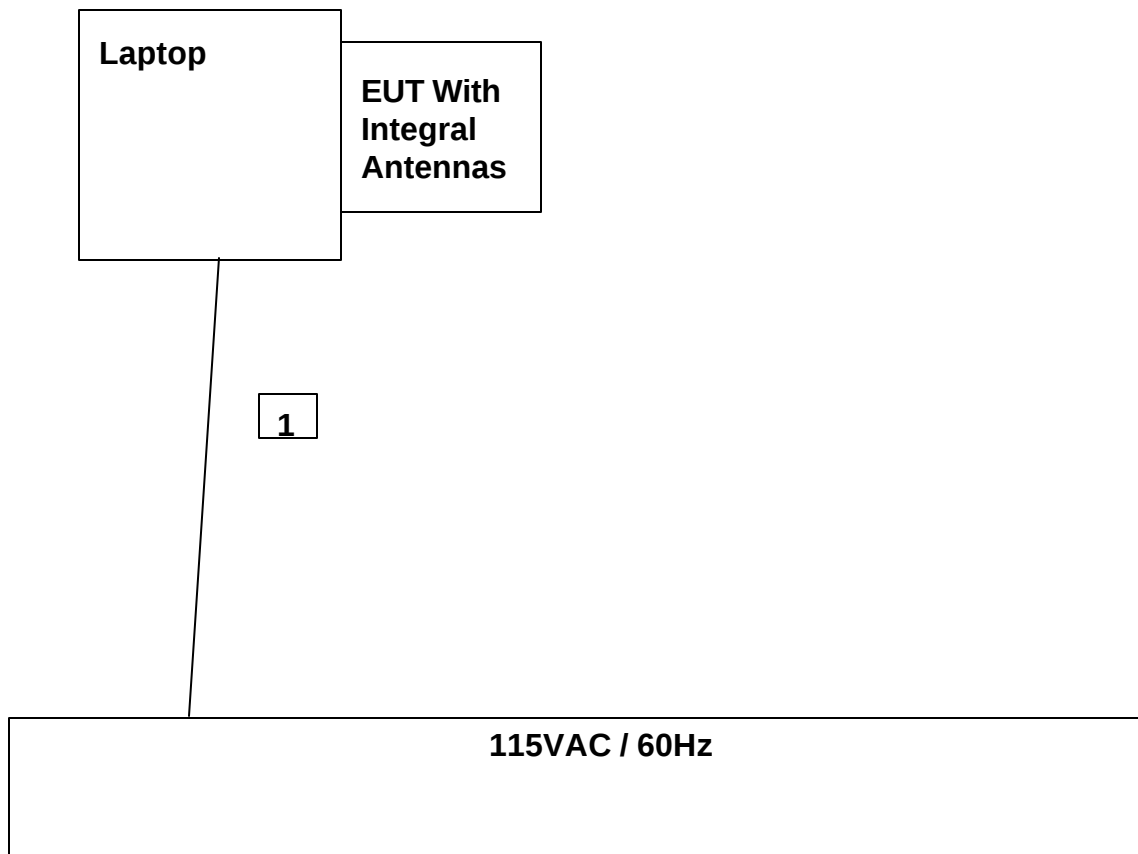
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	2 m	Laptop cable is integrated with AC Adapter

TEST SETUP

The EUT is installed in the laptop computer via a PCMCIA extender card.

SETUP DIAGRAM FOR TRANSMITTER TESTS



SETUP INFORMATION FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
MODEM	ACEEX	1414	9013538	IFAXDM1414
PRINTER	HP	2225C	2541S41679	BS46XU2225C
PS/2 MOUSE	PACKARD BELL	FDM-611	FWMC55039667	F4Z4K3FDM-612
LAPTOP	PERSONAL COMPUTER	N340S8	PB344S811902382	DoC
AC/DC ADAPTER	ELISHIN INTERNATIONAL	LSE9802A2060	010810241A1	N/A
DC POWER SUPPLY	HP	E3610A	KR24104150	N/A

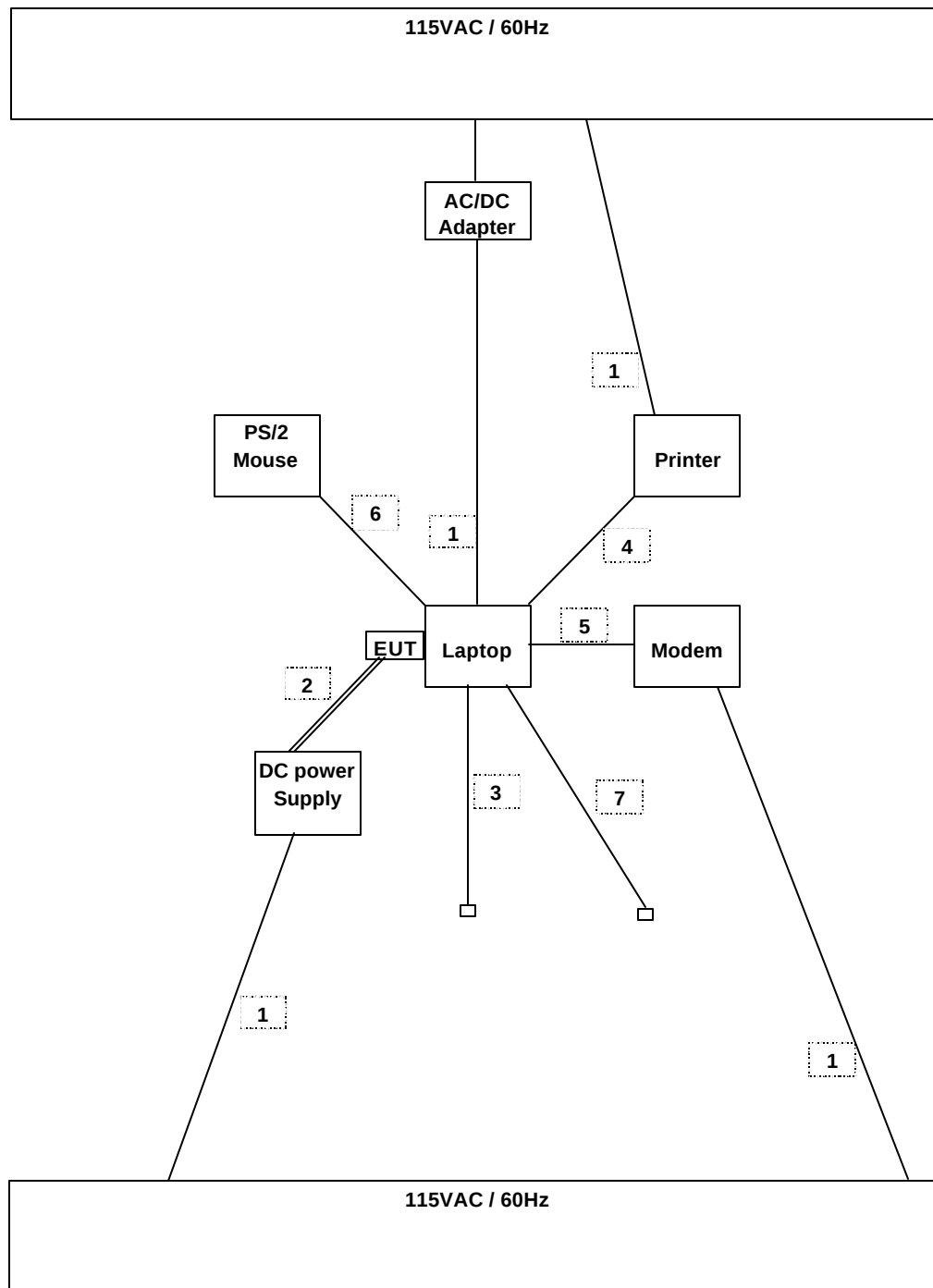
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	4	US 115V	Un-shielded	2m	Laptop cable is integrated with AC Adapter
2	DC	1	CLIPS	Un-shielded	2m	
3	USB	1	USB	Un-shielded	2m	
4	Parallel	1	DB25	Shielded	2m	
5	Serial	1	DB9	Shielded	2m	
6	Mouse	1	PS/2	Un-shielded	2m	
7	LAN	1	RJ45	Shielded	2m	

TEST SETUP

The EUT is installed in the laptop computer via a PCMCIA extender card.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



8. APPLICABLE RULES

§15.403- EMISSION BANDWIDTH

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

§15.407(a)- POWER LIMIT

(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 (17 dBm) or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. 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.

(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 (24 dBm) or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. 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.

Specification Limit:

Base Mode

Channel	Frequency (MHz)	10 Log B (dB)	$4 + 10 \log B$ or $11 + 10 \log B$ (dBm)	Power Limit (dBm)
Low	5180	14.8	18.8	17
Middle	5260	15.51	26.51	24
High	5320	14.73	25.73	24

Turbo Mode

Channel	Frequency (MHz)	10 Log B (dB)	$4 + 10 \log B$ or $11 + 10 \log B$ (dBm)	Power Limit (dBm)
Low	5210	19.22	21.22	17
Middle	5250	18.94	22.94	17
High	5290	18.22	29.22	24

Maximum antenna gain = 5.2 dBi, therefore there is no reduction due to antenna gain.

§15.407(a)- PEAK POWER SPECTRAL DENSITY

(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 or 4 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. 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.

(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 or 11 dBm + 10log B, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. 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.

Specification Limit:

4 dBm and 11 dBm. Maximum antenna gain = 5.2 dBi, therefore there is no reduction due to antenna gain.

§15.407(a)- PEAK EXCURSION

(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.

§15.407(b)- UNDESIRABLE EMISSION LIMITS

(1 & 2) 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.

(5) 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.

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

§15.407(c)- TRANSMISSION IN CASE OF ABSENCE OF INFORMATION

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.

§15.407(d)- ANTENNA TYPE

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.

§15.407(f)- RADIO FREQUENCY EXPOSURE

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

§15.407(g)- FREQUENCY STABILITY

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.

§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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

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.

§15.207- CONDUCTED LIMITS

(a) For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

§15.209- RADIATED EMISSION LIMITS

(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 (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** 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.

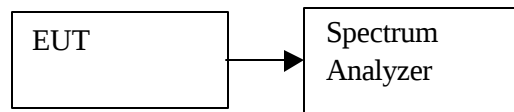
(b) In the emission table above, the tighter limit applies at the band edges.

Frequency Range (MHz)	Field Strength (uV/m at 3 m)	Field Strength (dBuV/m at 3 m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

9. TEST SETUP, PROCEDURE AND RESULT

9.1. EMISSION BANDWIDTH

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to approximately 1% of the emission bandwidth and peak detection is used. The emission bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26 dB.

RESULTS

No non-compliance noted:

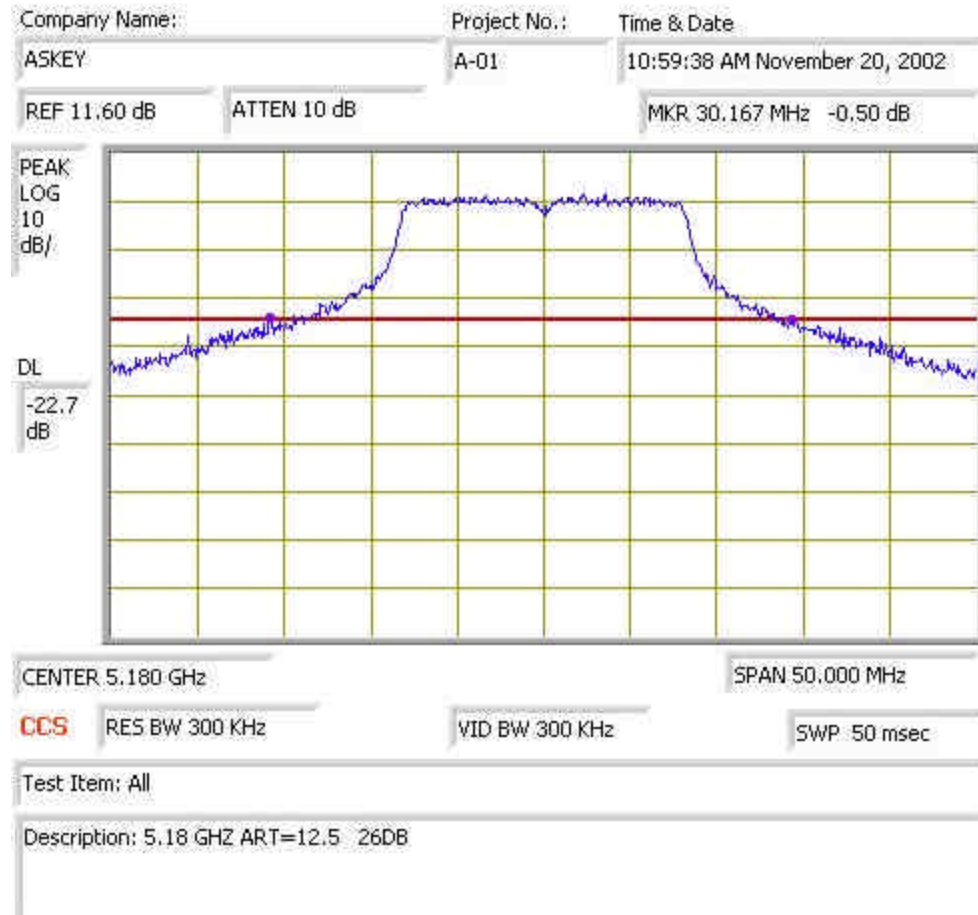
Base Mode

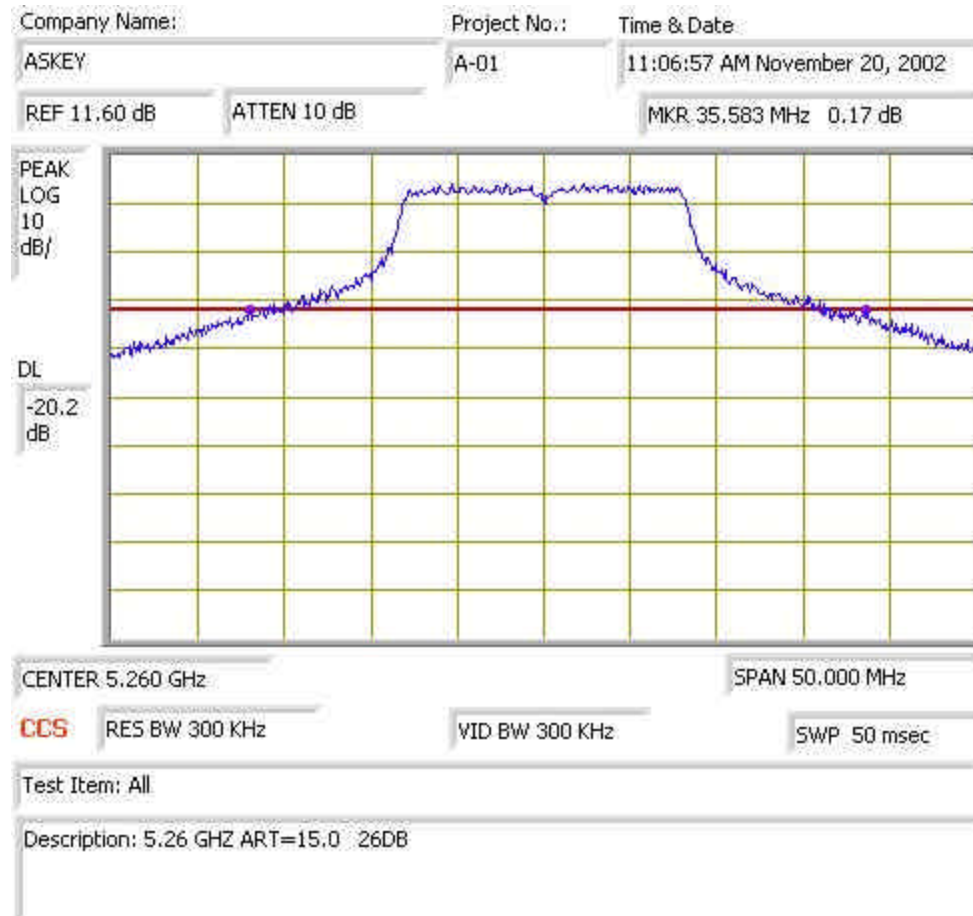
Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	30.167	14.8
Middle	5260	35.583	15.51
High	5320	29.75	14.73

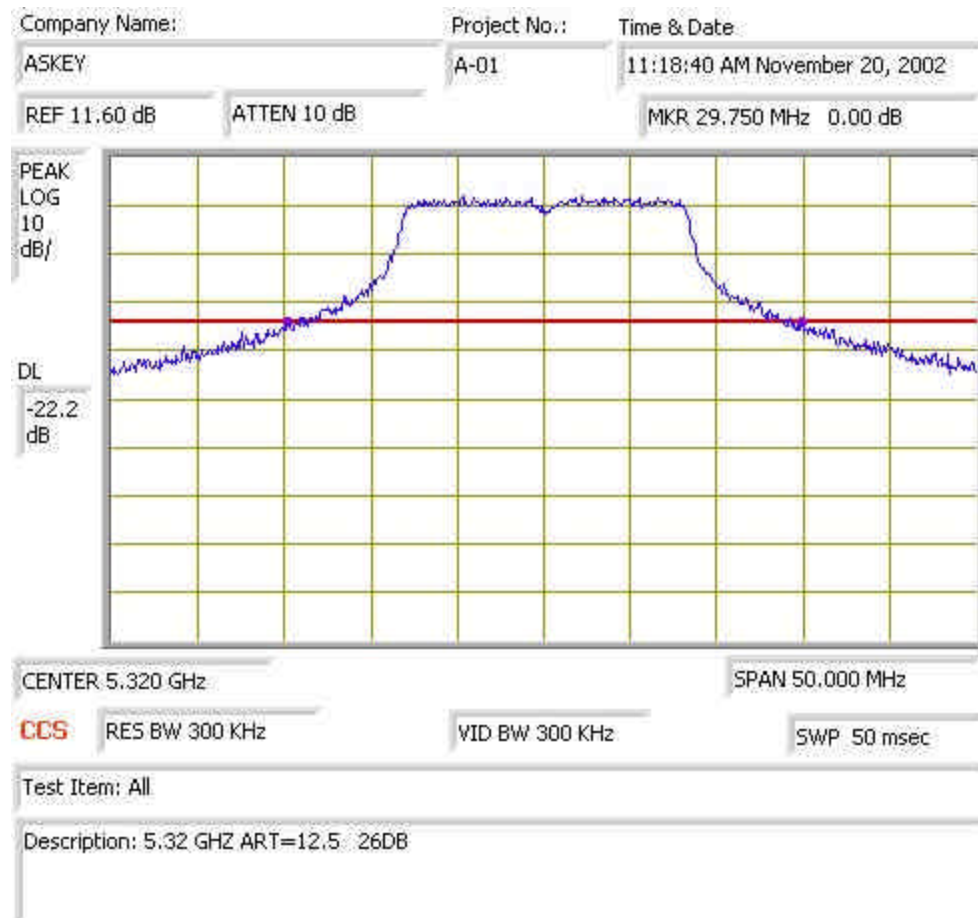
Turbo Mode

Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5210	83.5	19.22
Middle	5250	78.333	18.94
High	5290	66.333	18.22

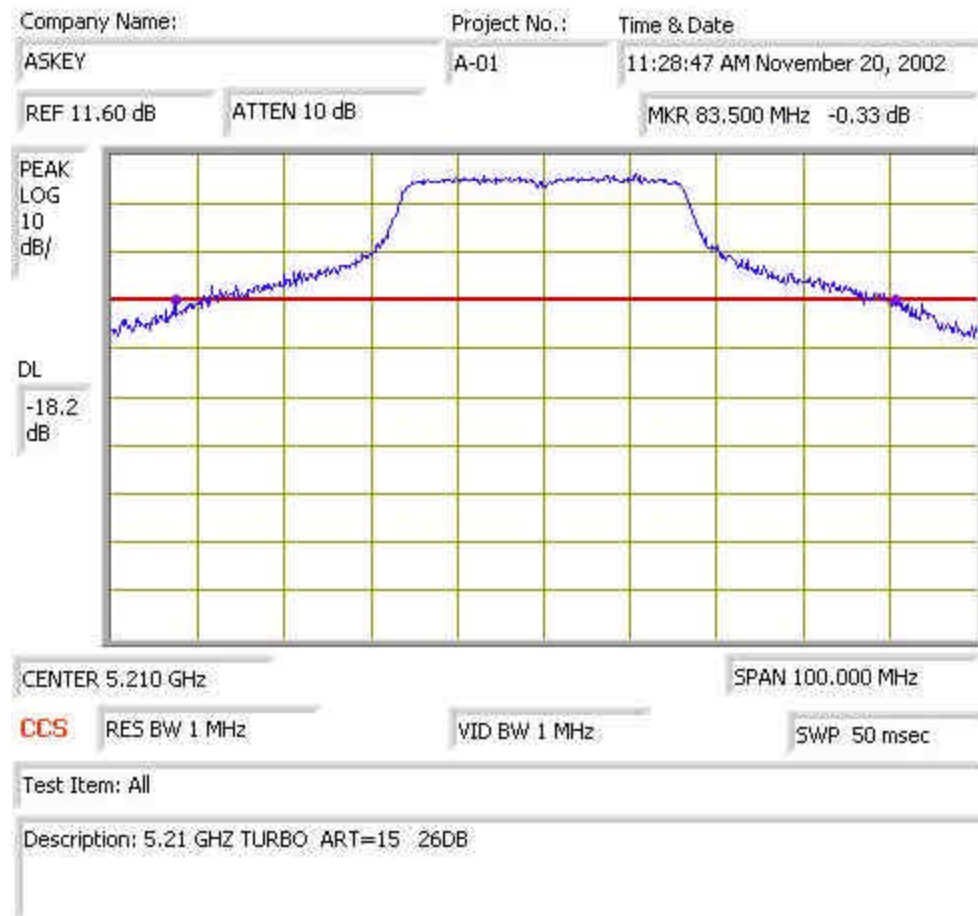
EMISSION BANDWIDTH (NORMAL MODE)

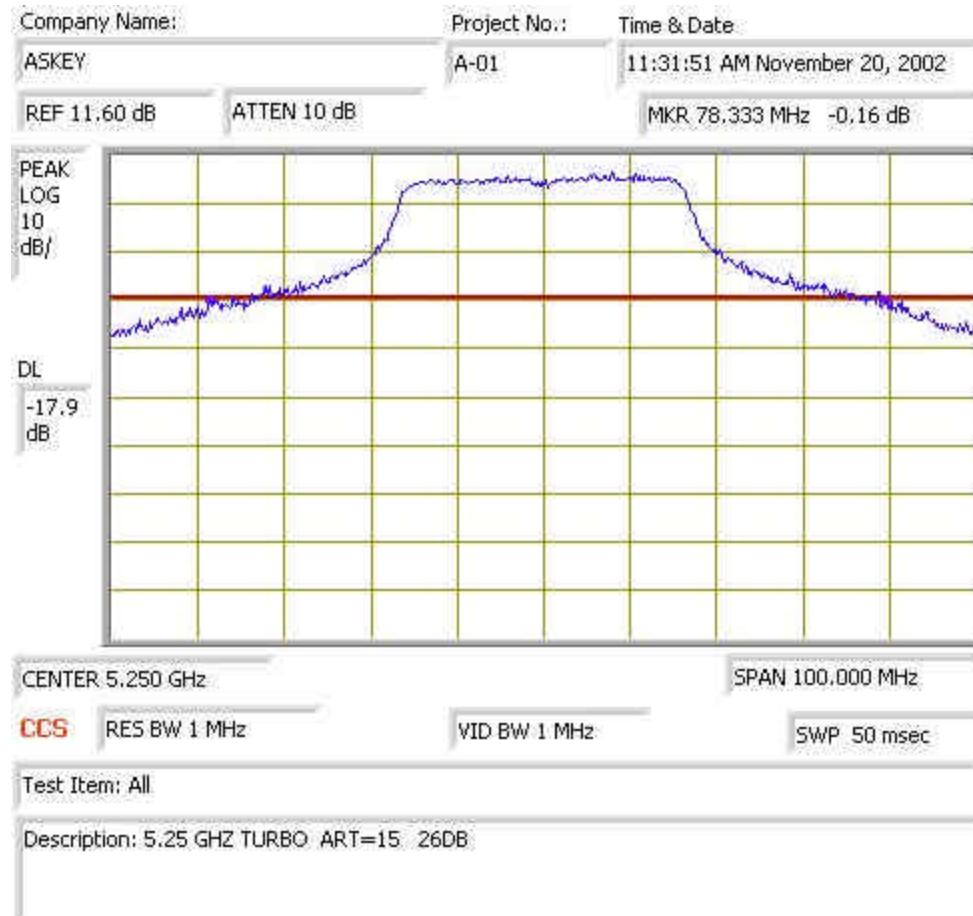


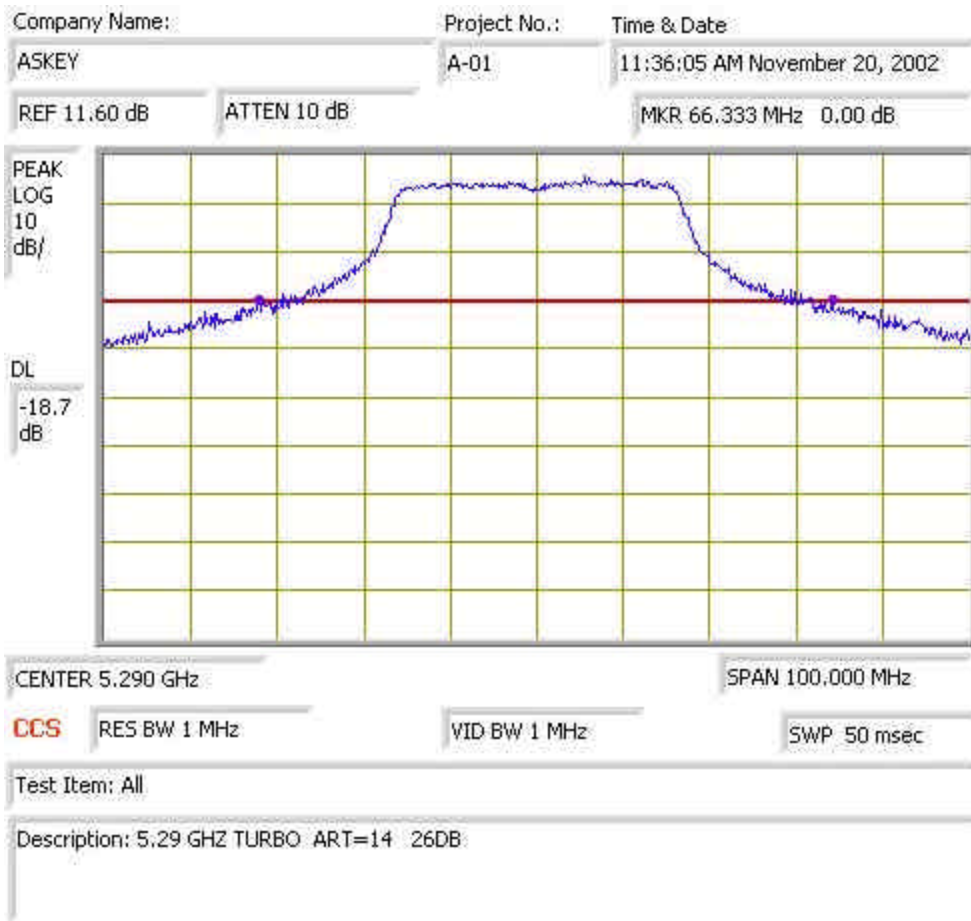




EMISSION BANDWIDTH (TURBO MODE)

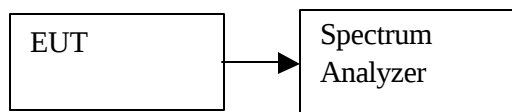






9.2. PEAK POWER

TEST SETUP



TEST PROCEDURE

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

The transmitter output is initially connected to a microwave detector and oscilloscope to measure the pulse duration, T.

Normal mode pulse duration = 3.14 msec.

Normal mode pulse duration = 1.57 msec.

The automatic analyzer settings yield a sweep time of 50 msec. Sweep time > T and EBW > largest available RBW, therefore Method # 3 is used.

RESULTS

No non-compliance noted:

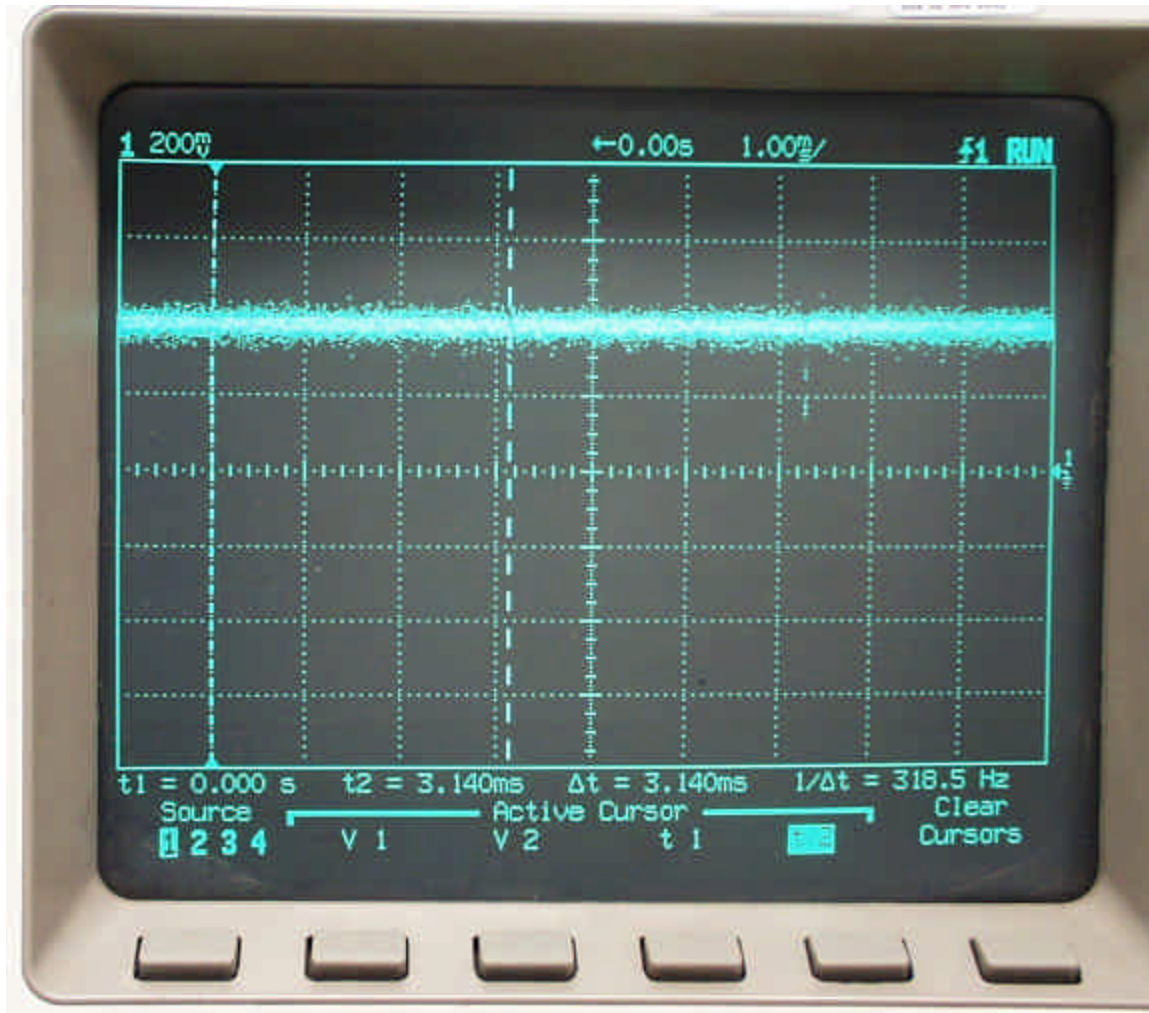
Base Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	11.9	17	-5.1
Middle	5260	14.3	24	-9.7
High	5320	12.5	24	-11.5

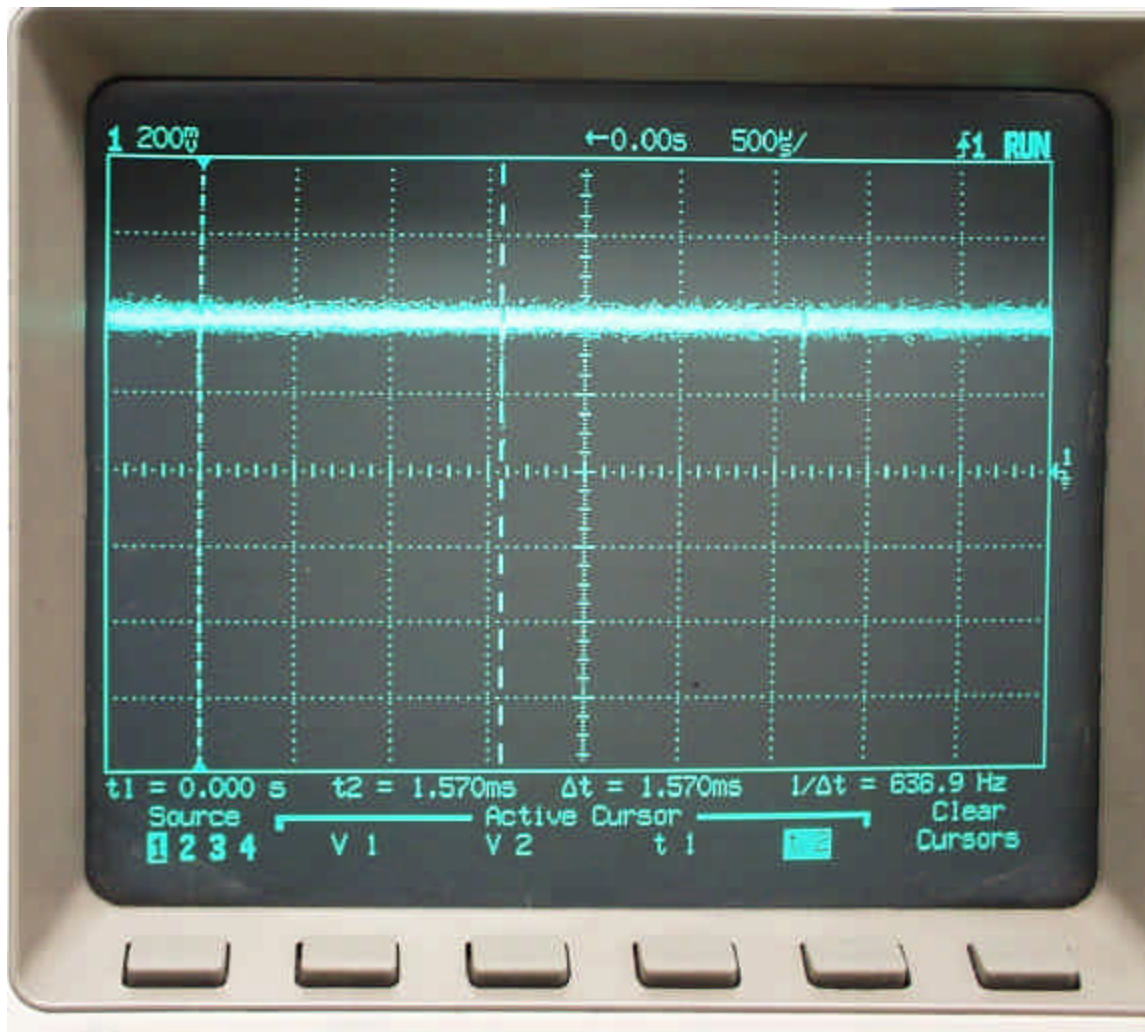
Turbo Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5210	14.6	17	-2.4
Middle	5250	14.6	17	-2.4
High	5290	14.0	24	-10.0

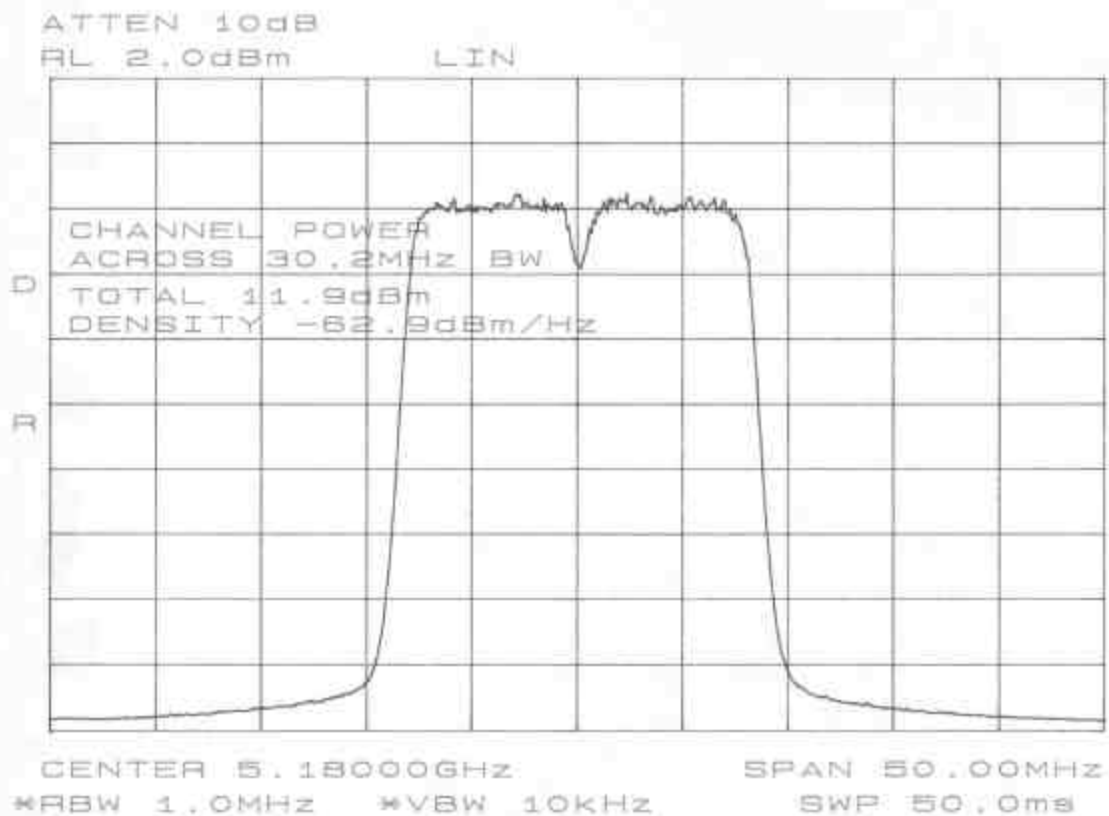
PULSE DURATION (NORMAL MODE)

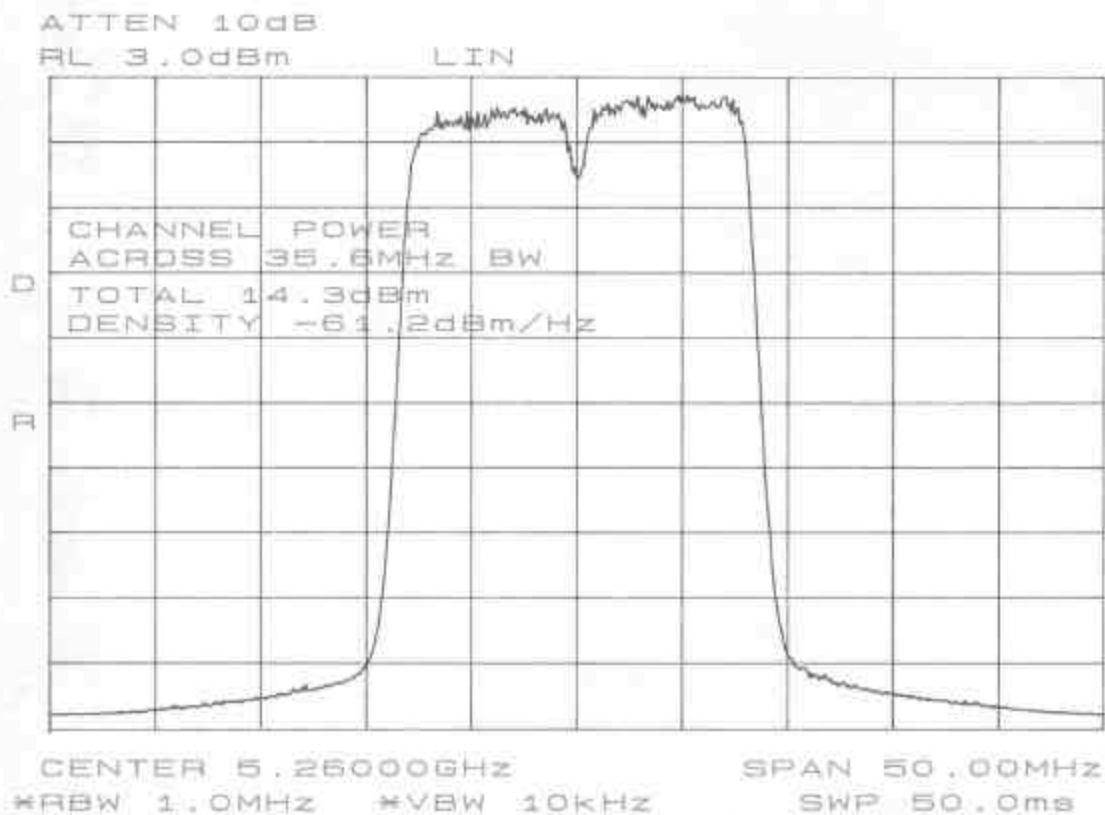


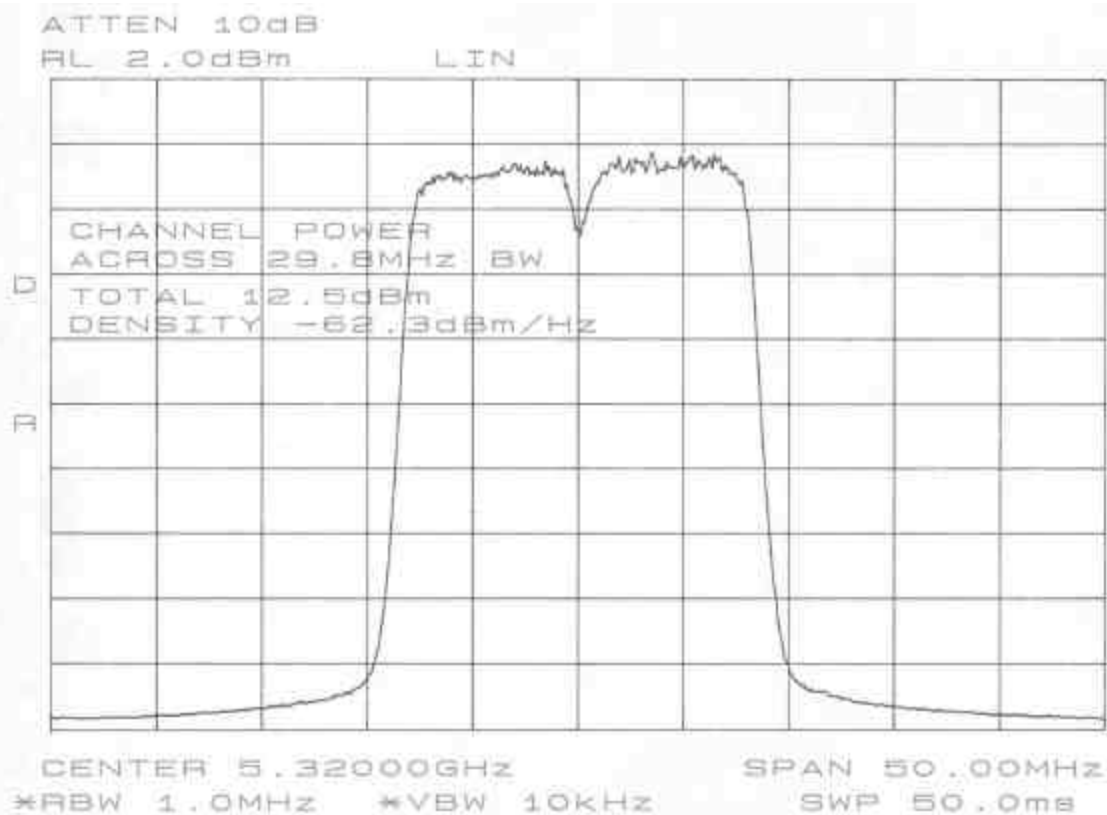
PULSE DURATION (TURBO MODE)



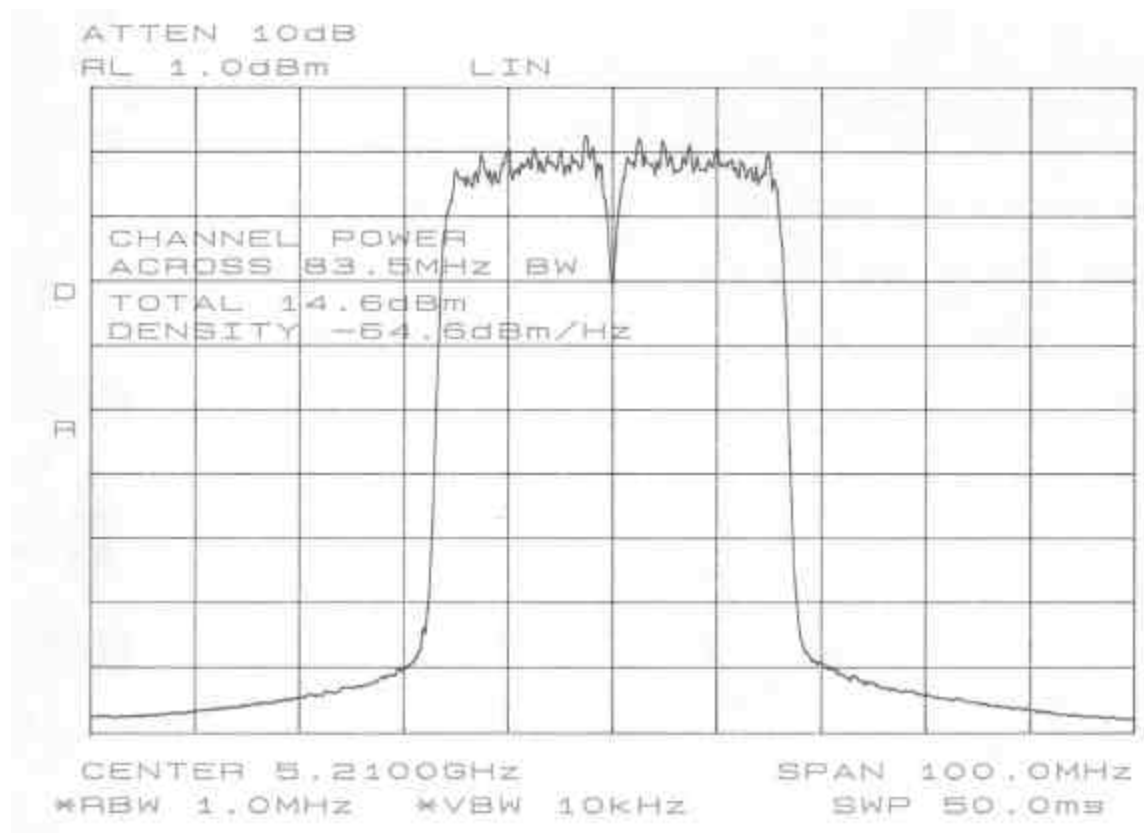
PEAK POWER (NORMAL MODE)

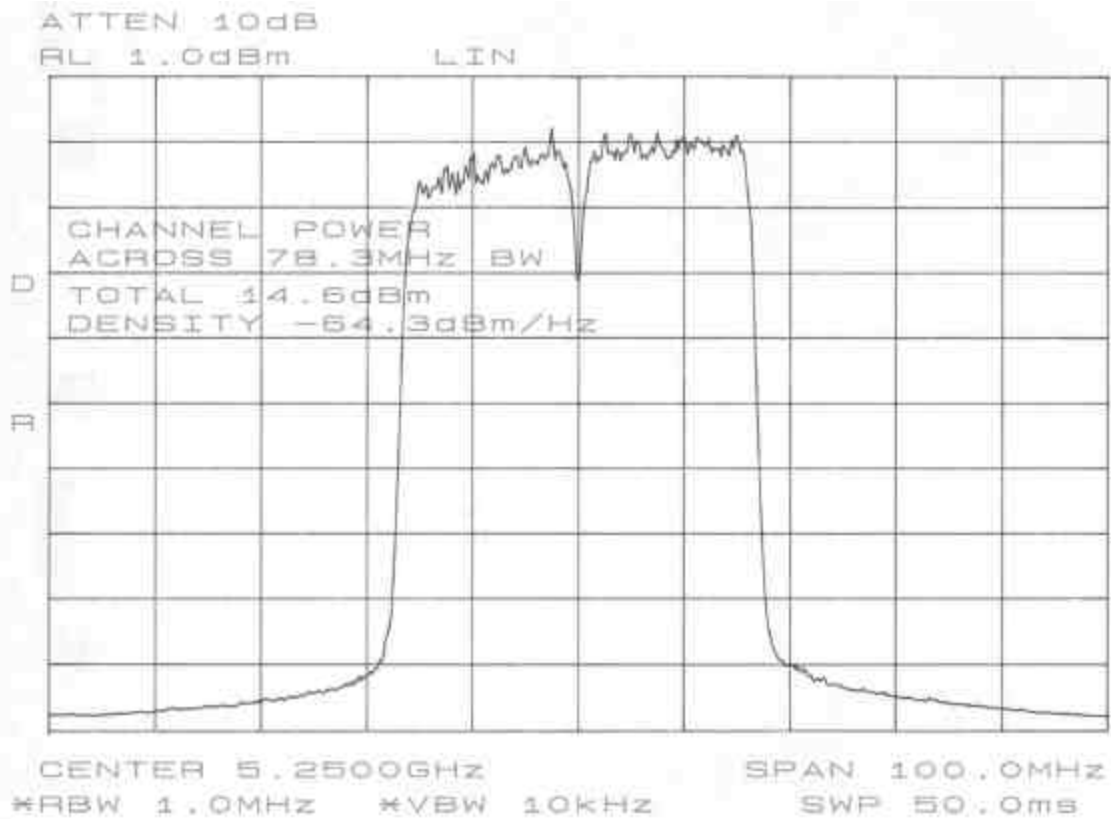


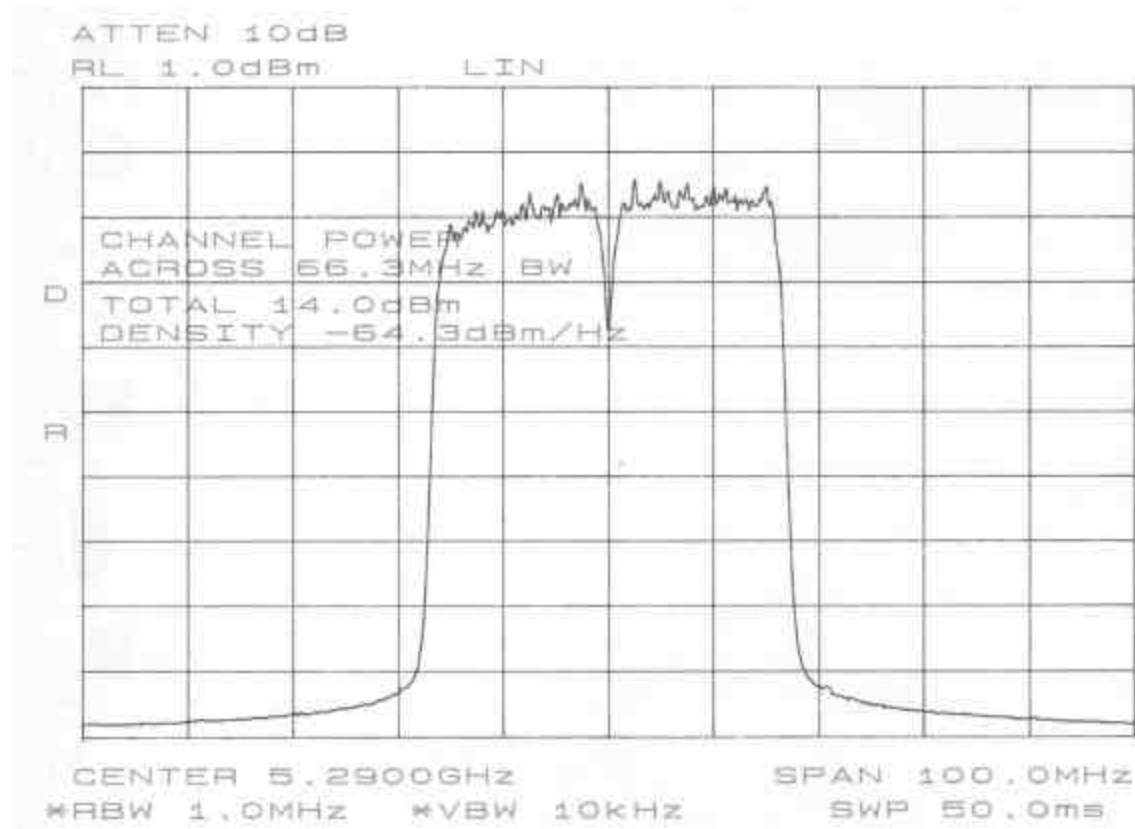




PEAK POWER (TURBO MODE)

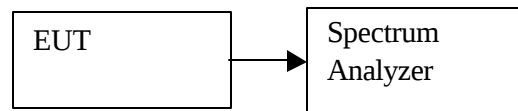






9.3. PEAK POWER SPECTRAL DENSITY

TEST SETUP



TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002, Method 2.

RESULTS

No non-compliance noted:

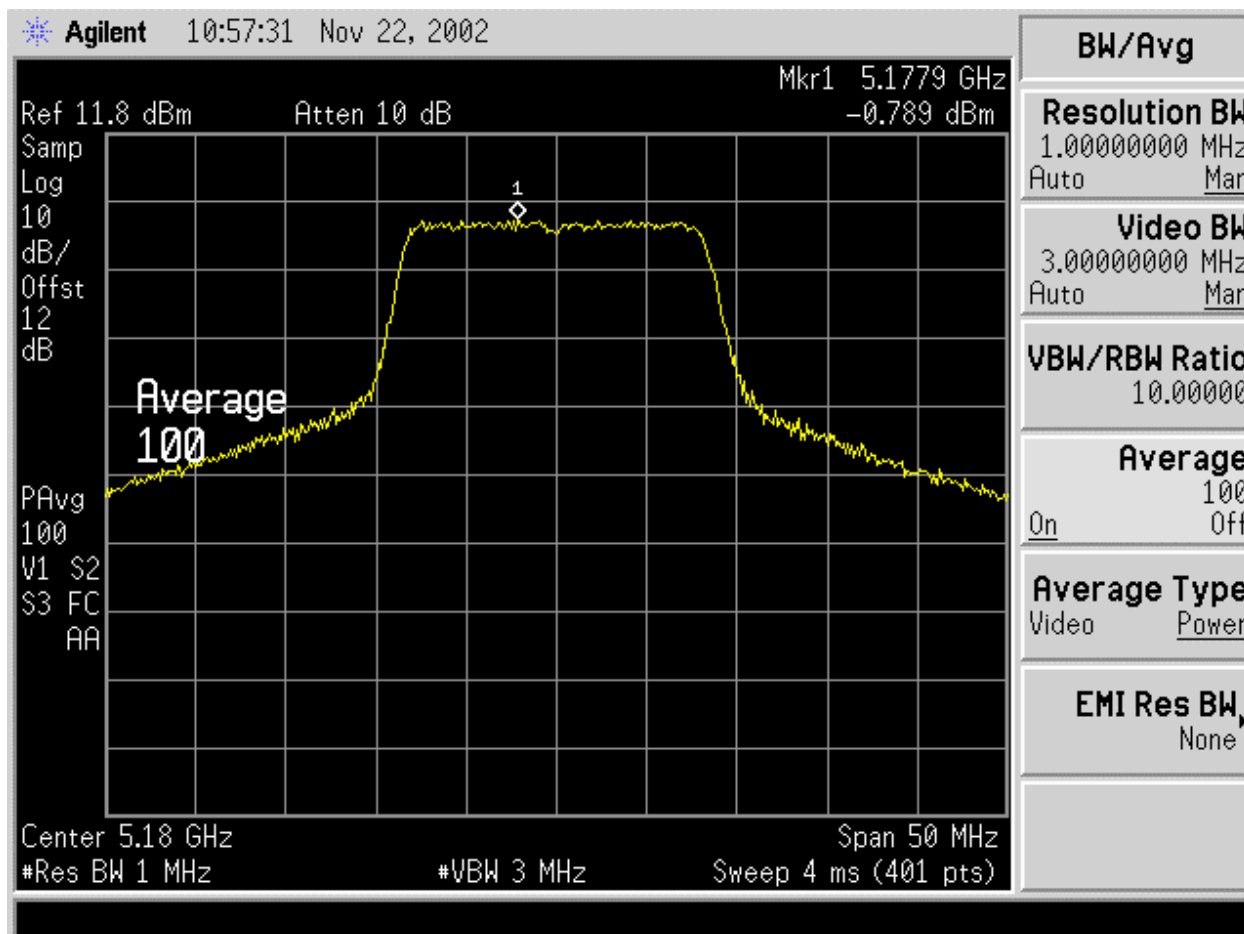
Base Mode

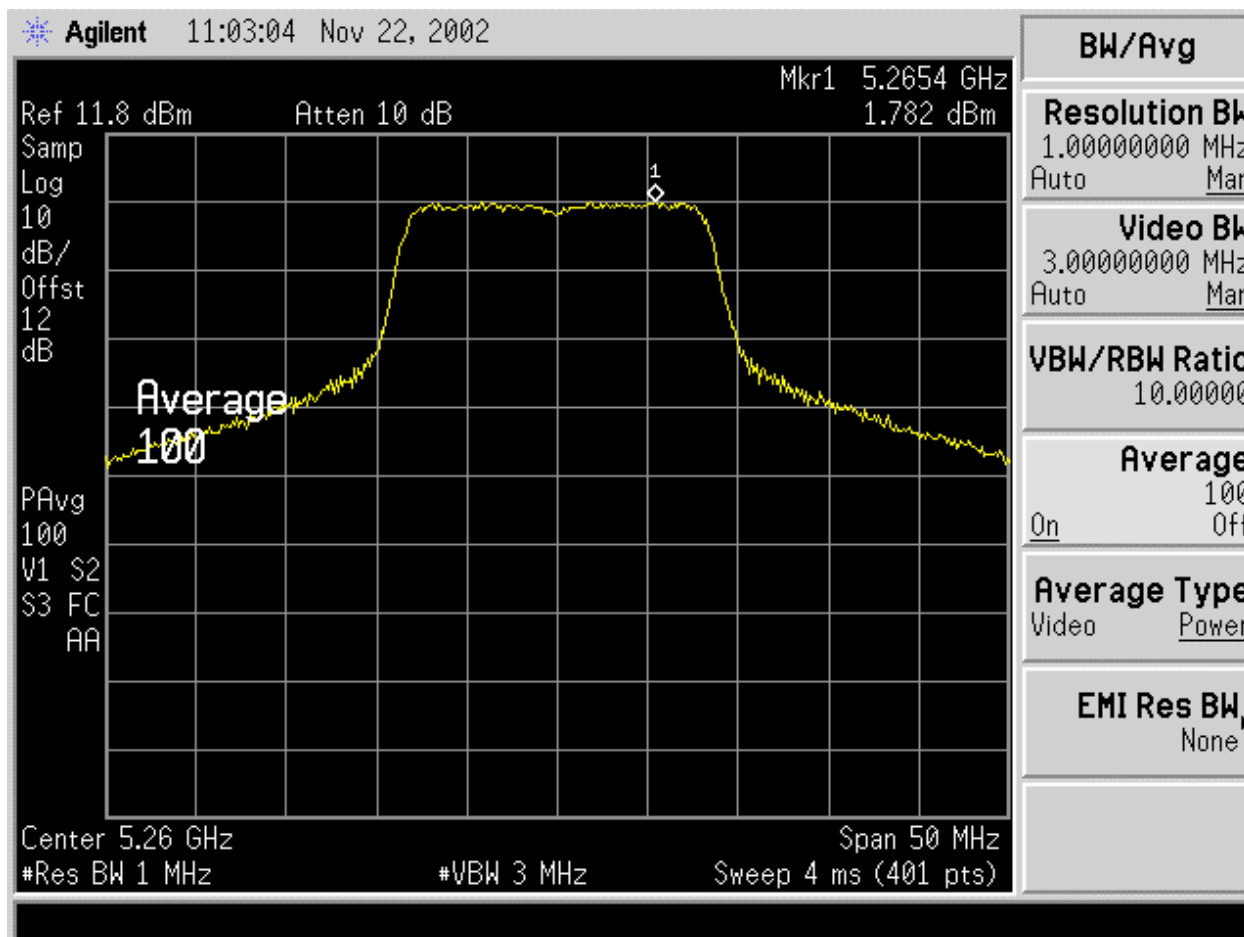
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	-0.789	4	-4.789
Middle	5260	1.782	11	-9.218
High	5320	-0.635	11	-11.635

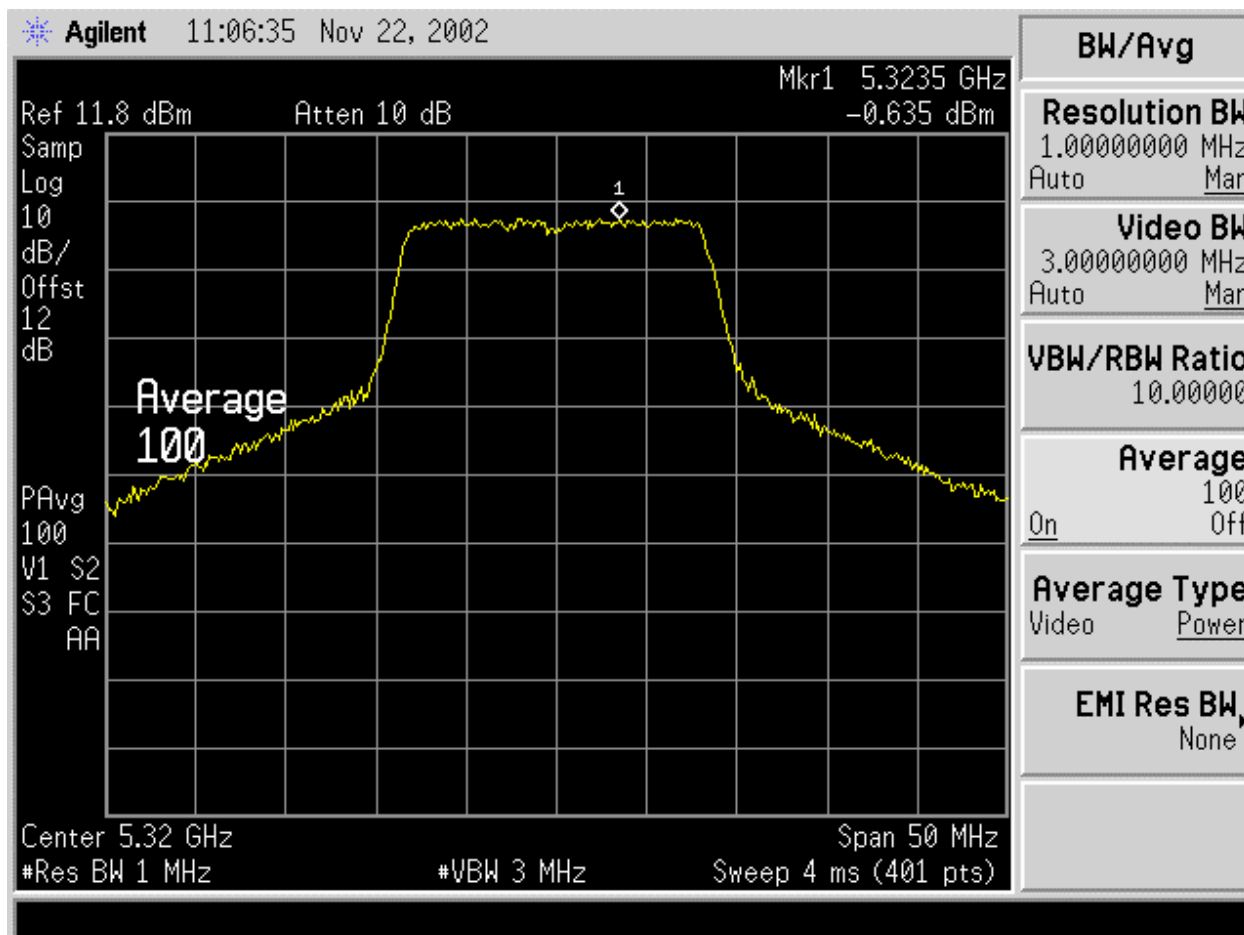
Turbo Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5210	-1.445	4	-5.445
Middle	5250	-1.297	4	-5.297
High	5290	-1.416	11	-12.416

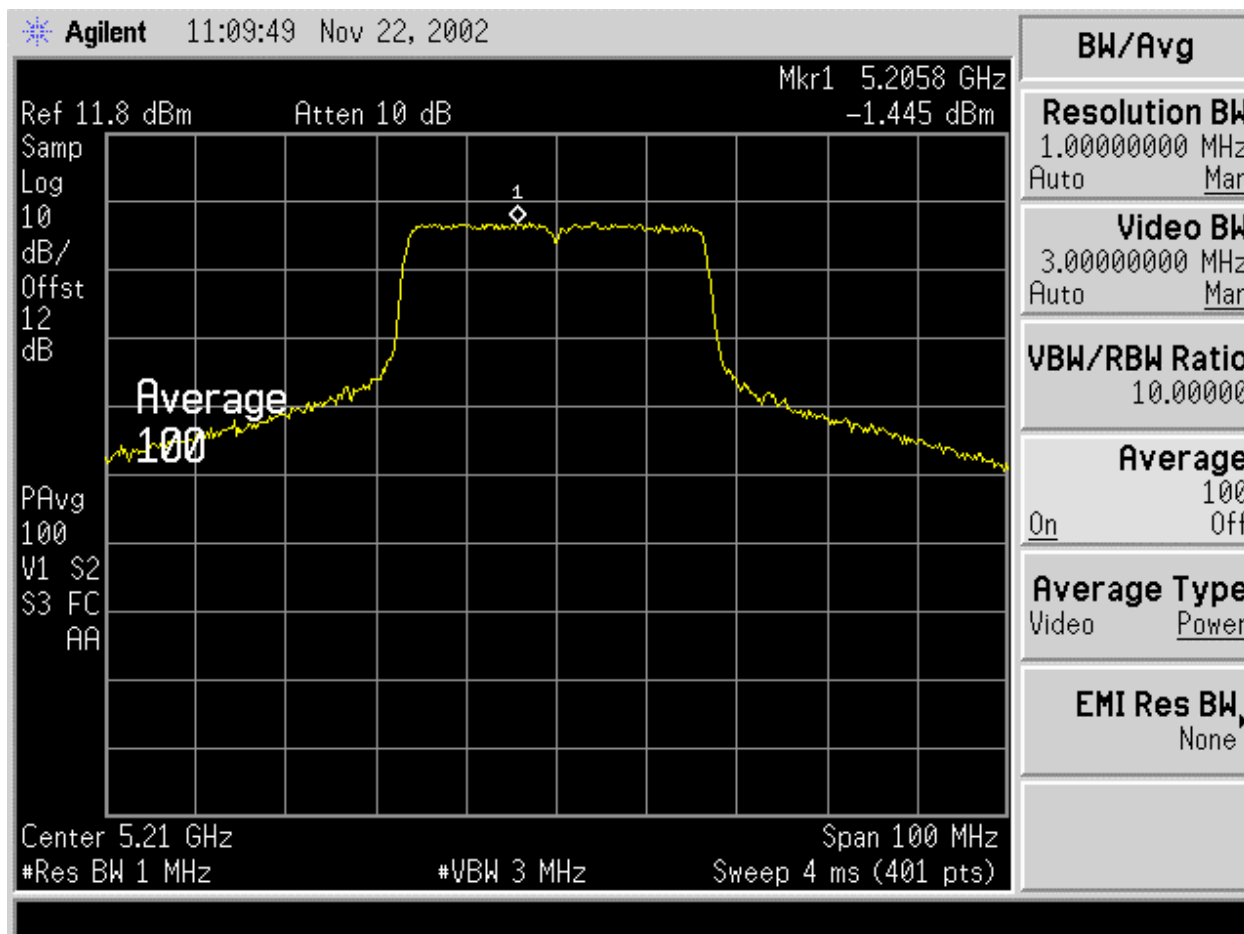
PPSD (NORMAL MODE)

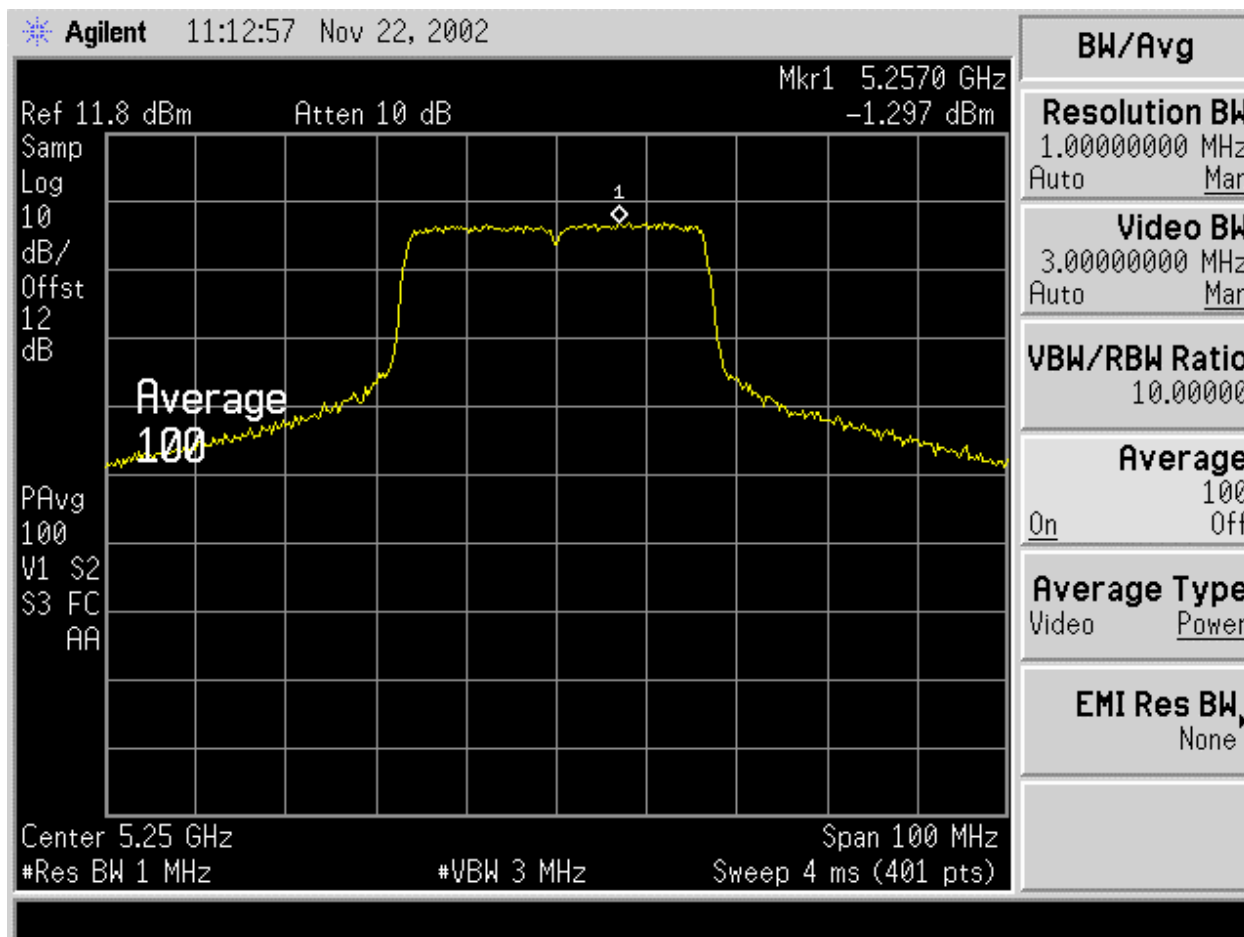


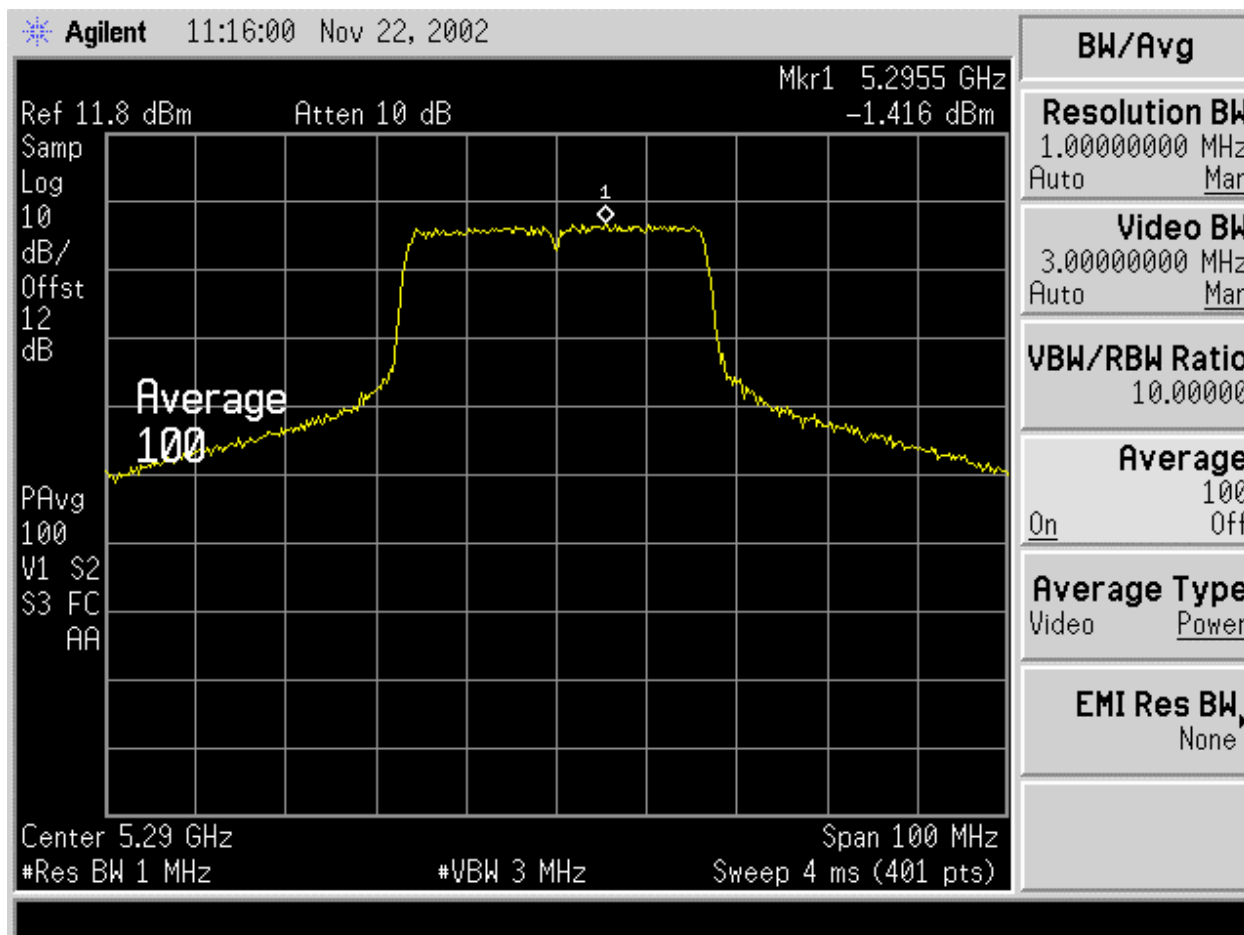




PPSD (TURBO MODE)

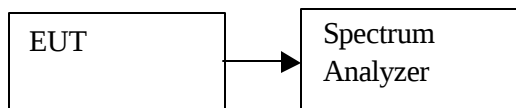






9.4. PEAK EXCURSION

TEST SETUP



TEST PROCEDURE

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

Since Method # 3 was used for peak power measurements, Method # 3 is used for the second PPSD trace.

RESULTS

No non-compliance noted:

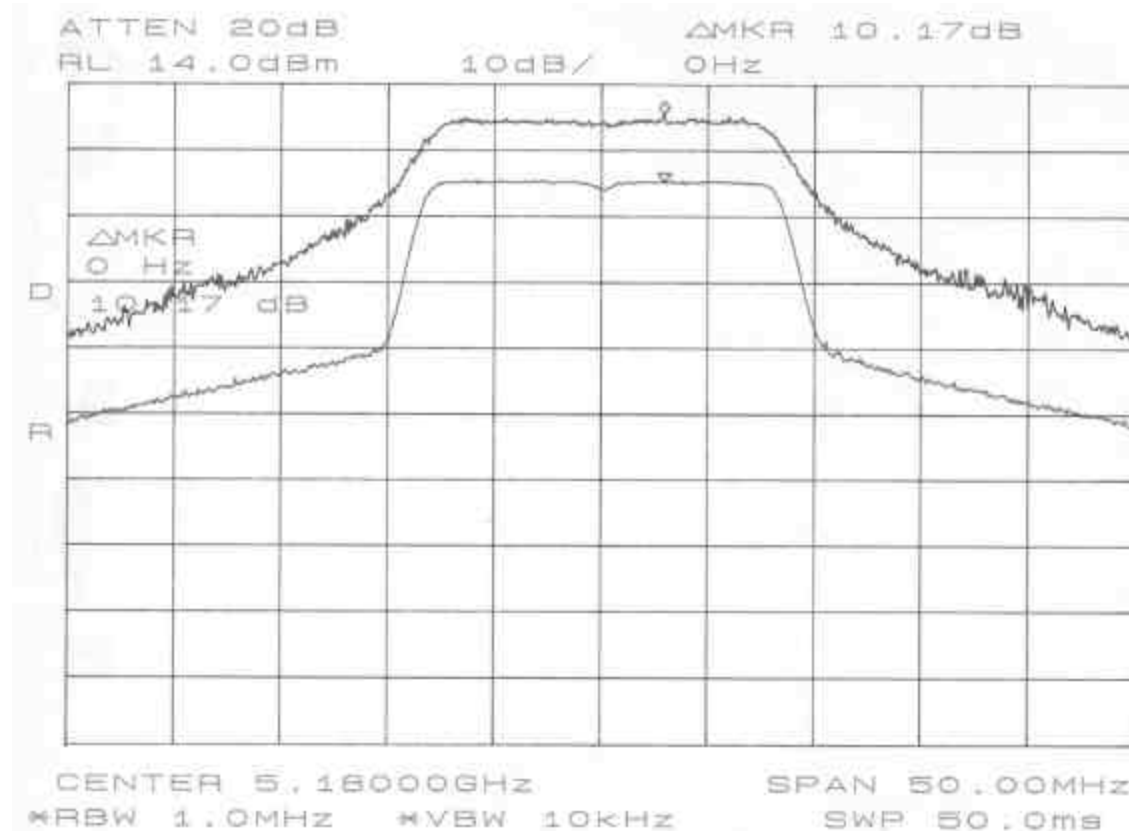
Base Mode

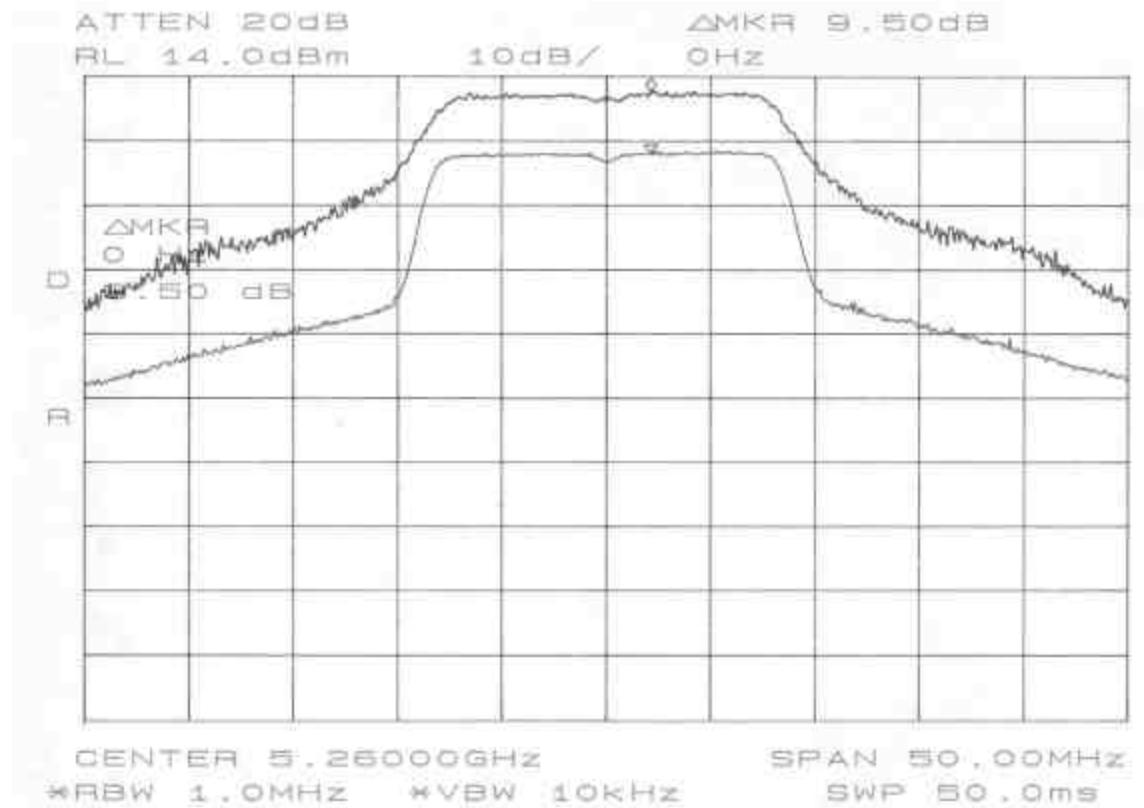
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.17	13	-2.83
Middle	5260	9.50	13	-3.5
High	5320	10.34	13	-2.66

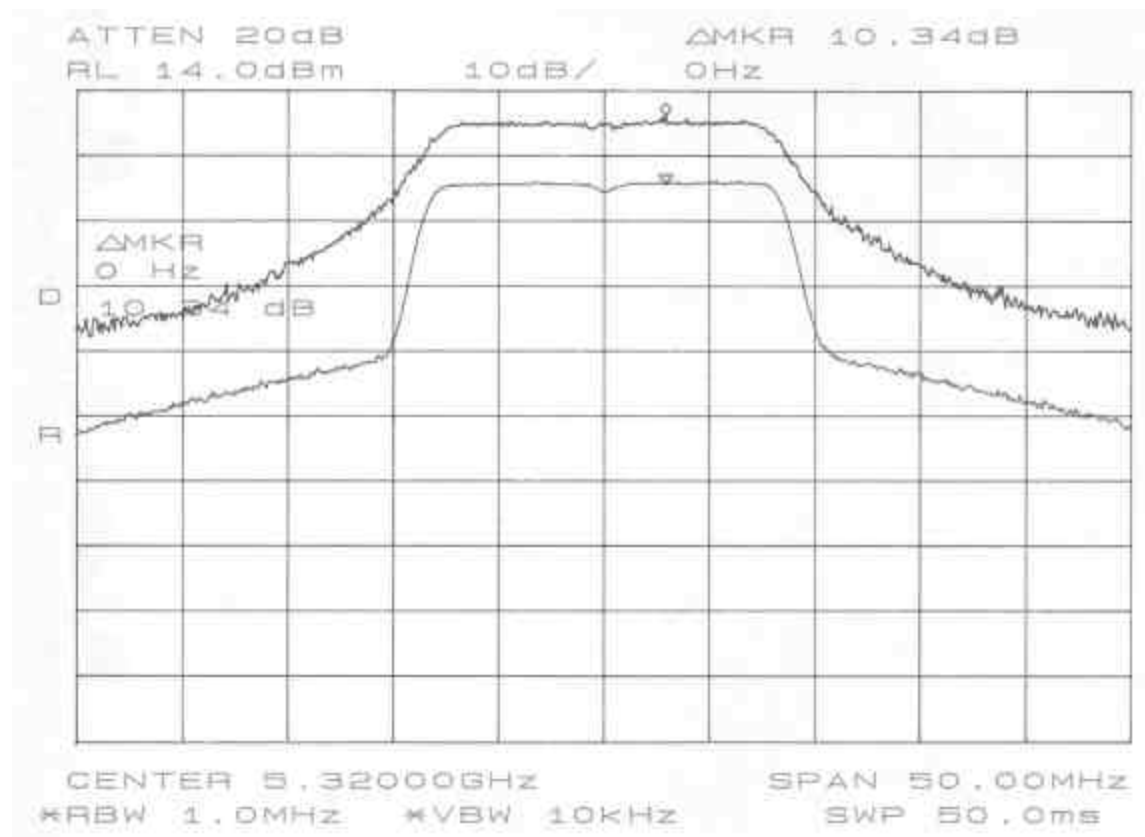
Turbo Mode

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5210	9.66	13	-3.34
Middle	5250	9.33	13	-3.67
High	5290	9.50	13	-3.5

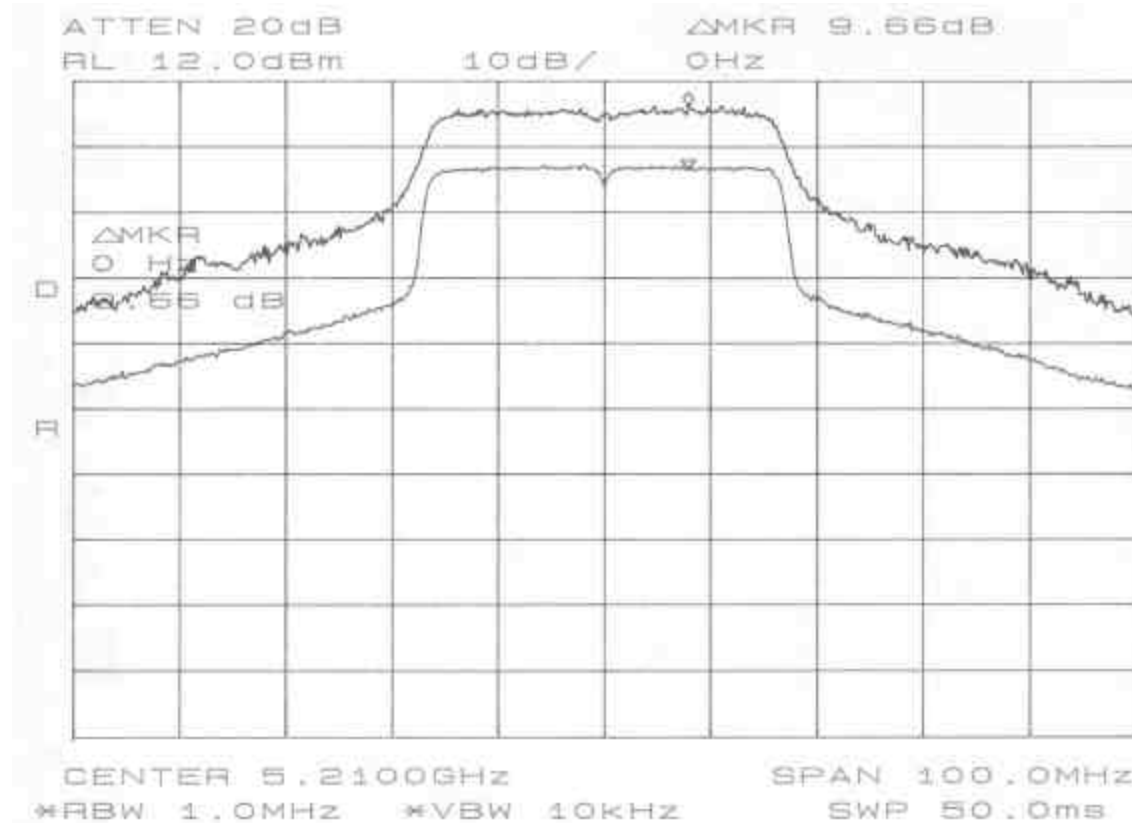
PEAK EXCURSION (NORMAL MODE)

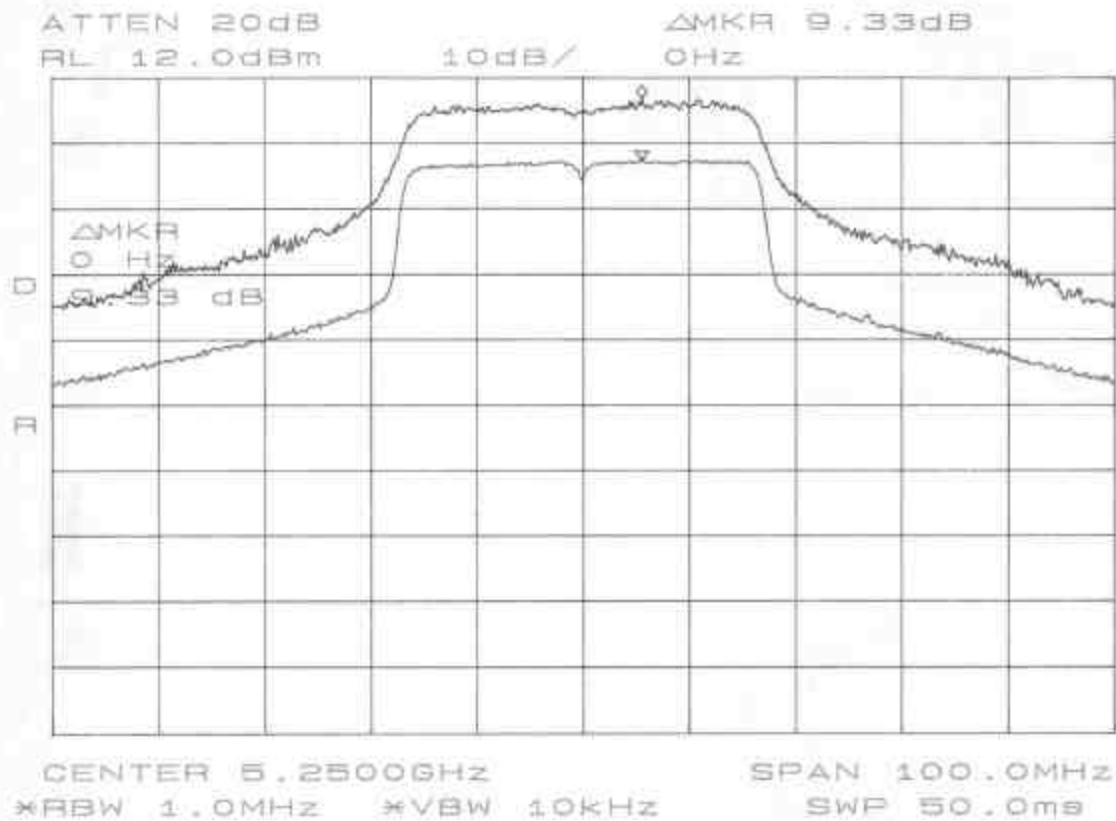


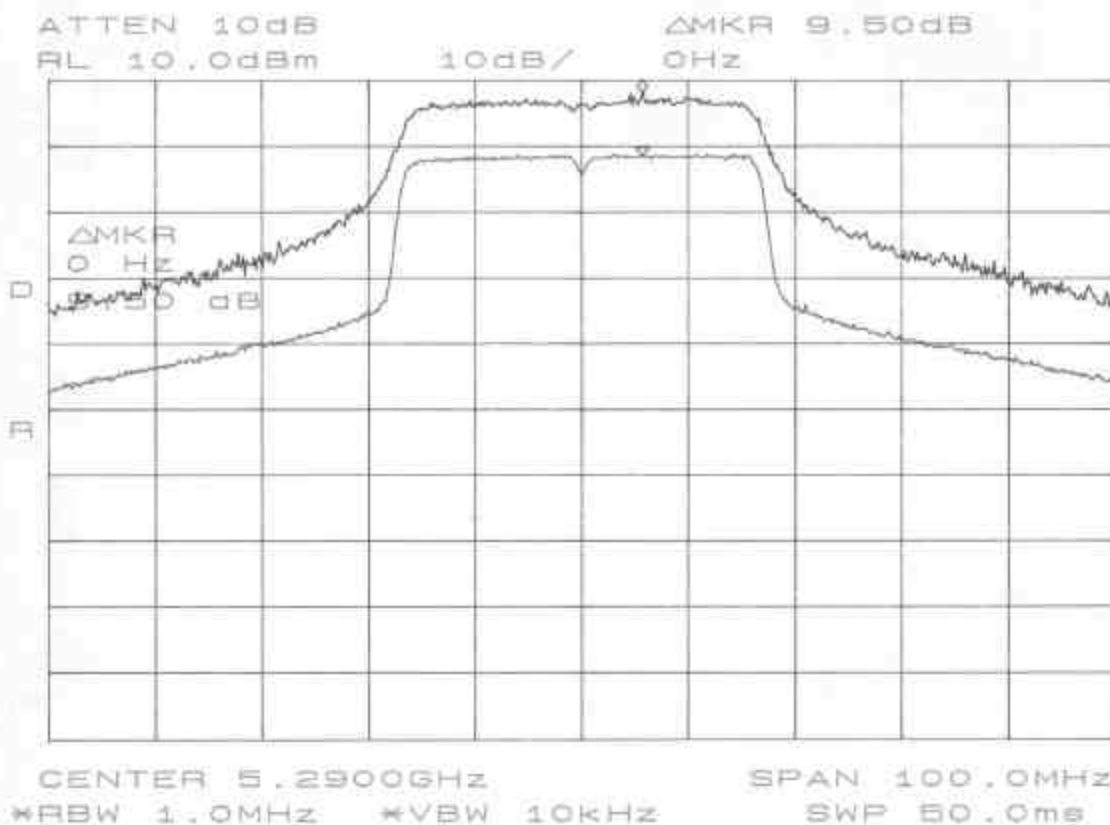




PEAK EXCURSION (TURBO MODE)







9.5. TRANSMISSION IN THE ABSENCE OF DATA

RESULTS

No non-compliance noted:

Refer to the theory of operation.

9.6. TYPE OF ANTENNA

RESULTS

No non-compliance noted:

Refer to the installation manual.

9.7. MAXIMUM PERMISSIBLE EXPOSURE

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts / meter

P = Power in Watts

G = Numeric antenna gain

d = distance in meters

S = Power Density in milliwatts / square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW / cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S} \quad \text{Equation (1)}$$

where

d = MPE safe distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW / cm²

RESULTS

No non-compliance noted:

EUT output power = 14.6 dBm

Antenna Gain = 5.2 dBi

S = 1.0 mW / cm² from 1.1310 Table 1

Substituting these parameters into Equation (1) above:

MPE Safe Distance = 2.76 cm

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

9.8. FREQUENCY STABILITY

RESULTS

No non-compliance noted:

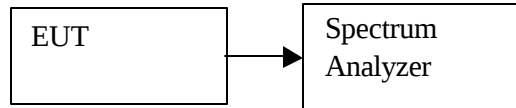
Referring to the theory of operation, the crystal used to set the frequency has a temperature coefficient of +/- 20 ppm over the specified rated temperature range. For a transmitter fundamental frequency of 5.35 GHz, this corresponds to +/- 107 kHz.

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

9.9. UNDESIRABLE EMISSIONS – CONDUCTED MEASUREMENTS

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.

TEST SETUP



TEST PROCEDURE

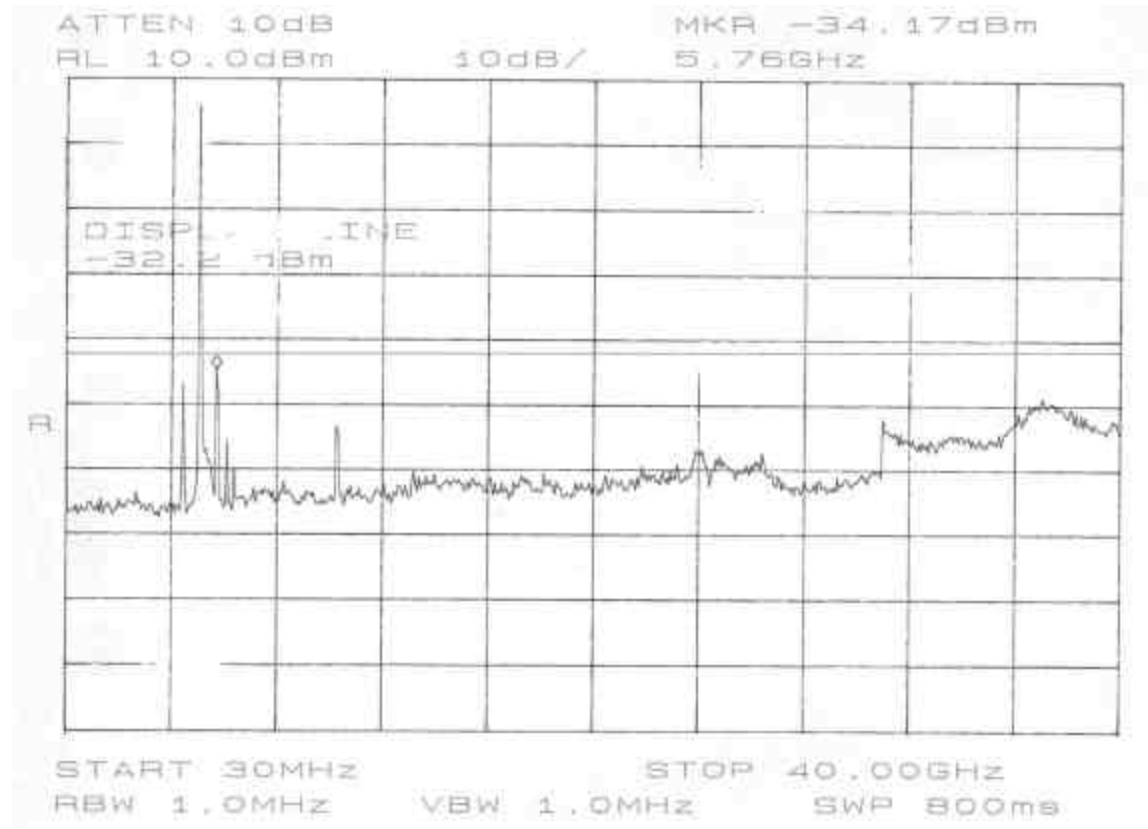
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements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

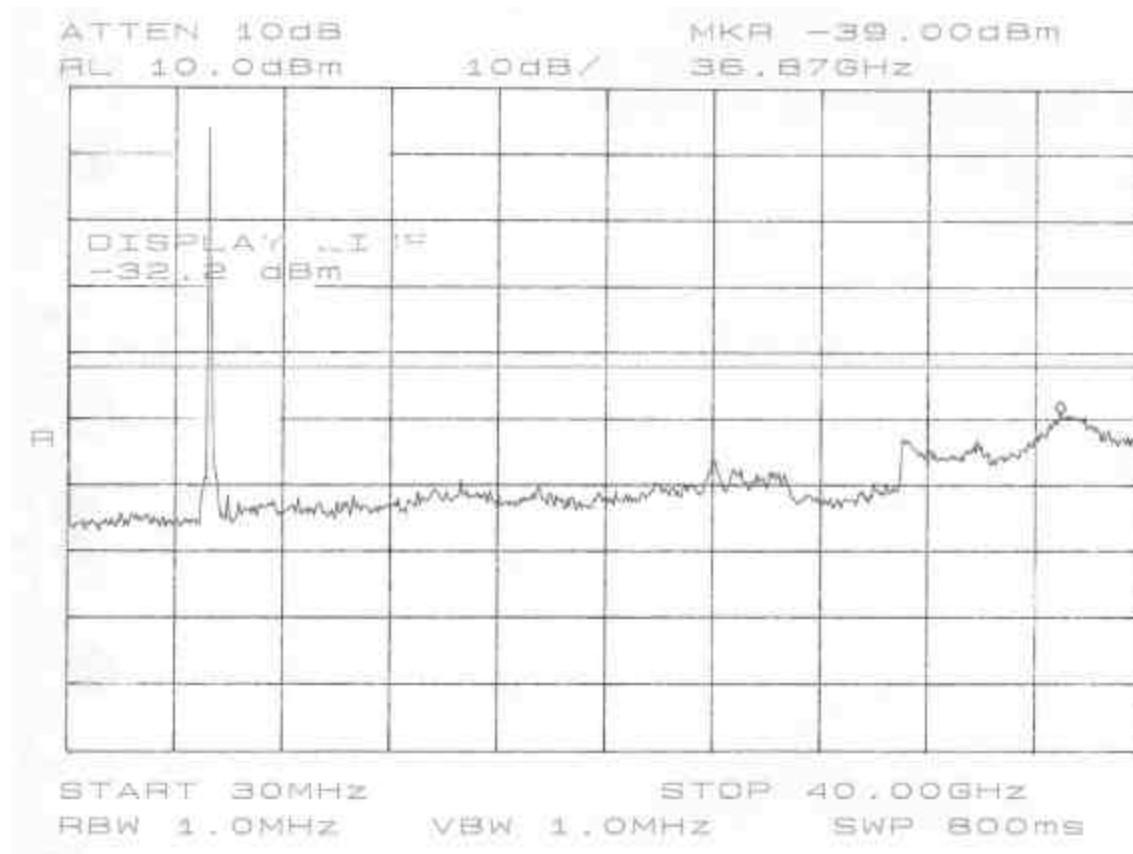
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

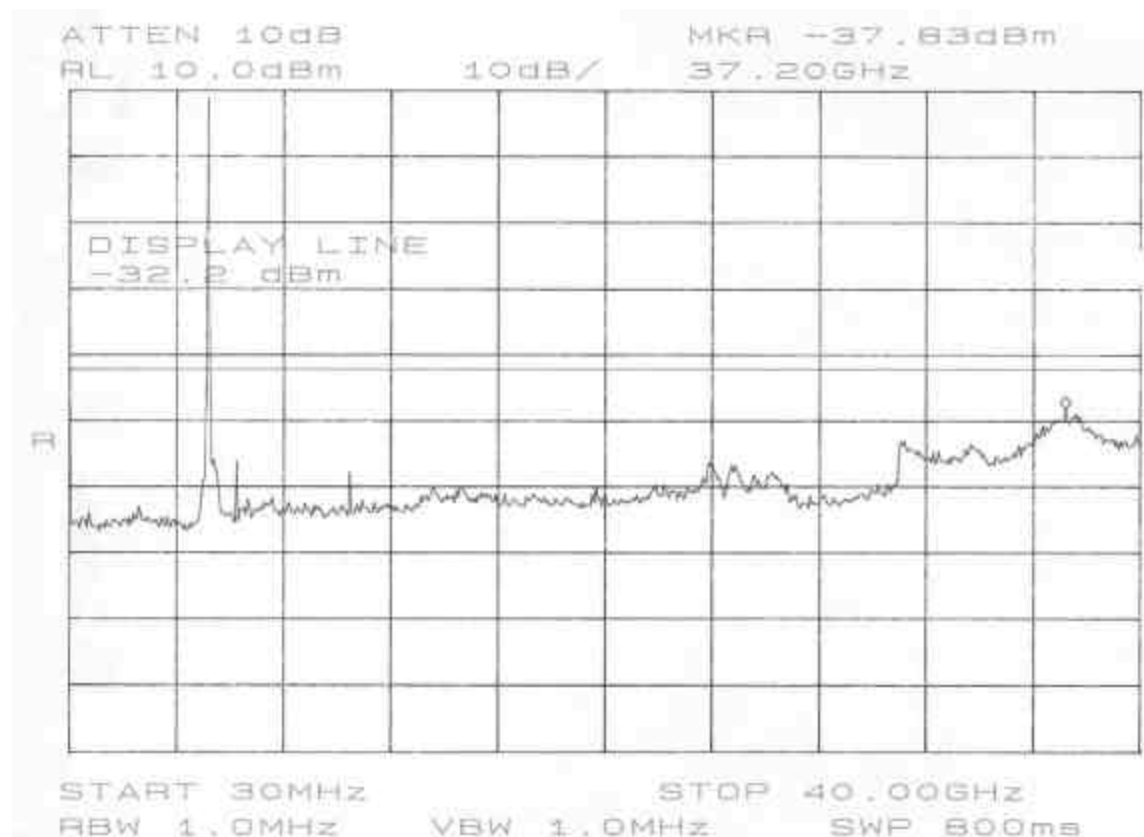
RESULTS

No non-compliance noted:

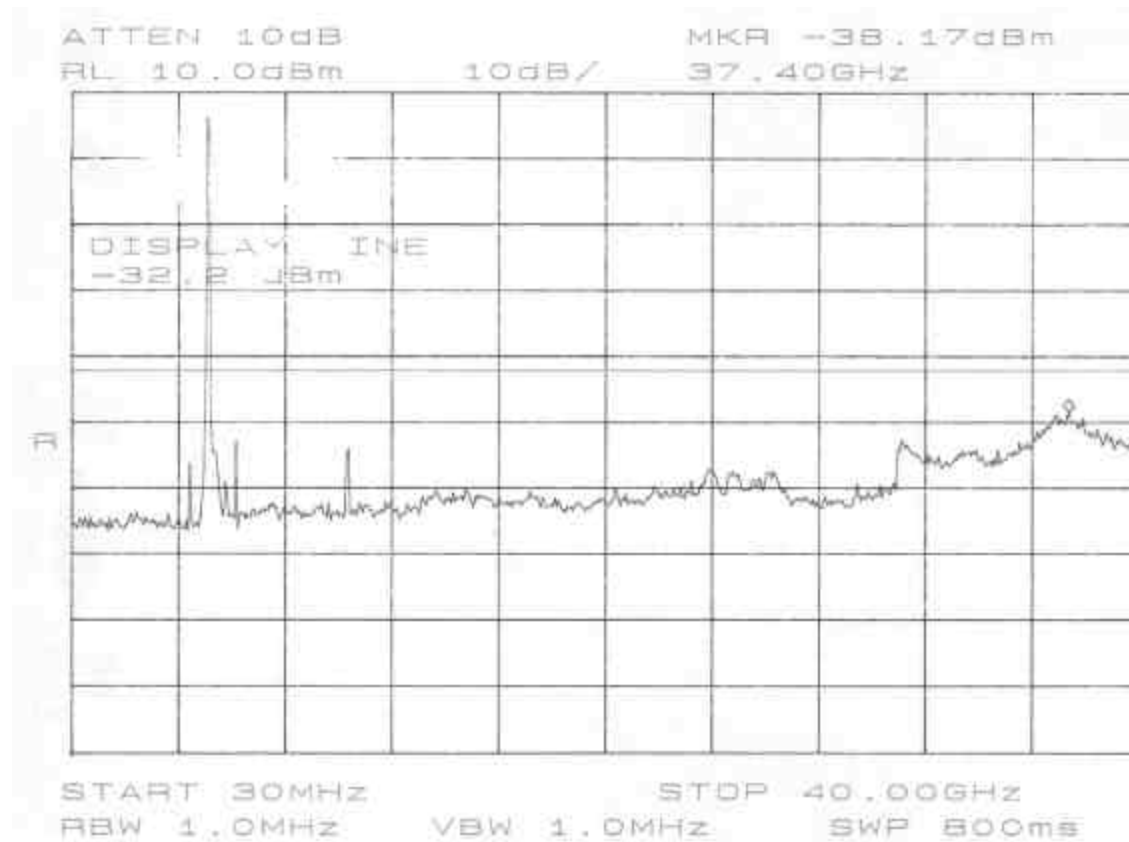
CONDUCTED SPURIOUS (NORMAL MODE)

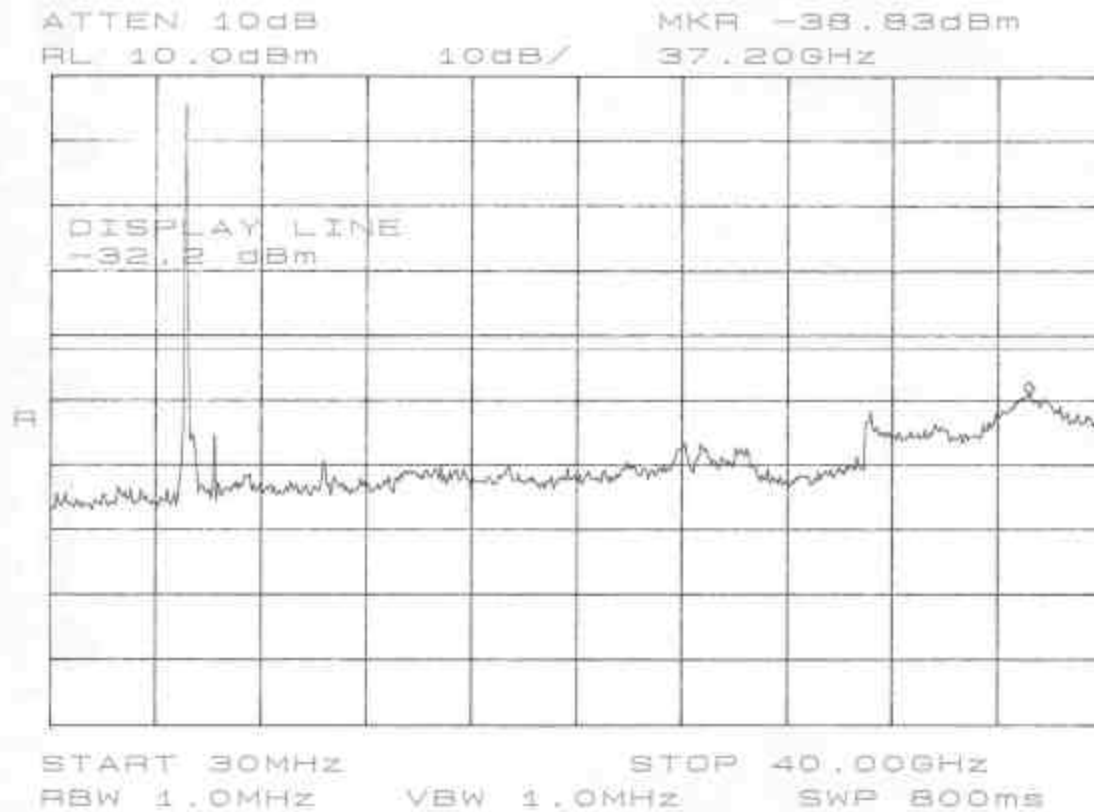


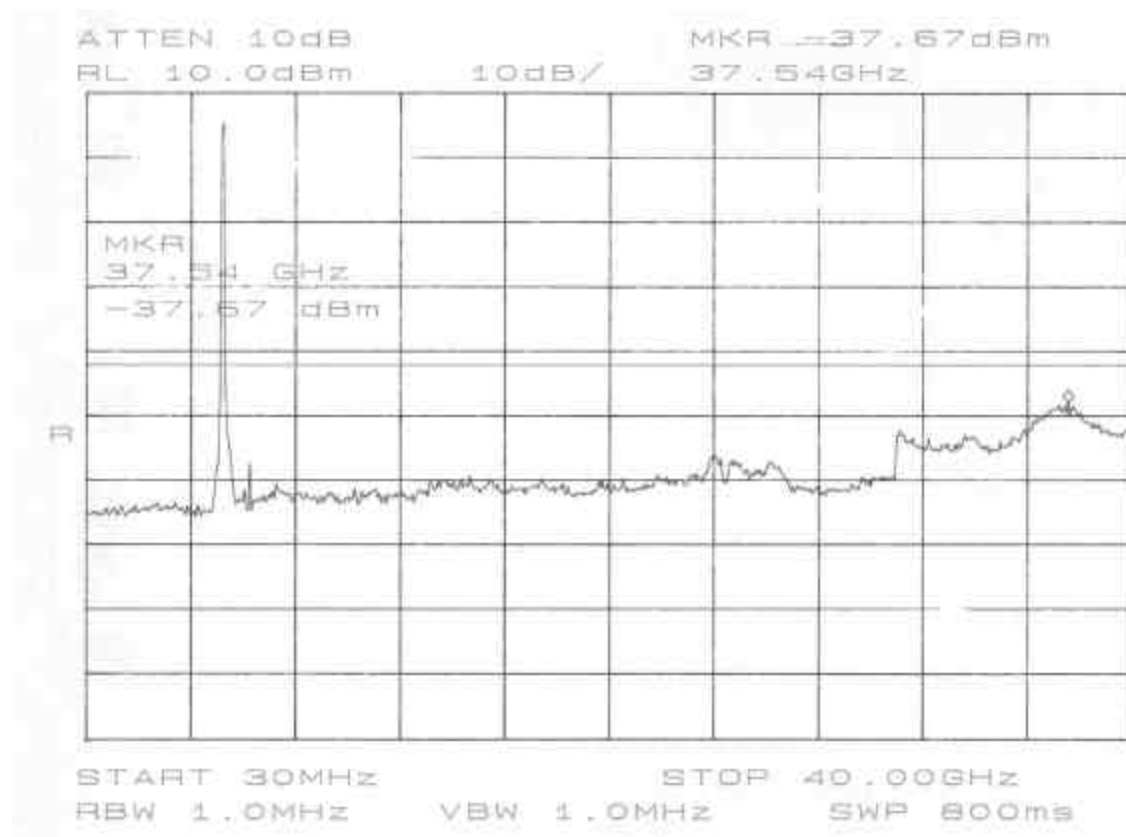




CONDUCTED SPURIOUS (TURBO MODE)







9.10. UNDESIRABLE EMISSIONS – RADIATED MEASUREMENTS

TEST SETUP

The EUT is placed on the wooden table. The antenna to EUT distance is 3 meters for measurements below 1 GHz and 1 meter for measurements above 1 GHz. The EUT is configured in accordance with Section 8 of ANSI C63.4/1992.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

For measurements below 1 GHz within restricted bands the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For all other measurements, 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.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The frequency span is set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the suspected signal. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

SYSTEM NOISE FLOOR FOR HARMONIC AND SPURIOUS MEASUREMENTS

Compliance Certification Services

Worst Case Radiated Emissions System Noise Floor

Each band below corresponds to each horn antenna band

Uses the lowest gain preamplifier; actual preamp used may have higher gain

Uses the longest typical cable configuration; actual cables used may have less loss

Noise floor field strength results are compared to the FCC 15.205 Restricted Band limit

Specification Distance: 3 meters

Freq GHz	SA dBuV	AF dB/m	Distance m	Distance dB	Preamp dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
1 to 18 GHz band									
RBW = 1 MHz, peak detection									
18	41.9	47.8	1	-9.5	32.6	13.5	61.06	74	-12.94
RBW = 1 MHz, average detection									
18	28.7	47.8	1	-9.5	32.6	13.5	47.86	54	-6.14
18 to 26.5 GHz band									
RBW = 1 MHz, peak detection									
26.5	44.6	33.4	1	-9.5	35.0	19.5	52.96	74	-21.04
RBW = 1 MHz, average detection									
26.5	32.4	33.4	1	-9.5	35.0	19.5	40.76	54	-13.24

SAMPLE CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

where

E = Field Strength in Volts / meter

P = Power in watts

G = Numeric antenna gain

d = distance in meters

Rearranging terms yields:

$$P * G = (d * E)^2 / 30$$

Converting to the logarithmic form and changing to units of mW and uV/m, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$E \text{ (uV/m)} = E \text{ (V/m)} / 1000000$$

yields

$$\begin{aligned} 10 \log (P * G) &= 10 \log (d^2) + 10 \log (E^2) - 10 \log (30) - 10 \log (10^9) \\ &= 20 \log (d) + 20 \log (E) - 104.77 \end{aligned}$$

In this logarithmic form

$$10 \log (P * G) \text{ is PG in dBm and}$$

$$20 \log (E) \text{ is E in dBuV/m}$$

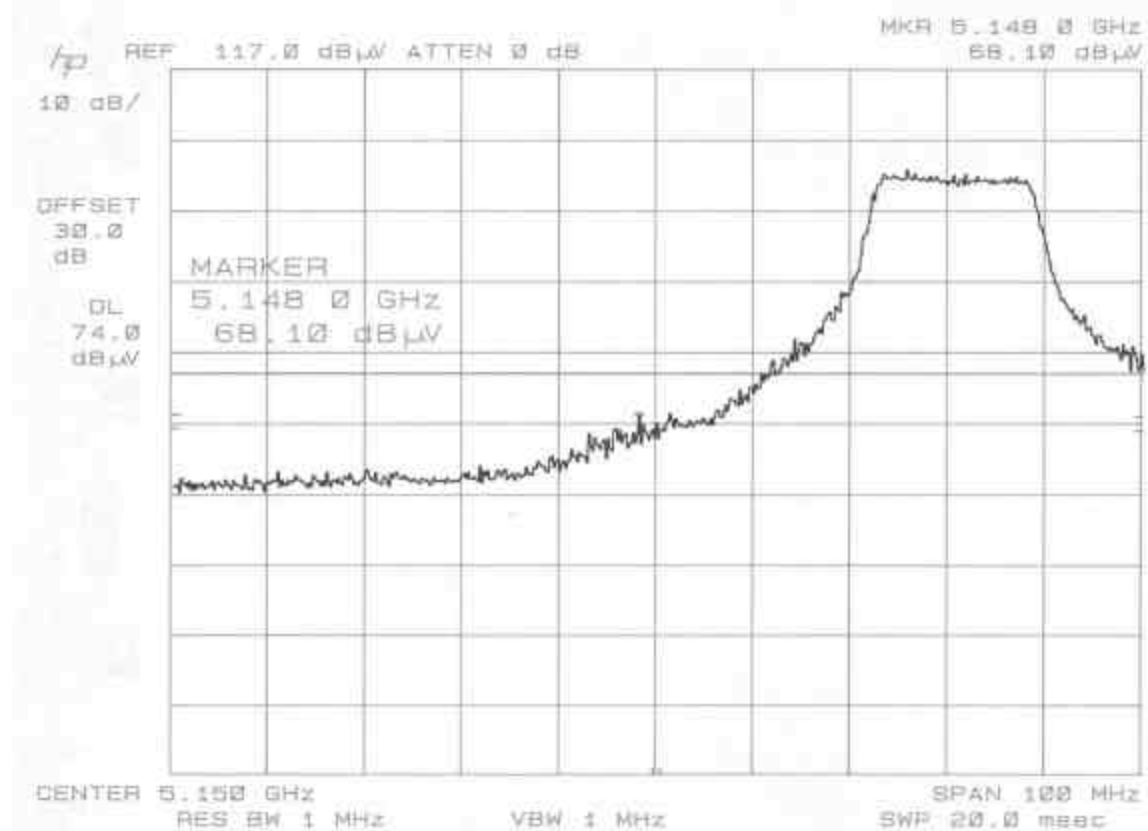
Since EIRP = P * G, then at a specification distance of 3 meters, the EIRP in terms of field strength is:

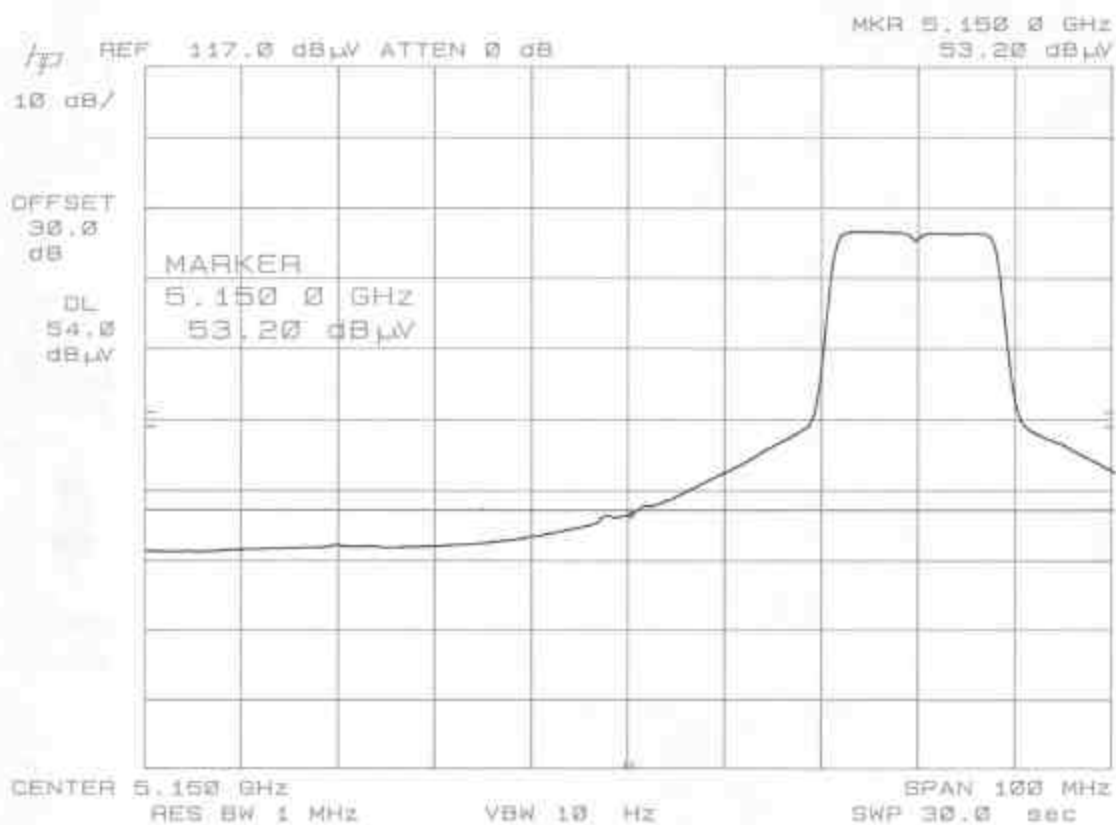
$$\text{EIRP (dBm)} = P * G \text{ (dBm)} = E \text{ (dBuV/m)} - 95.2$$

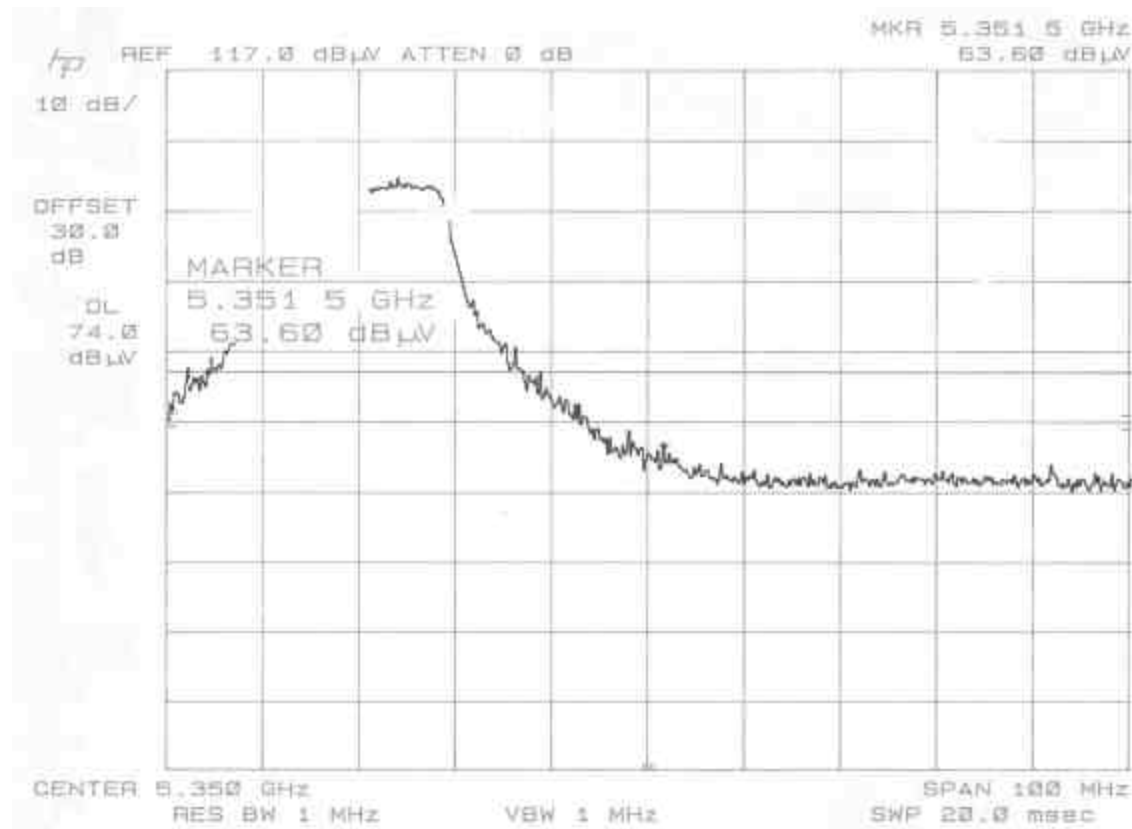
TEST RESULTS

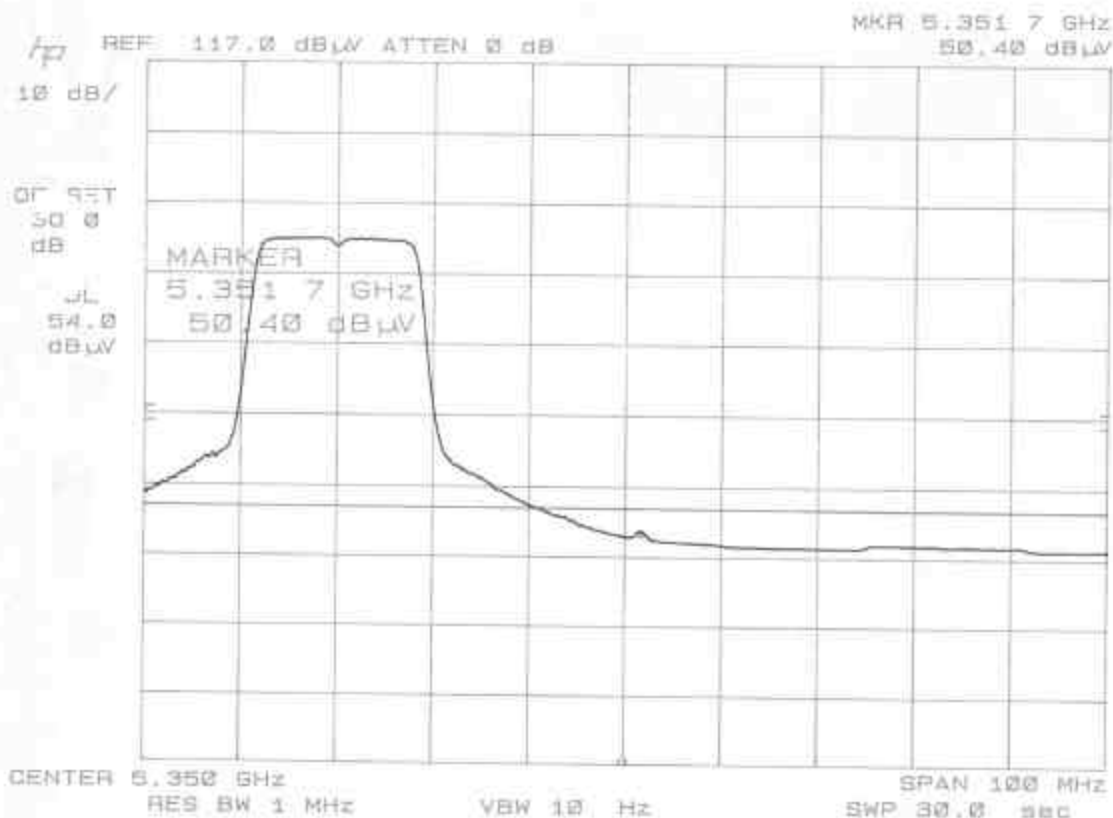
No non-compliance noted:

BAND EDGE RADIATED EMISSIONS (NORMAL MODE, VERTICAL POLARIZATION)

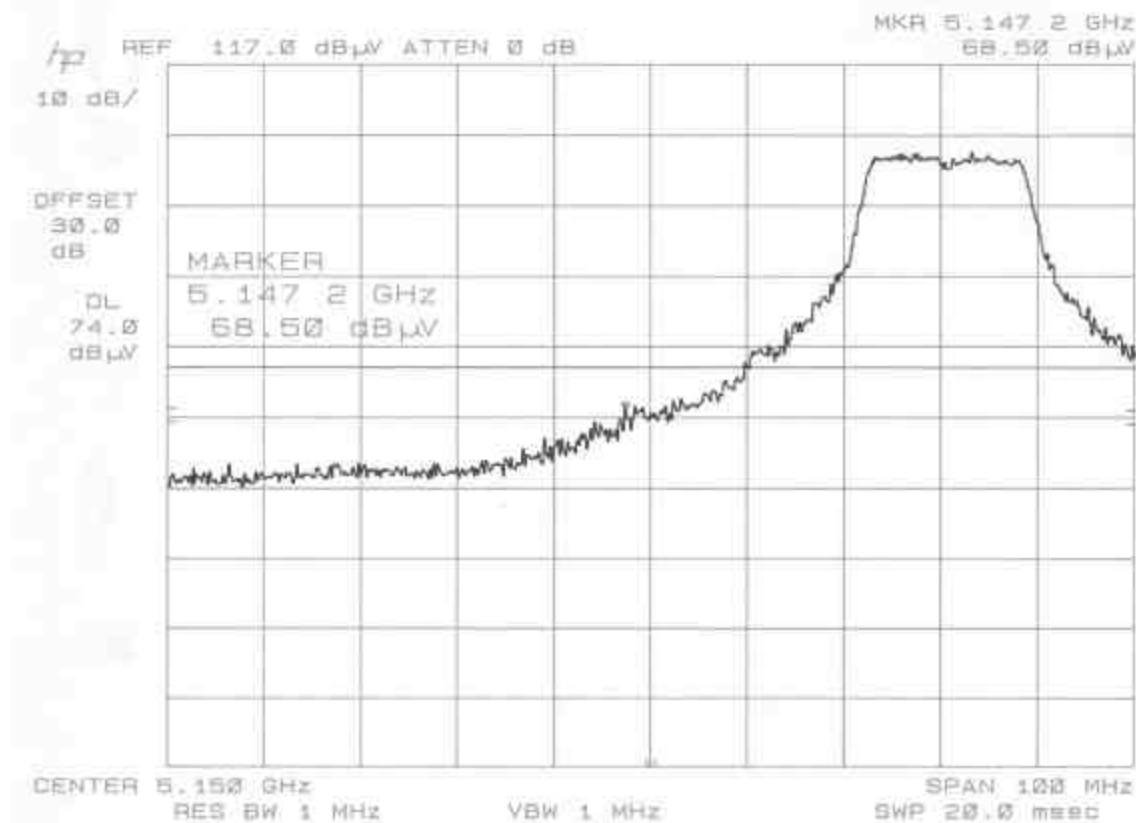


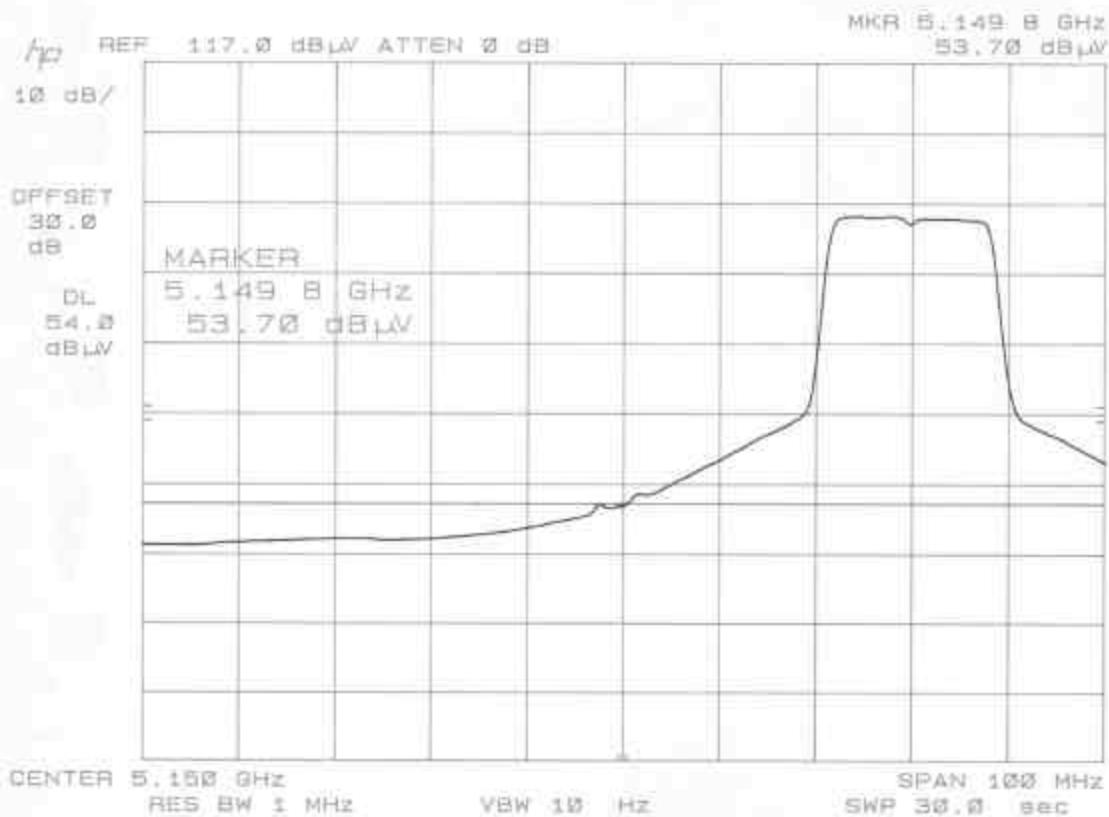


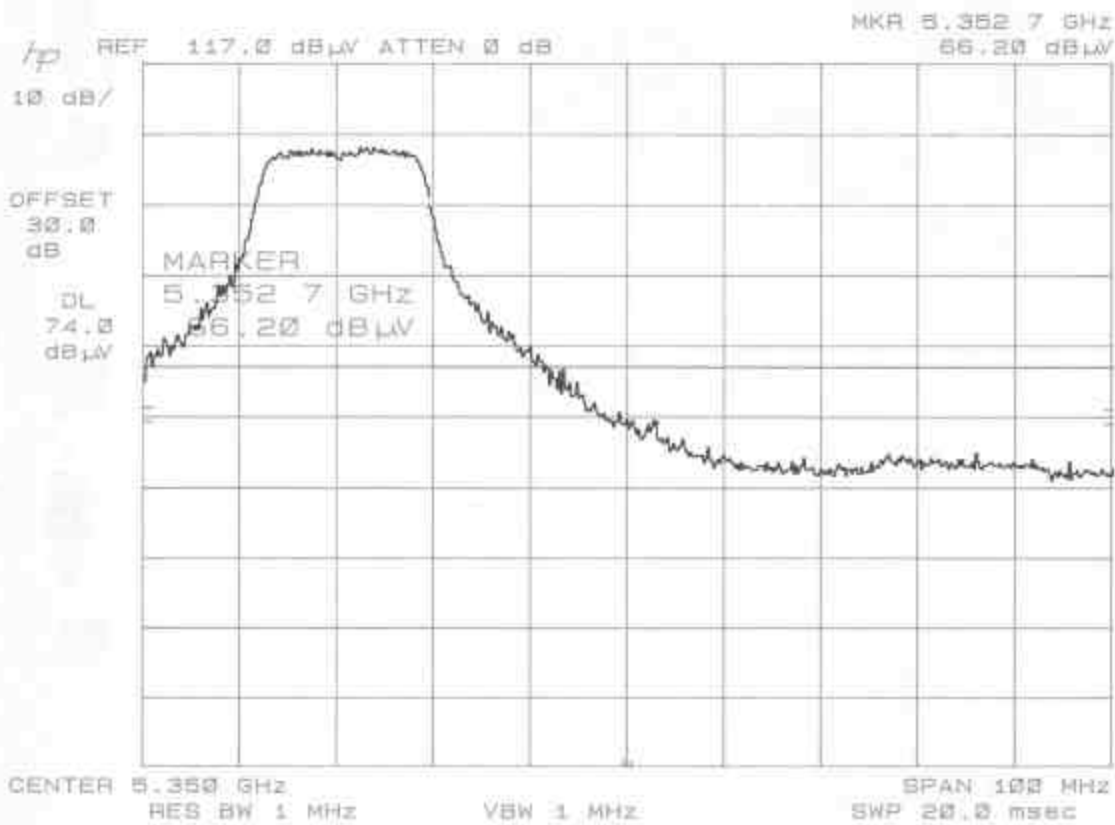


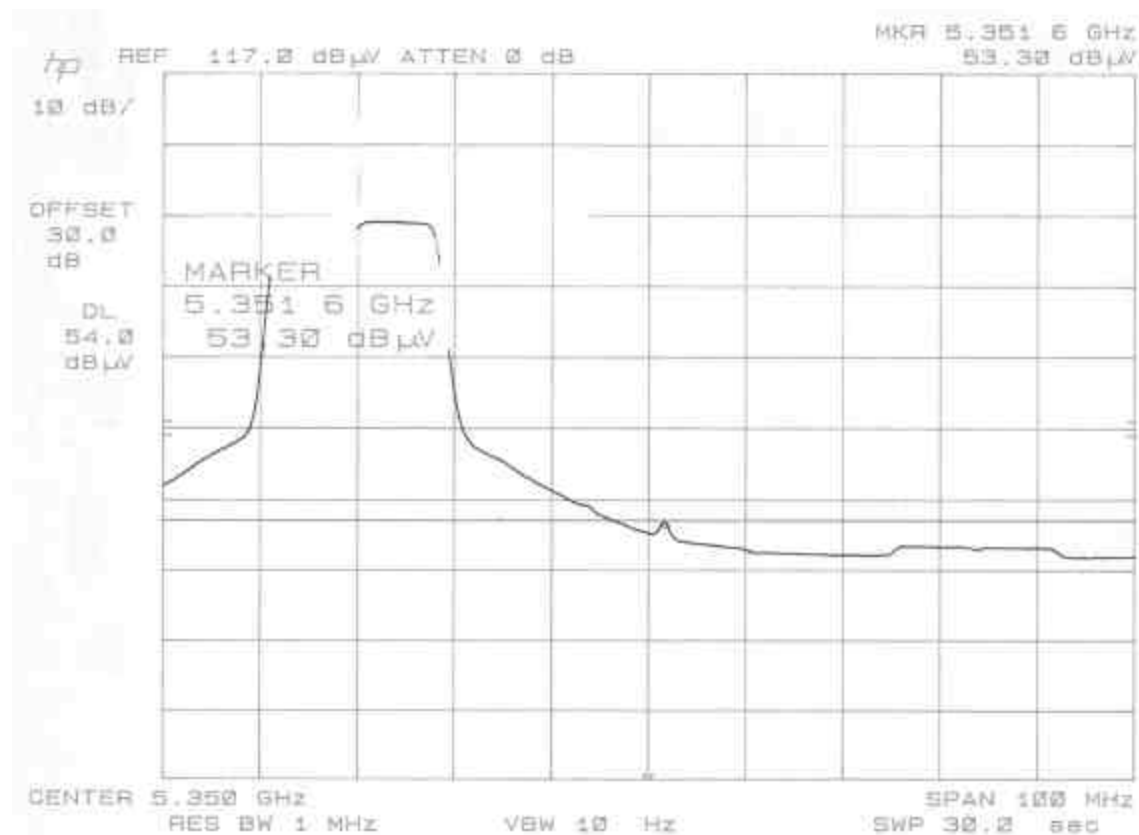


BAND EDGE RADIATED EMISSIONS (NORMAL MODE, HORIZONTAL POLARIZATION)

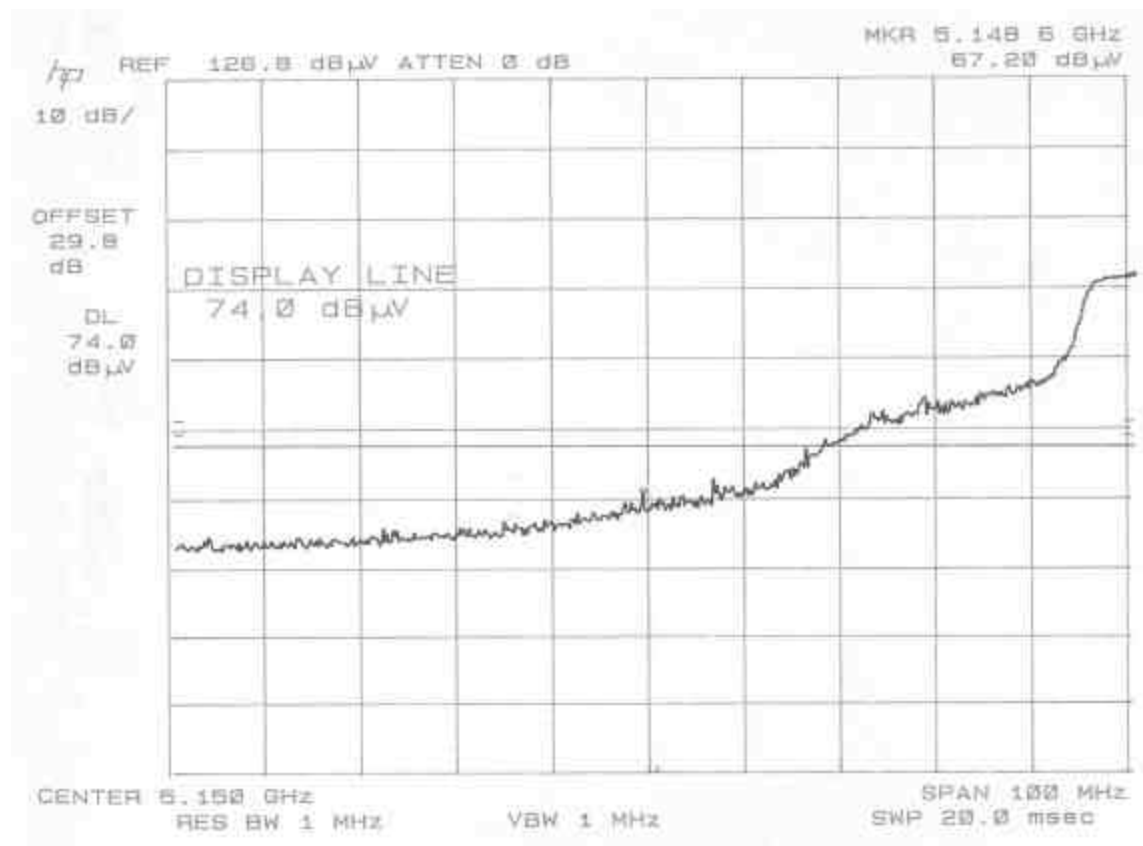


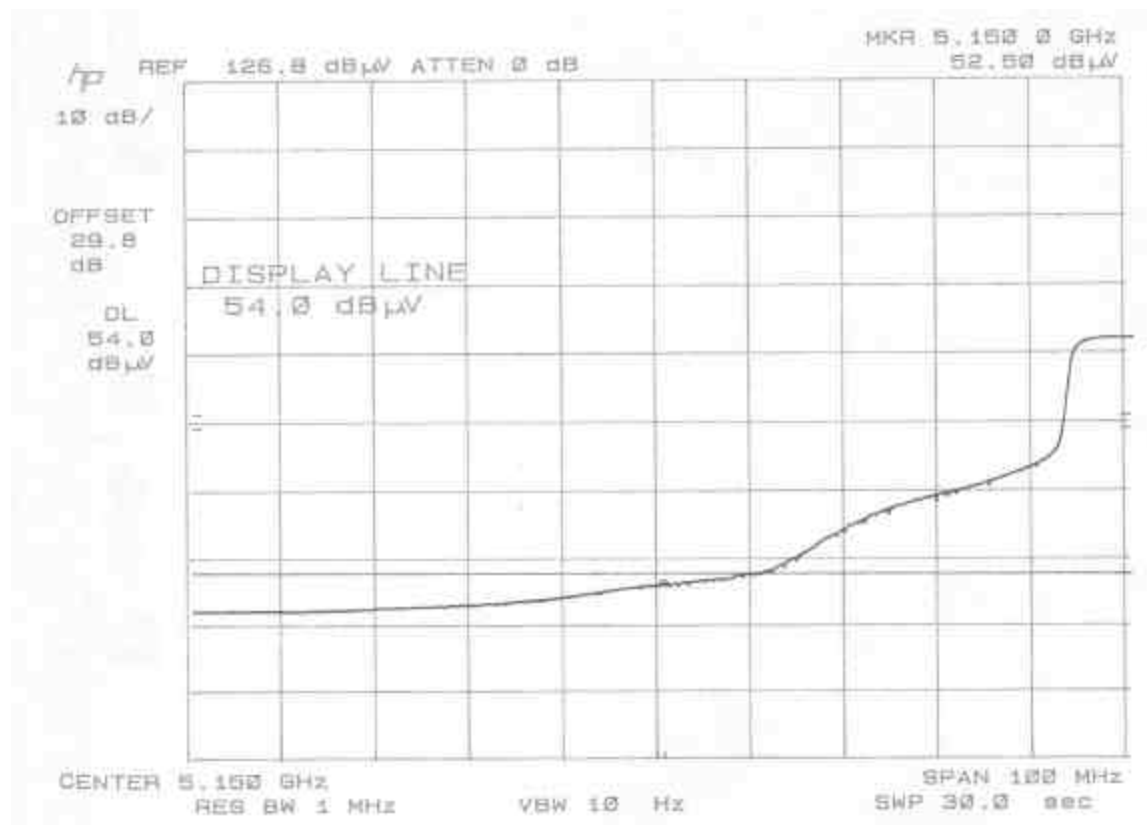


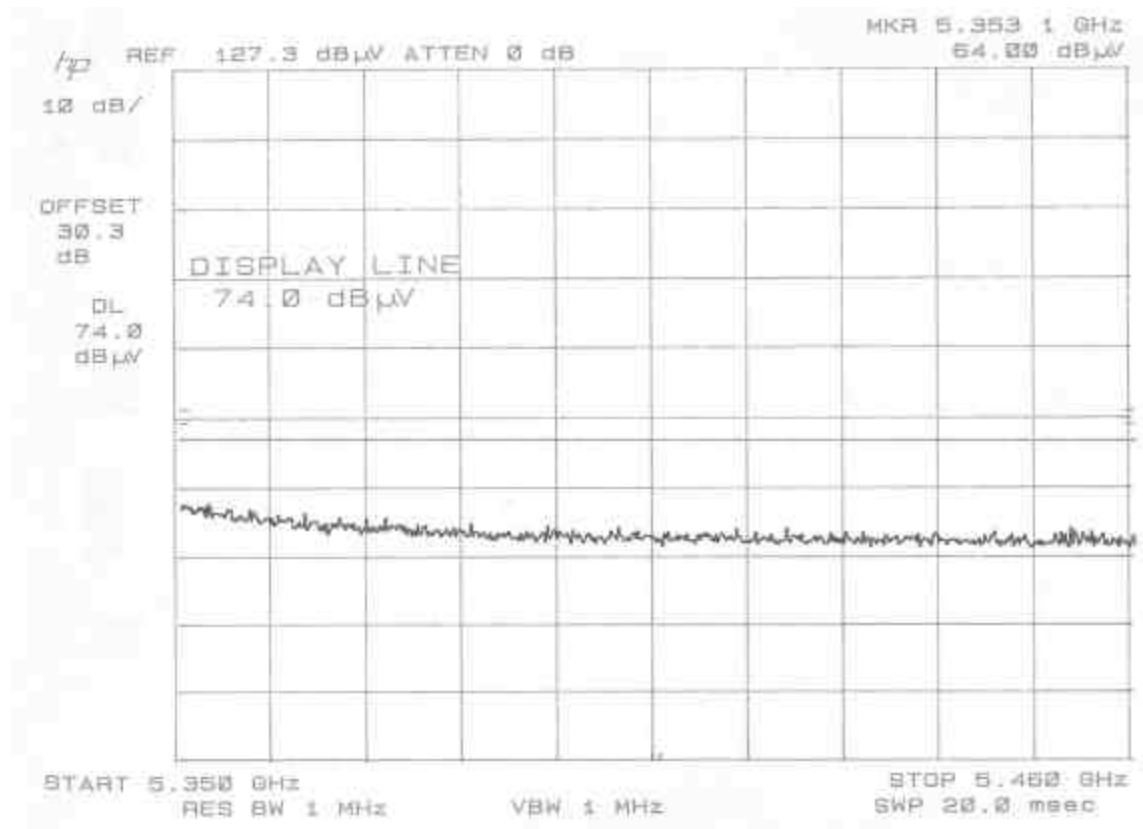


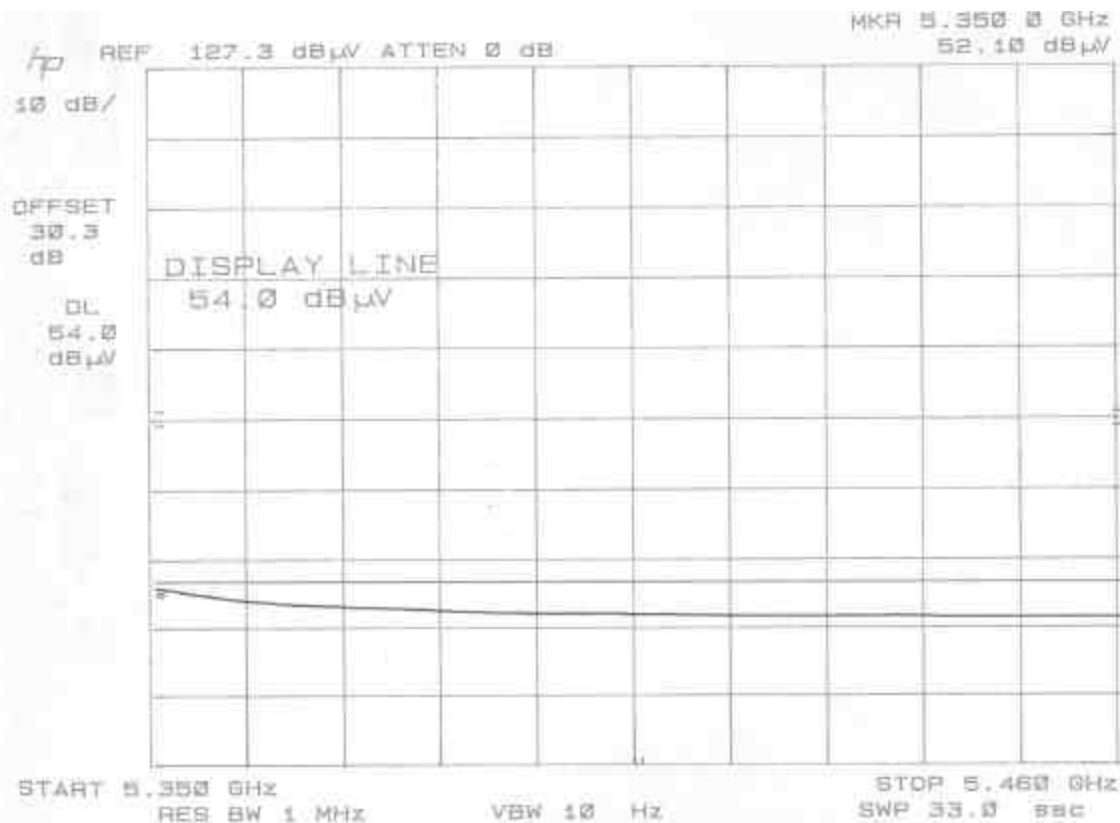


BAND EDGE RADIATED EMISSIONS (TURBO MODE, VERTICAL POLARIZATION)

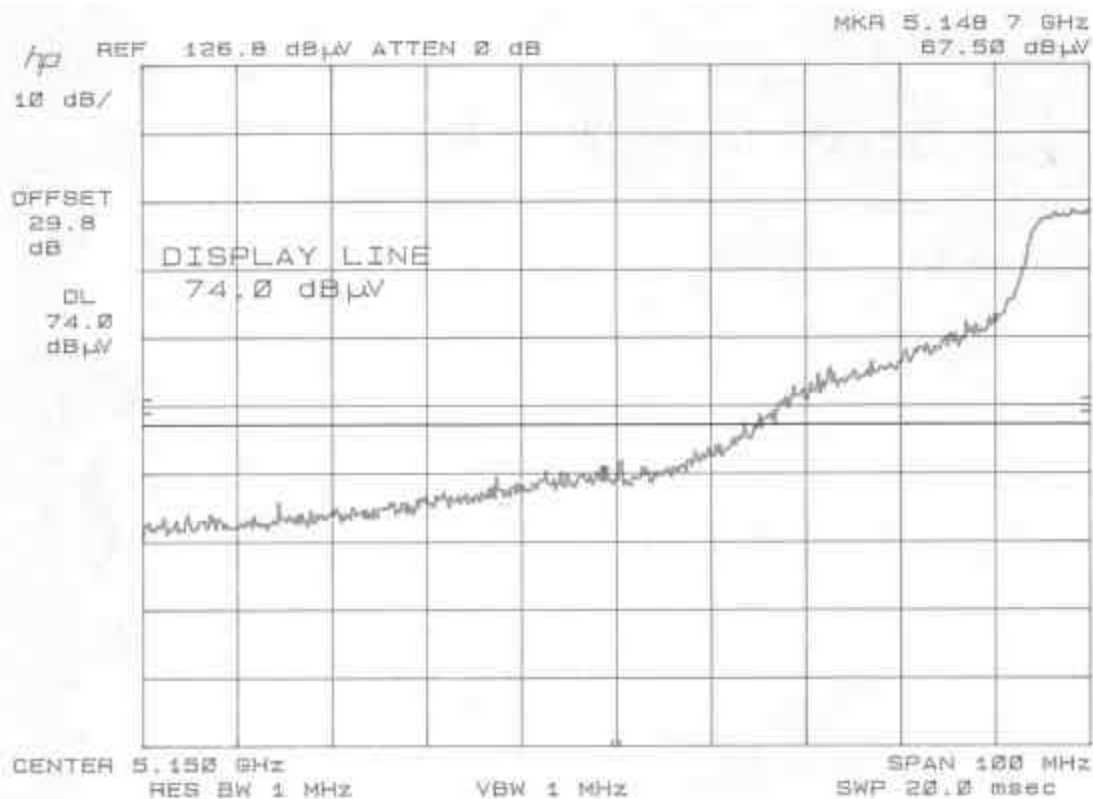


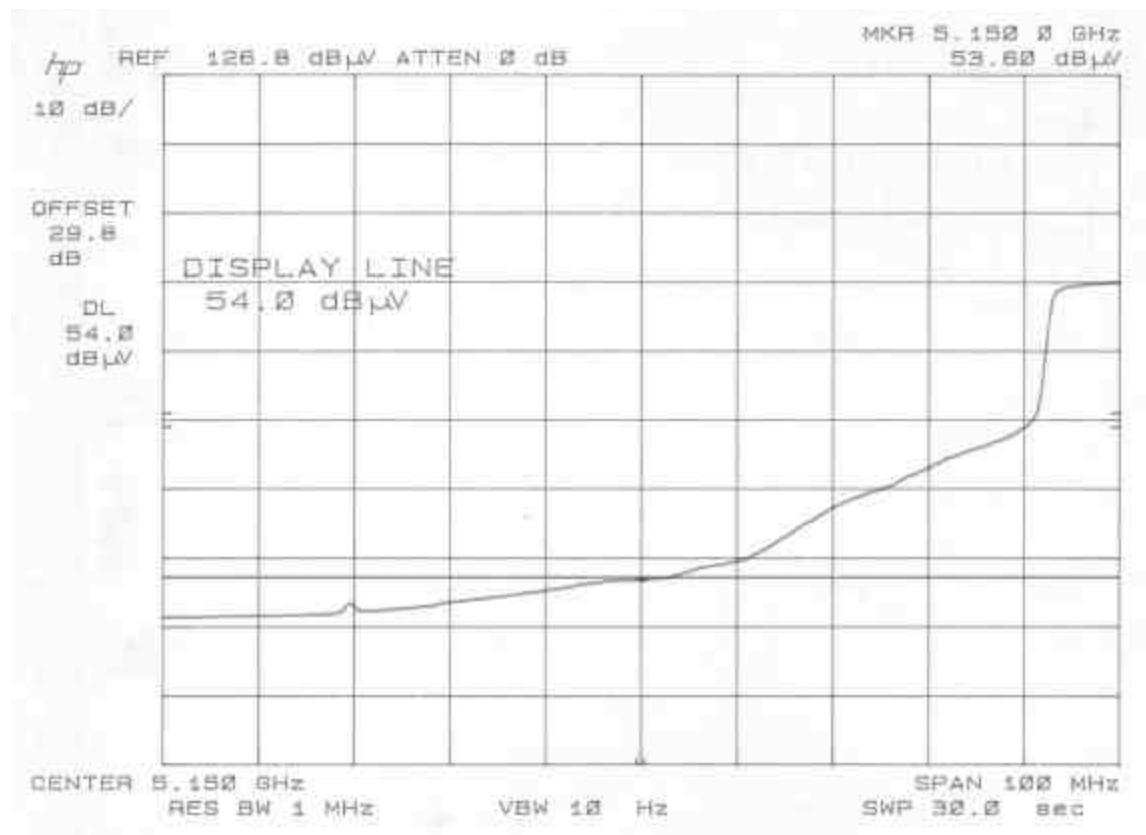


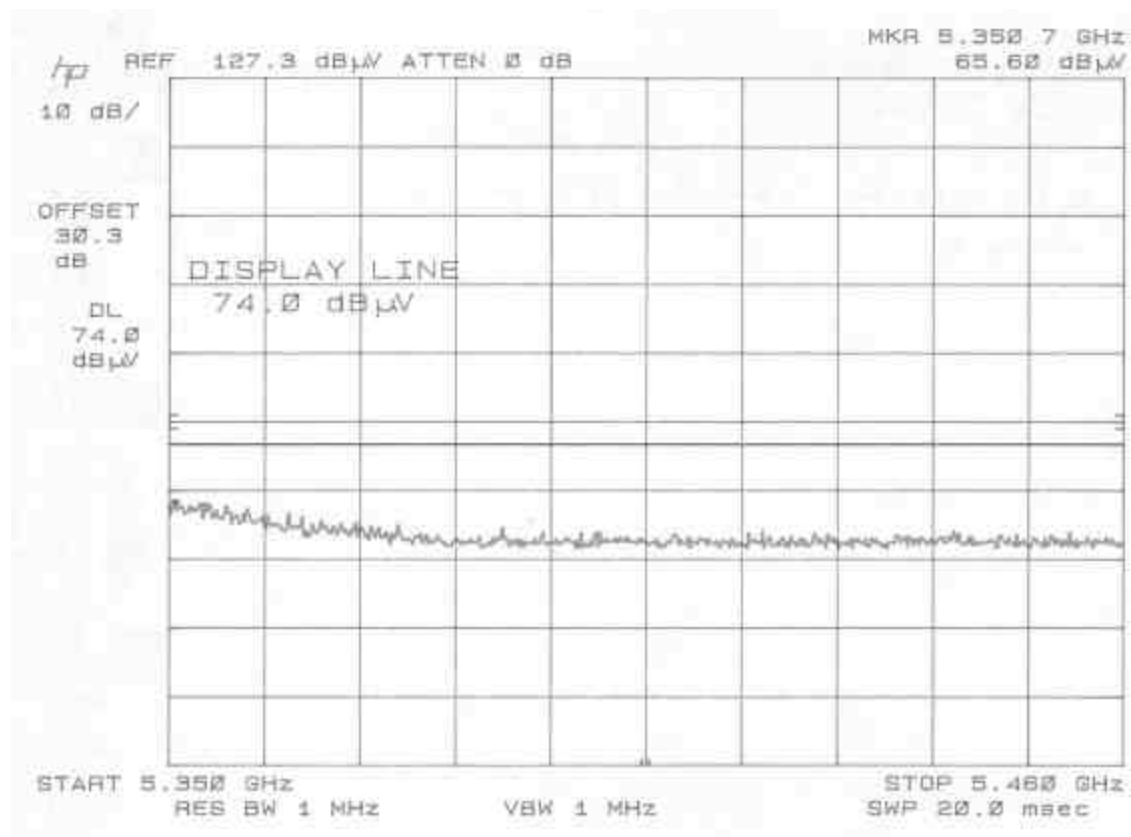


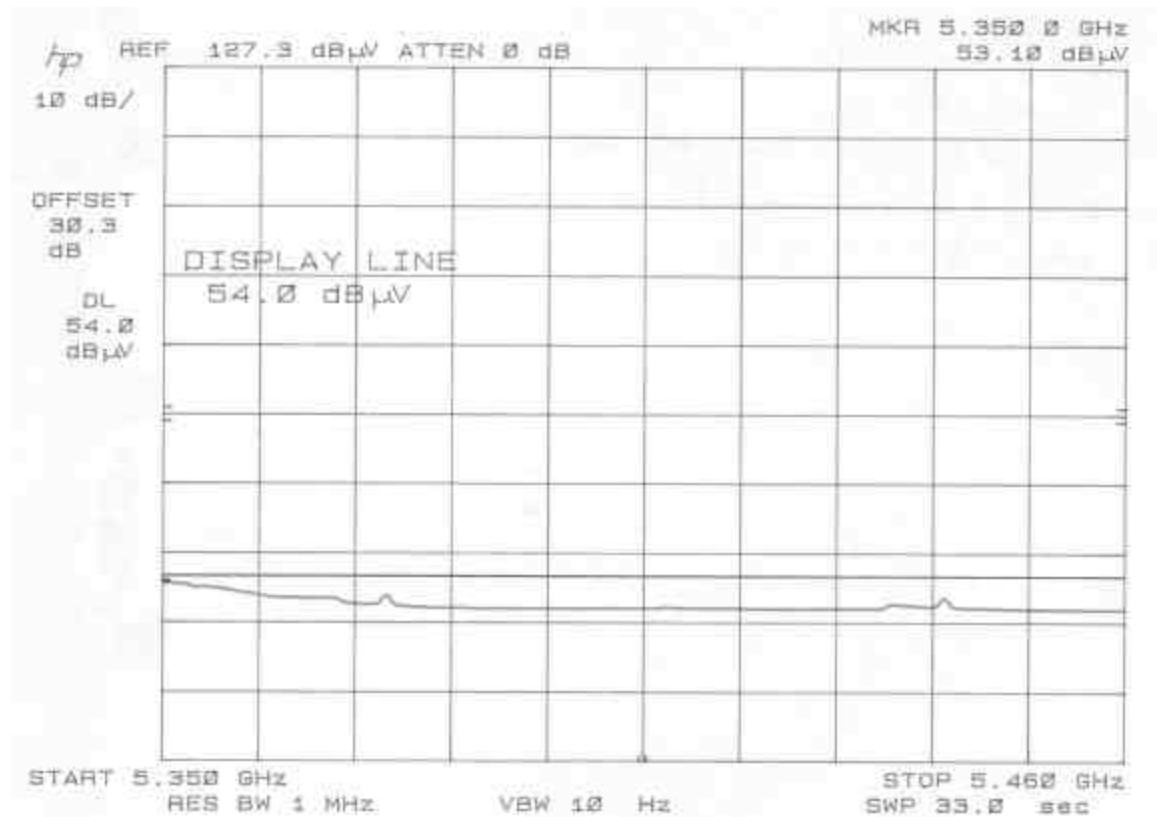


BAND EDGE RADIATED EMISSIONS (TURBO MODE, HORIZONTAL POLARIZATION)









HARMONIC AND SPURIOUS RADIATED EMISSIONS (NORMAL MODE)

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.18 GHz, Normal Mode, ART setting = 12.5												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.360	V	Peak	55.5	-9.5	38.9	34.6	1.0	8.8	60.0	-35.2	-7.0	-28.2
10.360	V	Avg	45.8	-9.5	38.9	34.6	1.0	8.8	50.3	-44.9	-27.0	-17.9
10.360	H	Peak	55.2	-9.5	38.9	34.6	1.0	8.8	59.7	-35.5	-7.0	-28.5
10.360	H	Avg	45.0	-9.5	38.9	34.6	1.0	8.8	49.5	-45.7	-27.0	-18.7

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.18 GHz, Normal Mode, ART setting = 12.5											
Specification Distance: 3.0 meters Actual Distance: 1.0 meters Cable Length: 15.0 feet											
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
15.540	V	Peak	54.2	-9.5	38.3	33.6	1.0	11.4	61.8	74.0	-12.2
15.540	V	Avg	43.6	-9.5	38.3	33.6	1.0	11.4	51.2	54.0	-2.8
15.540	H	Peak	51.1	-9.5	38.3	33.6	1.0	11.4	58.7	74.0	-15.3
15.540	H	Avg	41.8	-9.5	38.3	33.6	1.0	11.4	49.4	54.0	-4.6

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/14/02 Test Engineer: Frank Ibrahim Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.26 GHz, Normal Mode, ART setting = 15												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.520	V	Peak	57.7	-9.5	39.2	35.7	1.0	8.9	61.5	-33.7	-7.0	-26.7
10.520	V	Avg	48.2	-9.5	39.2	35.7	1.0	8.9	52.0	-43.2	-27.0	-16.2
10.520	H	Peak	55.7	-9.5	39.2	35.7	1.0	8.9	59.5	-35.7	-7.0	-28.7
10.520	H	Avg	46.2	-9.5	39.2	35.7	1.0	8.9	50.0	-45.2	-27.0	-18.2

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/14/02 Test Engineer: Frank Ibrahim Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.26 GHz, Normal Mode, ART setting = 15												
Specification Distance: 3.0 meters Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB	
15.780	V	Peak	58.8	-9.5	38.8	38.8	1.0	11.6	61.8	74.0	-12.2	
15.780	V	Avg	47.5	-9.5	38.8	38.8	1.0	11.6	50.5	54.0	-3.5	
15.780	H	Peak	53.0	-9.5	38.8	38.8	1.0	11.6	56.0	74.0	-18.0	
15.780	H	Avg	43.3	-9.5	38.8	38.8	1.0	11.6	46.3	54.0	-7.7	

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.32 GHz, Normal Mode, ART setting = 12.5												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.520	V	Peak	57.7	-9.5	38.9	34.5	1.0	8.9	62.5	-32.7	-7.0	-25.7
10.520	V	Avg	48.2	-9.5	38.9	34.5	1.0	8.9	53.0	-42.2	-27.0	-15.2
10.520	H	Peak	55.7	-9.5	38.9	34.5	1.0	8.9	60.5	-34.7	-7.0	-27.7
10.520	H	Avg	46.2	-9.5	38.9	34.5	1.0	8.9	51.0	-44.2	-27.0	-17.2

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.32 GHz, Normal Mode, ART setting = 12.5												
Specification Distance: 3.0 meters Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB	
10.640	V	Peak	53.2	-9.5	38.9	34.4	1.0	8.9	58.1	74.0	-15.9	
10.640	V	Avg	42.6	-9.5	38.9	34.4	1.0	8.9	47.5	74.0	-26.5	
10.640	H	Peak	52.6	-9.5	38.9	34.4	1.0	8.9	57.5	74.0	-16.5	
10.640	H	Avg	41.0	-9.5	38.9	34.4	1.0	8.9	45.9	74.0	-28.1	
15.960	V	Peak	54.3	-9.5	38.0	34.0	1.0	11.7	61.5	74.0	-12.5	
15.960	V	Avg	44.3	-9.5	38.0	34.0	1.0	11.7	51.5	54.0	-2.5	
15.960	H	Peak	50.5	-9.5	38.0	34.0	1.0	11.7	57.7	74.0	-16.3	
15.960	H	Avg	41.2	-9.5	38.0	34.0	1.0	11.7	48.4	54.0	-5.6	

HARMONIC AND SPURIOUS RADIATED EMISSIONS (TURBO MODE)

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.21 GHz, Turbo Mode, ART setting = 15												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.420	V	Peak	59.1	-9.5	38.9	34.6	1.0	8.9	63.7	-31.5	-7.0	-24.5
10.420	V	Avg	48.4	-9.5	38.9	34.6	1.0	8.9	53.0	-42.2	-27.0	-15.2
10.420	H	Peak	59.5	-9.5	38.9	34.6	1.0	8.9	64.1	-31.1	-7.0	-24.1
10.420	H	Avg	48.9	-9.5	38.9	34.6	1.0	8.9	53.5	-41.7	-27.0	-14.7

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.21 GHz, Turbo Mode, ART setting = 15											
Specification Distance: 3.0 meters Actual Distance: 1.0 meters Cable Length: 15.0 feet											
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
15.630	V	Peak	56.0	-9.5	38.2	33.7	1.0	11.5	63.5	74.0	-10.5
15.630	V	Avg	45.6	-9.5	38.2	33.7	1.0	11.5	53.1	54.0	-0.9
15.630	H	Peak	52.1	-9.5	38.2	33.7	1.0	11.5	59.6	74.0	-14.4
15.630	H	Avg	41.3	-9.5	38.2	33.7	1.0	11.5	48.8	54.0	-5.2

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/14/02 Test Engineer: Frank Ibrahim Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.25 GHz, Turbo Mode, ART setting = 15												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq MHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.500	V	Peak	56.1	-9.5	39.2	35.7	1.0	8.9	59.9	-35.3	-7.0	-28.3
10.500	V	Avg	46.1	-9.5	39.2	35.7	1.0	8.9	49.9	-45.3	-27.0	-18.3
10.500	H	Peak	56.4	-9.5	39.2	35.7	1.0	8.9	60.2	-35.0	-7.0	-28.0
10.500	H	Avg	45.4	-9.5	39.2	35.7	1.0	8.9	49.2	-46.0	-27.0	-19.0

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/14/02 Test Engineer: Frank Ibrahim Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.25 GHz, Turbo Mode, ART setting = 15											
Specification Distance: 3.0 meters Actual Distance: 1.0 meters Cable Length: 15.0 feet											
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamp dB	Filter dB	Cable dB	Field dBuV/m	Limit dBuV/m	Margin dB
15.750	V	Peak	55.0	-9.5	38.8	38.8	1.0	11.6	58.0	74.0	-16.0
15.750	V	Avg	45.9	-9.5	38.8	38.8	1.0	11.6	48.9	54.0	-5.1
15.750	H	Peak	51.5	-9.5	38.8	38.8	1.0	11.6	54.5	74.0	-19.5
15.750	H	Avg	40.8	-9.5	38.8	38.8	1.0	11.6	43.8	54.0	-10.2

Description of Test: Radiated Out of Band Harmonic and Spurious Emissions Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.29 GHz, Turbo Mode, ART setting = 14												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamplifier dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
10.580	V	Peak	56.3	-9.5	38.9	34.4	1.0	8.9	61.1	-34.1	-7.0	-27.1
10.580	V	Avg	45.4	-9.5	38.9	34.4	1.0	8.9	50.2	-45.0	-27.0	-18.0
10.580	H	Peak	53.8	-9.5	38.9	34.4	1.0	8.9	58.6	-36.6	-7.0	-29.6
10.580	H	Avg	43.6	-9.5	38.9	34.4	1.0	8.9	48.4	-46.8	-27.0	-19.8

Description of Test: Radiated Emissions - Restricted Bands Project Number: 02T1639-2 Date: 11/15/02 Test Engineer: Neelish Raj Company: Askey Computer Corp EUT Description: 802.11 a/b WLAN Card, Model: WLC221-D4, BCP3483U Test Configuration: EUT, Laptop, DC power Supply Mode of Operation: TX ON , Freq = 5.29 GHz, Turbo Mode, ART setting = 14												
Specification Distance: 3.0 meters EIRP Conversion Factor: 95.2 dB Actual Distance: 1.0 meters Cable Length: 15.0 feet												
Freq GHz	Pol V/H	Det	SA dBuV	Dist dB	AF dB/m	Preamplifier dB	Filter dB	Cable dB	Field dBuV/m	EIRP dBm	Limit dBm	Margin dB
15.870	V	Peak	54.2	-9.5	38.1	33.9	1.0	11.6	61.5	-34.1	-7.0	-12.5
15.870	V	Avg	43.6	-9.5	38.1	33.9	1.0	11.6	50.9	-45.0	-27.0	-3.1
15.870	H	Peak	51.9	-9.5	38.1	33.9	1.0	11.6	59.2	-36.6	-7.0	-14.8
15.870	H	Avg	39.9	-9.5	38.1	33.9	1.0	11.6	47.2	-46.8	-27.0	-6.8

DIGITAL DEVICE RADIATED EMISSIONS

 FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888	Project #: 02T1639-2 Report #: 021114C01 Date & Time: 11/14/02 9:36 AM Test Engr: Frank Ibrahim
Company: Askey Computer Corporation EUT Description: 802.11 a/b Dual Band Card Bus, Model: WL C221-D4, BCP3483U Test Configuration : EUT, Laptop, Mouse, Printer, Modem, DC Power Supply Type of Test: FCC 15.407 Mode of Operation: TX ON, Freq = 5.26 MHz, ART setting = 15	
<< Main Sheet	

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
480.00	50.90	17.53	3.94	27.47	44.90	46.00	-1.10	3mH	0.00	1.00	QP
416.00	50.70	15.89	3.64	27.19	43.04	46.00	-2.96	3mH	0.00	1.00	QP
533.00	47.50	18.29	4.21	27.64	42.37	46.00	-3.63	3mH	0.00	1.00	P
633.00	45.60	19.69	4.69	27.84	42.14	46.00	-3.86	3mH	0.00	1.00	P
133.00	49.90	13.28	1.93	26.95	38.17	43.50	-5.33	3mV	0.00	1.00	P
544.00	45.10	18.38	4.27	27.66	40.09	46.00	-5.91	3mV	0.00	1.00	P
6 Worst Data											

9.11. POWERLINE CONDUCTED EMISSIONS

TEST SETUP

The EUT is placed on a wooden table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane on the floor.

The EUT is set to transmit in a continuous mode.

TEST PROCEDURE

The resolution bandwidth is set to 10 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

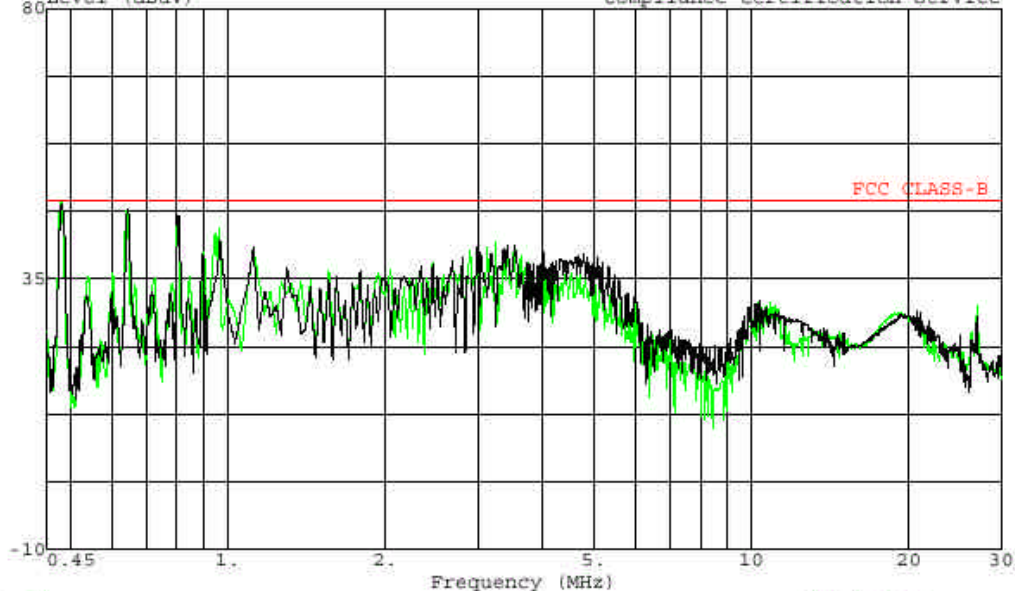
No non-compliance noted:

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	ECC. B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.48	47.90	46.10	--	0.00	48.00	--	-1.90	--	L1
0.64	46.48	45.50	--	0.00	48.00	--	-2.50	--	L1
0.80	44.02	43.40	--	0.00	48.00	--	-4.60	--	L1
0.48	47.44	46.60	--	0.00	48.00	--	-1.40	--	L2
0.64	46.72	45.70	--	0.00	48.00	--	-2.30	--	L2
0.81	45.54	44.20	--	0.00	48.00	--	-3.80	--	L2
6 Worst Data									



561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: LC1114:EMI Date: 11-14-2002 Time: 14:26:36
Level (dBuV) Compliance Certification Service

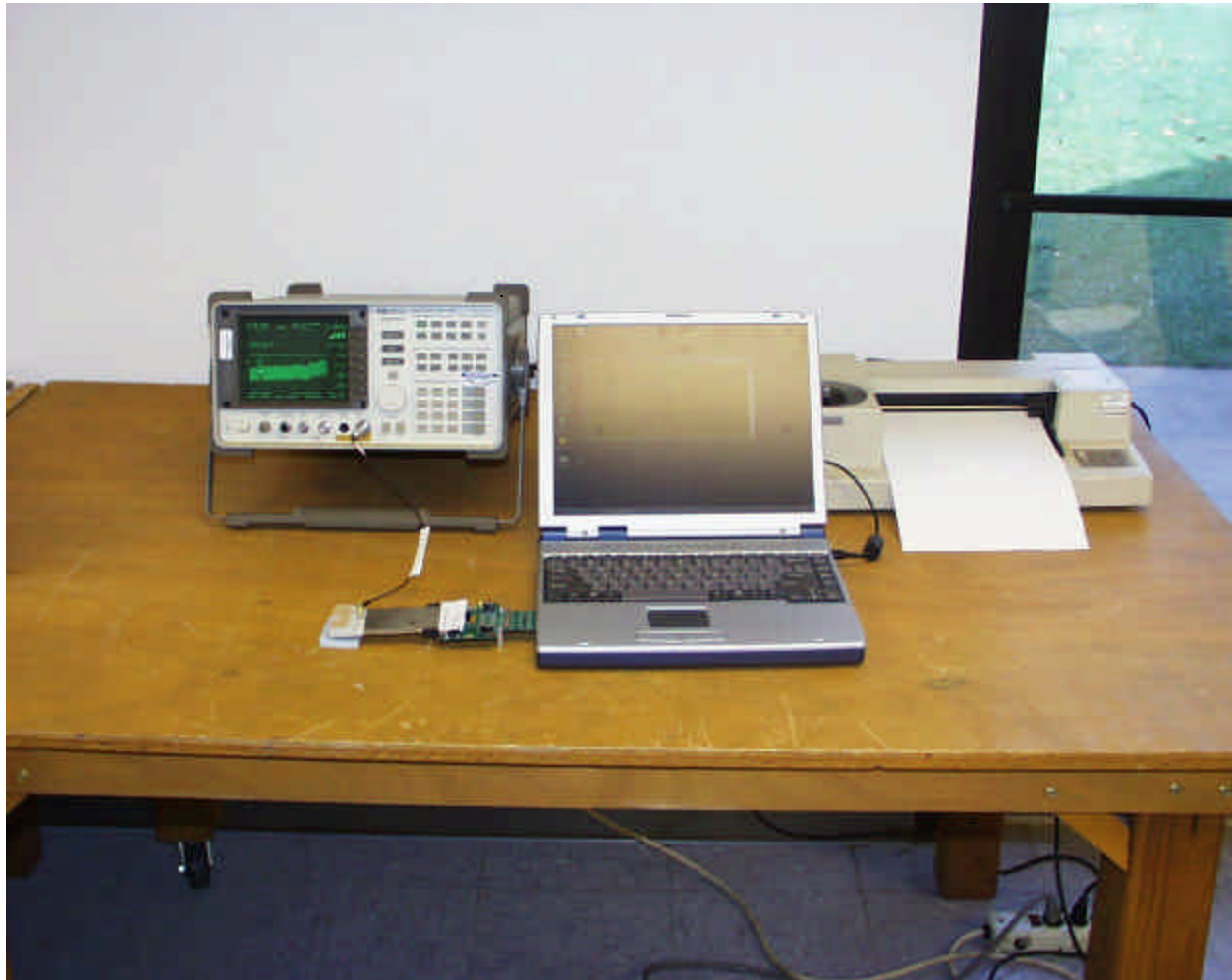


Trace: 3
Project # : 02T1639-2
Test Engineer : Frank Ibrahim
Company : Askey Computer Corp.
EUT : 802.11 a/b Dual Band Card Bus
: with extension card
Model Name : WLC221-D4, BCP3483U
Test Config. : EUT, Laptop, Printer, Mouse, Modem, P.S.
Test of Target: FCC 15.407
Mode of Op. : TX ON, Mid Channel 5.26 GHz, ART(15)
: 115VAC@60Hz
: Peak: L1(Black), L2(Green)

Ref Trace:

10. SETUP PHOTOS

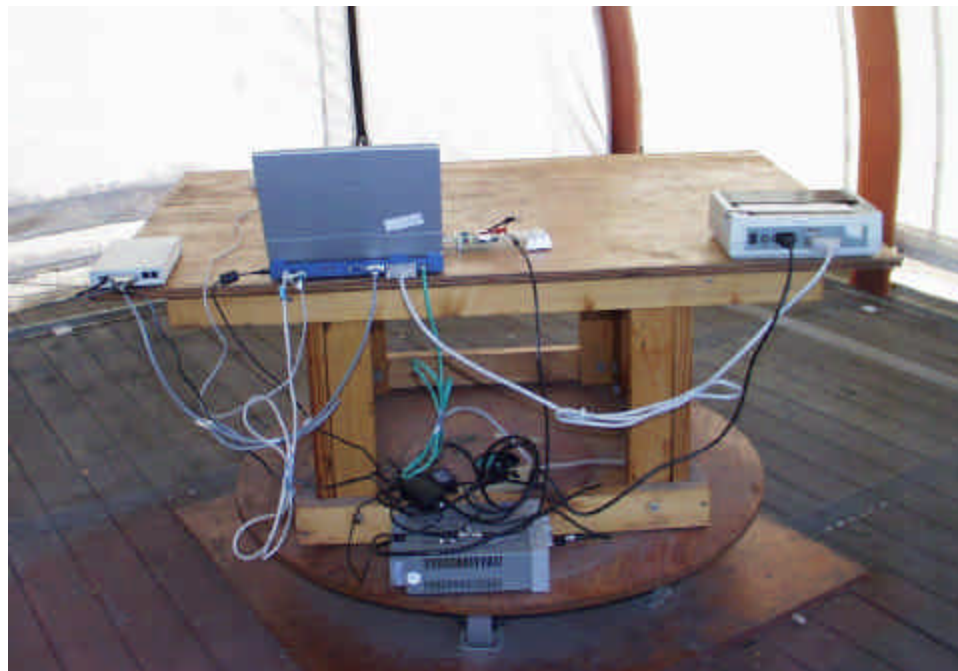
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



RADIATED RF MEASUREMENT SETUP



DIGITAL DEVICE RADIATED EMISSIONS MEASUREMENT SETUP



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



END OF REPORT