



FCC CFR47 PART 15 CERTIFICATION

TEST REPORT

FOR

POINT TO MULTIPOINT 5GHz SUBSCRIBER

MODEL: AR3155

FCC ID:PLRAR315500

REPORT NUMBER: 01U1019-1

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Prepared for
**ADVANCED RADIO CELLS, INC.
910 CAMPISI WAY STE. 1F
CAMPBELL, CA 95008
USA**

Prepared by
**COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888**

NVLAP[®]
LAB CODE:200065-0

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1. TEST RESULT CERTIFICATION

COMPANY NAME: ADVANCED RADIO CELLS, INC.
910 CAMPISI WAY STE. 1F
CAMPBELL, CA 95008 USA

CONTACT PERSON: LEON LOUIE / DIRECTOR OF OPERATIONS

TELEPHONE NO: 408-558-2764

EUT DESCRIPTION: POINT TO MULTIPOINT 5GHZ SUBSCRIBER

MODEM NAME: AR3155

DATE TESTED: DECEMBER 28, 2001

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	5.8 GHz TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.E

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:



STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

HUE LY VANG
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The Advanced Radio Cell (ARC) Subscriber antenna is mounted outdoors at the subscriber location with line of sight to the Hub antenna. A single cable is run to the modem and computer inside the subscriber location. The Subscriber antenna is housed in a waterproof enclosure.

The Subscriber circuit board itself is enclosed by a bag that provides additional weatherproofing and additional RF shielding.

The main carrier frequency of the Subscriber is fixed at 5300 MHz. The center frequency of each of the sidebands has a deviation from this main carrier that is equal to the modem transmit frequency. The modem transmit frequency can vary from 6.4 to 12.8 MHz, therefore the center of the lower sideband can vary from 5293.6 to 5287.2 MHz and the center of the upper sideband can vary from 5306.4 to 5312.8 MHz.

3. TEST METHODOLOGY

Both 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.

4. TEST FACILITY

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.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 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))

5.1. Laboratory 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	 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. 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.

6.1. 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.

7. SUPPORT EQUIPMENT / TEST DIAGRAM

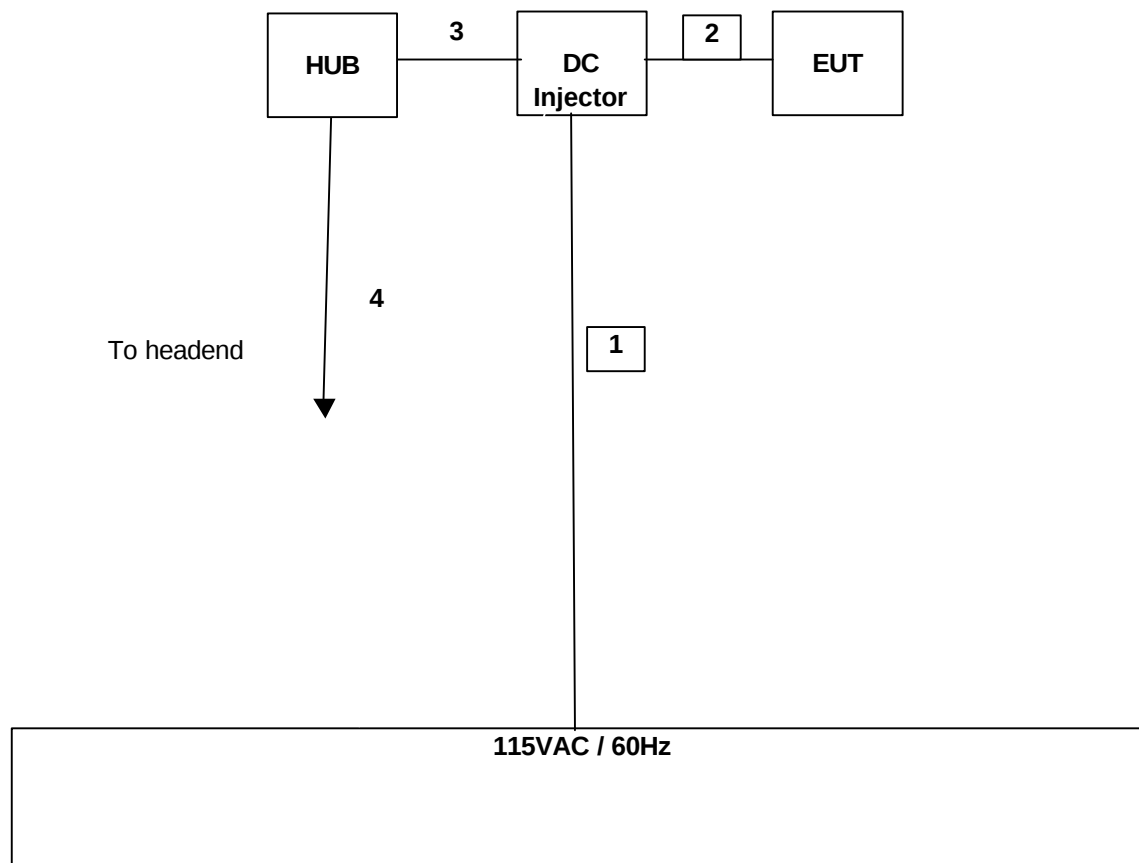
Support Equipment

TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID
DOCSIS PROCESSOR	VVYO	P3000	9123064	DoC
UHF TRANSVERTER	CADCO	VVYO VERSION	U2162	DoC
HUB	LINKSYS	EZX588R	90000198	DoC
MONITOR	VIEWMATE	L5032LA	9BMLB0011669	DoC
KEYBOARD	MICROSOFT	RT9410V56TW	5167700956909	DoC
MOUSE	LOGITECH	P04-1136006	LZE94503596	DoC
DC POWER SUPPLY	AGILENT	E3610A	MY40001557	DoC
WIRELESS MODEM	VVYO	V251	07A004454	DoC
LAPTOP	IBM	1171	AA-FXZGX 00/08	DoC
PORT ADAPTER	ENTREGA	U1-S9	N/A	DoC
SPECTRUM ANALYZER	ANRITSU	MS2711A	115024	DoC
POWER METER	HP	436A	2709A26544	DoC
MODEM/PC TEST SET	SENCORE	MSM980	6715992	DoC

Test Equipment

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/4/02
Spectrum Display	HP	85662A	2152A03066	5/10/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P_1M)	2944A06833	8/21/02
Antenna, BiLog	Chase 30 - 2000MHz	CBL6112	2049	8/2/02
Line Filter	Lindgren 10k - 10GHz	LMF-3489	497	N.C.R.
LISN	Fisher Cus. Comm.	LISN-50/250-25-2	2023	8/2/02
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	4/2/02
Pre-amplifier, 35.5 dB (1 - 26.5GHz)	HP	8449B	3008A00369	5/30/02
Horn Antenna(1 - 18GHz)	EMCO	3115	9001-3245	6/20/02
Horn Antenna,(18 - 26GHz)	Antenna Research Associate	MWH 1826/B	1013	7/26/02
Harmonic Mixer (26.5-40GHz)	HP	11970A	3003A04190	9/23/02
Horn Antenna(26.5 - 40GHz)	Dico	1149	2	9/22/02
High Pass Filter(7.6GHz)	FSY Microwave	7600-9SS	1	N.C.R.
10 dB Attenuator	Mini-Circuits	MCL BW-S10W2	0026	In House Cal
Environmental Chamber	Thermotron	SE 600-10-10	29800	3/23/02
Spectrum Analyzer	HP	8593E	3710A00205	6/2/02

Test Diagram



I/O Cables

TEST I / O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	1	US 115V	Un-shielded	2m	No	Yes	Bundled in LC test only
2	F-Type	1	Coxial	Shielded	4m	Yes	No	N/A
3	F-Type	1	Coxial	Shielded	4m	Yes	No	N/A
4	F-Type	1	Coxial	Shielded	20m	Yes	No	N/A

8. APPLICABLE RULES AND BRIEF TEST RESULT

§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.

Test result:

Modem TX 6.4MHz

<i>Sideband</i>	<i>Frequency (MHz)</i>	<i>Sideband Bandwidth (MHz)</i>	<i>Emission Bandwidth (MHz)</i>
<i>Upper</i>	<i>5306.4</i>	<i>3.2</i>	<i>6.4</i>
<i>Lower</i>	<i>5293.6</i>	<i>3.2</i>	

Modem TX 12.8MHz

<i>Sideband</i>	<i>Frequency (MHz)</i>	<i>Sideband Bandwidth (MHz)</i>	<i>Emission Bandwidth (MHz)</i>
<i>Upper</i>	<i>5312.8</i>	<i>3.22</i>	<i>6.48</i>
<i>Lower</i>	<i>5287.2</i>	<i>3.26</i>	

§15.407(a)- POWER LIMIT

(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 $11 \text{ dBm} + 10\log B$, 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.

Spec limit: As specified above

For the 6.4 MHz modem, B is 6.4 MHz and the antenna gain is 11 dBi

therefore the limit is $11 \text{ dBm} + 10\log(6.4) \text{ dB} - 5 \text{ dB} = 14.06 \text{ dBm}$

For the 12.8 MHz modem, B is 6.48 MHz and the antenna gain is 11 dBi

therefore the limit is $11 \text{ dBm} + 10\log(6.48) \text{ dB} - 5 \text{ dB} = 14.12 \text{ dBm}$

<i>Modem TX (MHz)</i>	<i>Frequency (MHz)</i>	<i>Power Limit</i>
<i>6.4</i>	<i>5306.4 & 5293.6</i>	<i>25.47 mW (14.06 dBm)</i>
<i>12.8</i>	<i>5312.8 & 5287.2</i>	<i>25.82 mW (14.12 dBm)</i>

Test result: No non-compliance noted.

<i>Modem TX (MHz)</i>	<i>Frequency (MHz)</i>	<i>Measured Power</i>
<i>6.4</i>	<i>5306.4 & 5293.6</i>	<i>20.28 mW (13.07 dBm)</i>
<i>12.8</i>	<i>5312.8 & 5287.2</i>	<i>18.4 mW (12.65 dBm)</i>

§15.407(a)- PEAK POWER SPECTRAL DENSITY

(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.

Spec limit: the antenna gain is 11 dBi, therefore the limit is 6 dBm.

Test result: No non-compliance noted.

Modem TX 6.4 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>PPSD Results (dBm)</i>
<i>Upper</i>	<i>5306.4</i>	<i>4.9</i>
<i>Lower</i>	<i>5293.6</i>	<i>4.6</i>

Modem TX 12.8 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>PPSD Results (dBm)</i>
<i>Upper</i>	<i>5312.8</i>	<i>3.5</i>
<i>Lower</i>	<i>5287.2</i>	<i>3.5</i>

§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.

Spec limit: <13 dB

Test result: No non-compliance noted.

Modem TX 6.4 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>Results (dB)</i>
<i>Upper</i>	<i>5306.4</i>	<i>5.2</i>
<i>Lower</i>	<i>5293.6</i>	<i>5.2</i>

Modem TX 12.8 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>Results (dB)</i>
<i>Upper</i>	<i>5312.8</i>	<i>4.4</i>
<i>Lower</i>	<i>5287.2</i>	<i>4.4</i>

§15.407(b)- UNDESIRABLE EMISSION – BAND EDGE

(2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.

Spec limit: < -27 dBm/MHz EIRP outside the 5.15 to 5.35 GHz band.

< -27 dBm/MHz EIRP within 5.15 to 5.25 GHz band

Test result: No non-compliance noted.

Band Edge	Reading	Antenna Gain	EIRP	Limit	Margin
	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
below 5.15 GHz	-54.94	13	-41.94	-27	-14.94
5.15 to 5.25 GHz	-52.23	13	-39.23	-27	-12.23
above 5.35 GHz	-53.85	13	-40.85	-27	-13.85

§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.

Spec limit: Emission remains within the range of 5.25 to 5.35 GHz over the temperature range of -30°C to +50°C.

Test result: No non-compliance noted.

Temperature	Edge / Sideband	Edge Frequency (MHz)	Limit Frequency(MHz)
+25°C (ref)	Lower Edge of LSB	5287.0342	5250 to 5350
+25°C (ref)	Upper Edge of USB	5312.8660	5250 to 5350
-30°C	Lower Edge of LSB	5287.0383	5250 to 5350
-30°C	Upper Edge of USB	5312.8636	5250 to 5350
+50°C	Lower Edge of LSB	5287.0259	5250 to 5350
+50°C	Upper Edge of USB	5312.8604	5250 to 5350

§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.

Spec limit: As specified above,.

Test result: No non-compliance noted.

§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.

FCC PART 15.207

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-30MHz	250	48

Spec limit: As specified above.

Test result: No non-compliance noted.

§15.209- RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS

(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.

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

Spec limit: As specified above.

Test result: No non-compliance noted.

9. TEST SETUP, PROCEDURE AND RESULT

In general, plots in this section which are labeled LO or LOW correspond to the 6.4 MHz modem frequency, while those labeled HI or HIGH correspond to the 12.8 MHz modem frequency. The modem frequency has no effect on the frequency of the main carrier. The modem frequency determines the deviation of each sideband from the main carrier.

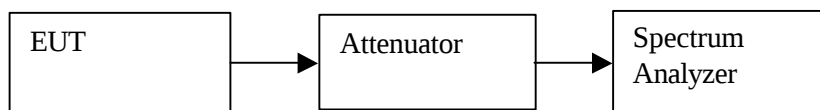
All spurious and band edge measurements are made with the 12.8 MHz modem frequency so that the emission signal has the widest deviation.

9.1. EMISSION BANDWIDTH

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 100 kHz ☐ 1 MHz	☒ 100 kHz ☐ 1 MHz

TEST SETUP



TEST PROCEDURE

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

For this EUT, the bandwidth of each sideband is measured separately, then added together to yield the total bandwidth. For each sideband, the reference power used for the 26 dB down points is the highest power in that sideband.

The calculation of emission bandwidth does not include the carrier at 5300 MHz because the bandwidth of this signal component is infinitesimal. The center (5300 MHz) signal in the occupied bandwidth plots shows the skirt response of the IF resolution bandwidth filters in the spectrum analyzer.

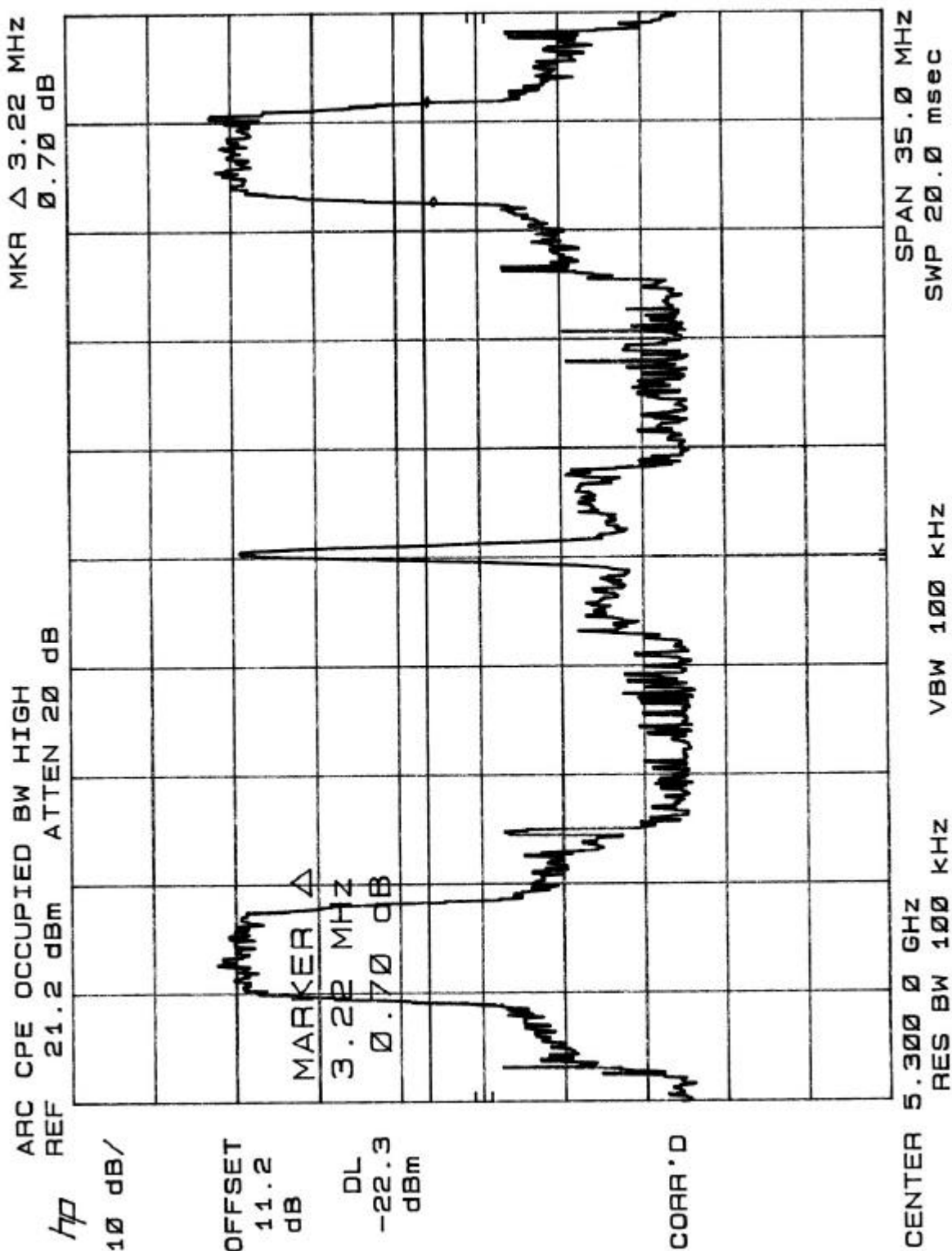
RESULT

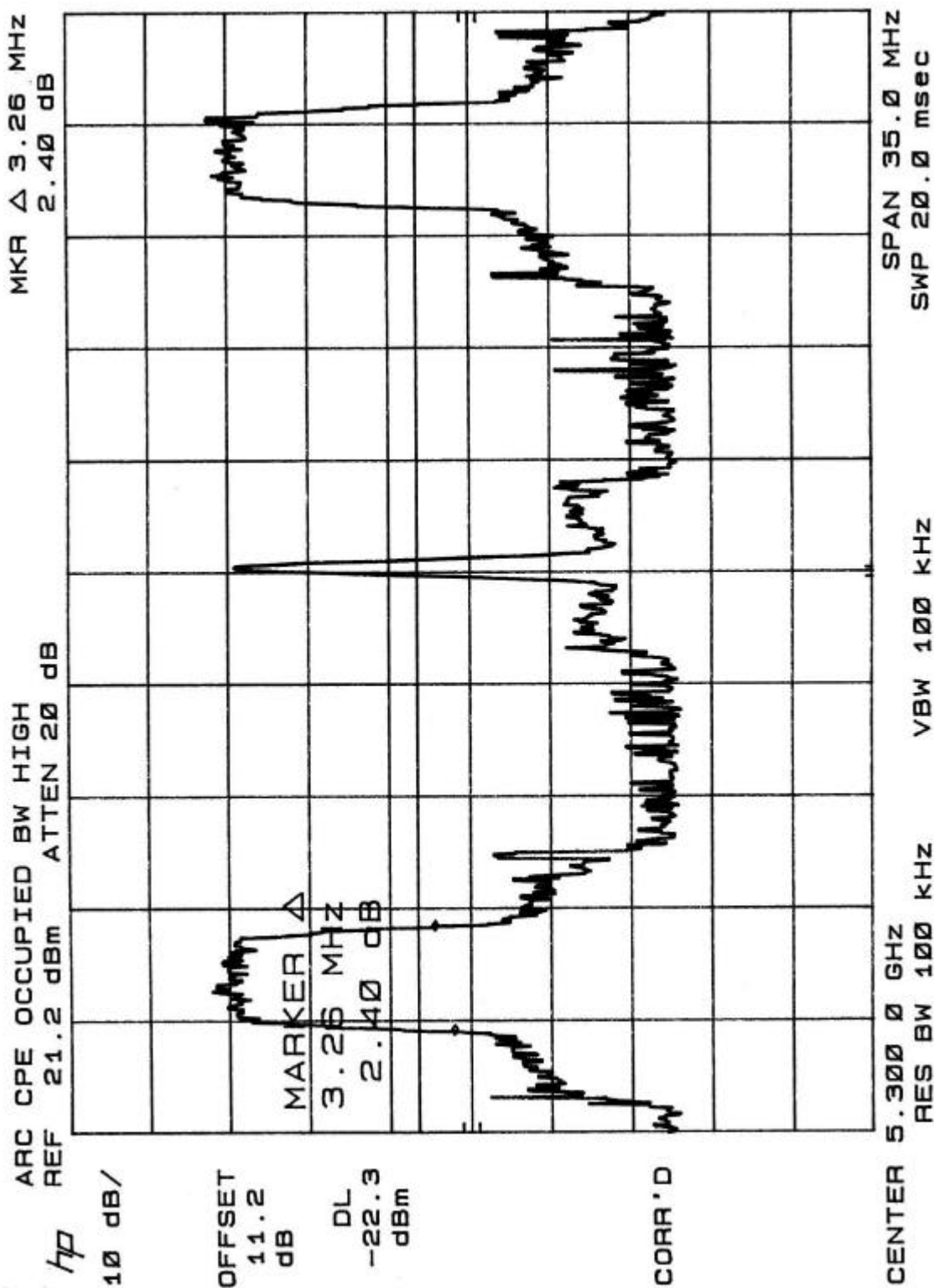
Modem TX 6.4MHz

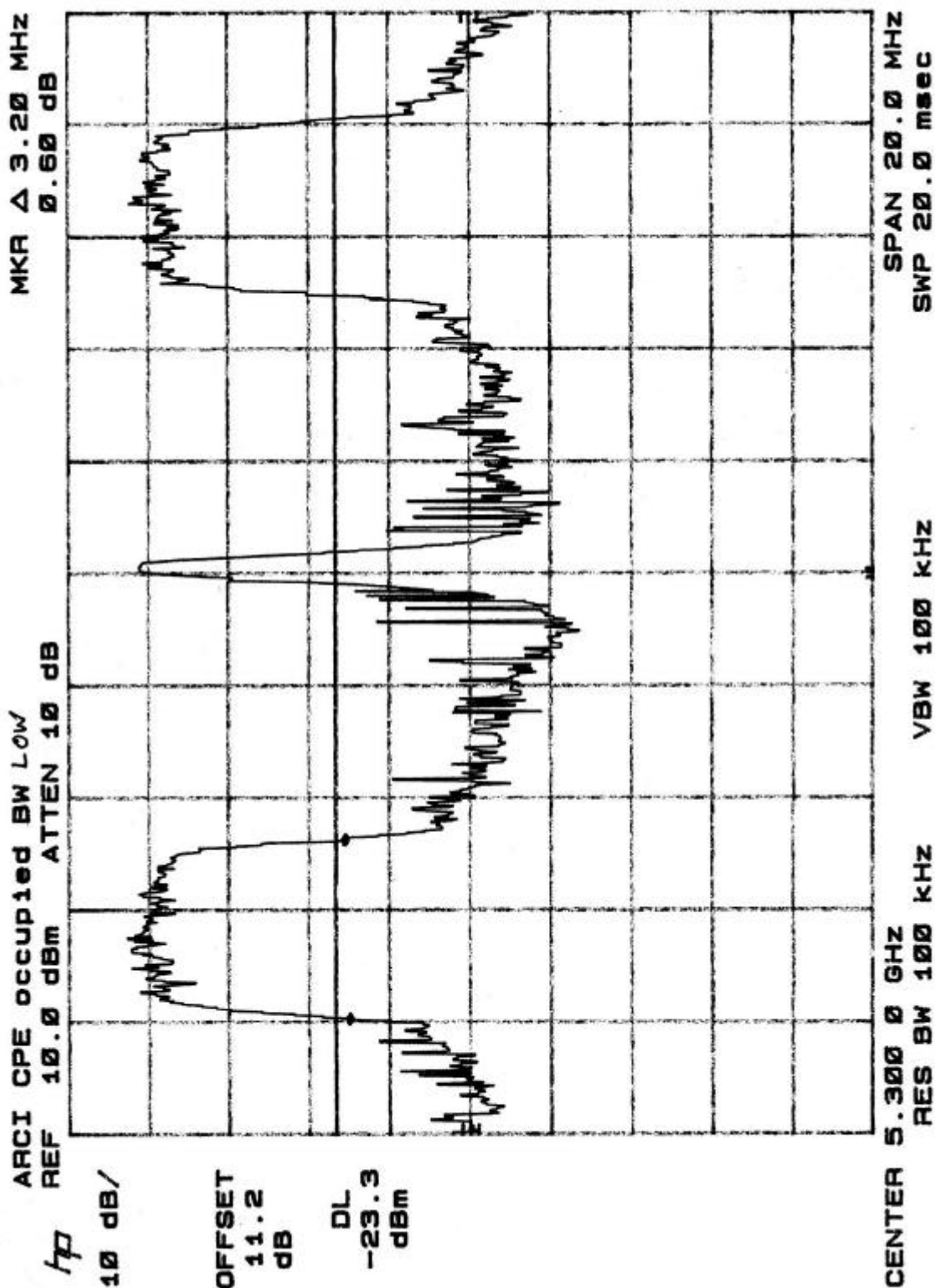
<i>Sideband</i>	<i>Frequency (MHz)</i>	<i>Sideband Bandwidth (MHz)</i>	<i>Emission Bandwidth (MHz)</i>
<i>Upper</i>	<i>5306.4</i>	<i>3.2</i>	<i>6.4</i>
<i>Lower</i>	<i>5293.6</i>	<i>3.2</i>	

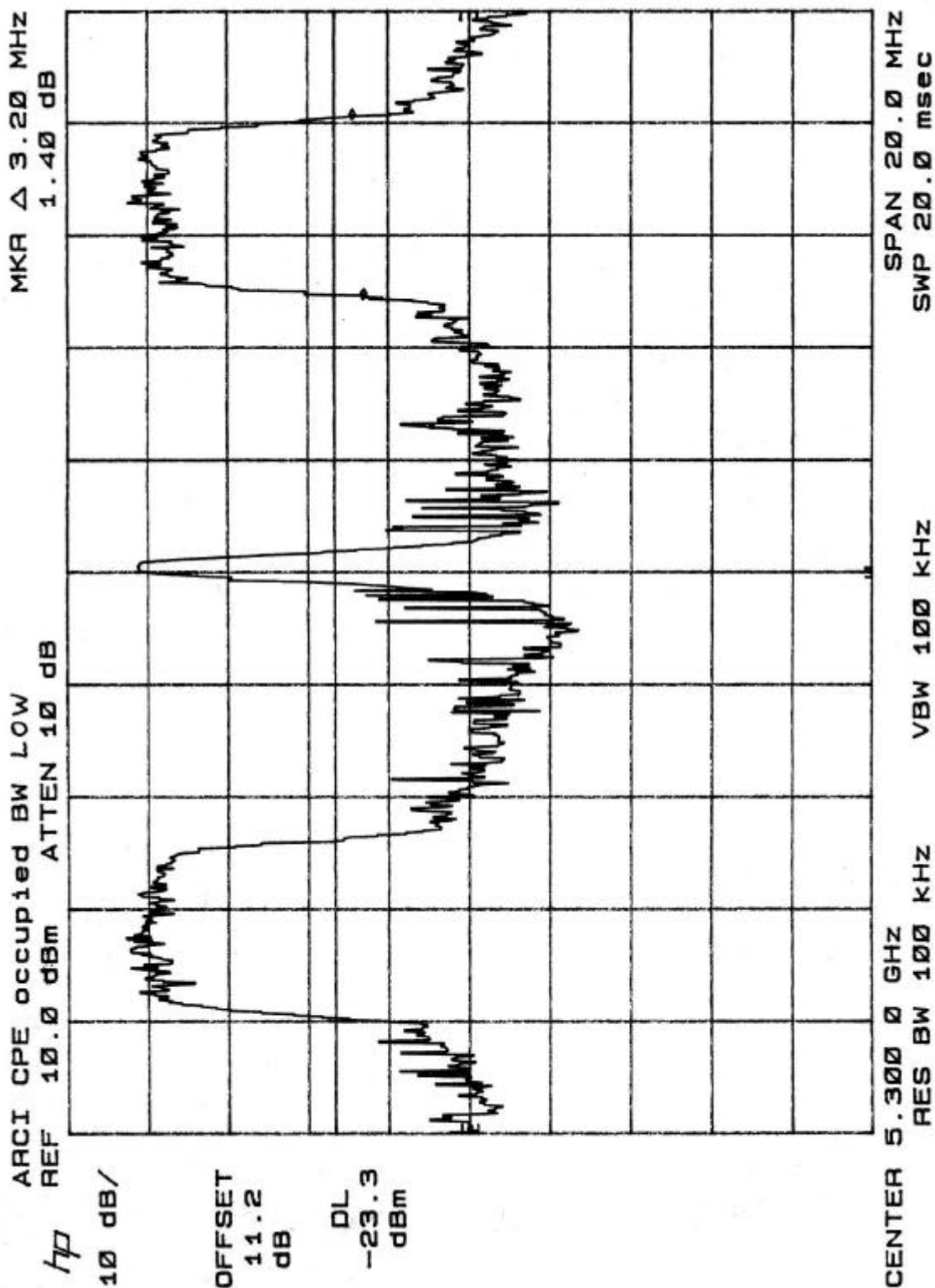
Modem TX 12.8MHz

<i>Sideband</i>	<i>Frequency (MHz)</i>	<i>Sideband Bandwidth (MHz)</i>	<i>Emission Bandwidth (MHz)</i>
<i>Upper</i>	<i>5312.8</i>	<i>3.22</i>	<i>6.48</i>
<i>Lower</i>	<i>5287.2</i>	<i>3.26</i>	



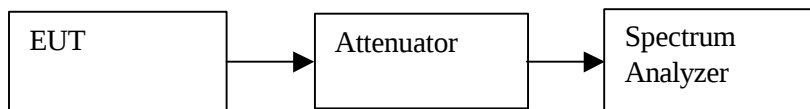






9.2. PEAK POWER

TEST SETUP



Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak	☒ 1 MHz	☒ 30 kHz

TEST PROCEDURE

The EUT is configured on a test bench as shown above in a continuously transmitting / receiving mode. For the peak power limit test, the measurement is made at the antenna end of the cable and coupler normally installed between the transmitter and the subscriber antenna. Therefore this power limit test measures the power delivered to the antenna rather than the power at the transmitter output connector.

The highest reading of each sideband is measured and corrected for the emissions bandwidth of that sideband to yield the sideband power. The peak power is the sum of the two sideband powers and the power of the CW carrier, with the sum being performed in linear units (Watts or mW).

Sideband Power = measured reading + 10 log (B), B as measured in Section 9.1.

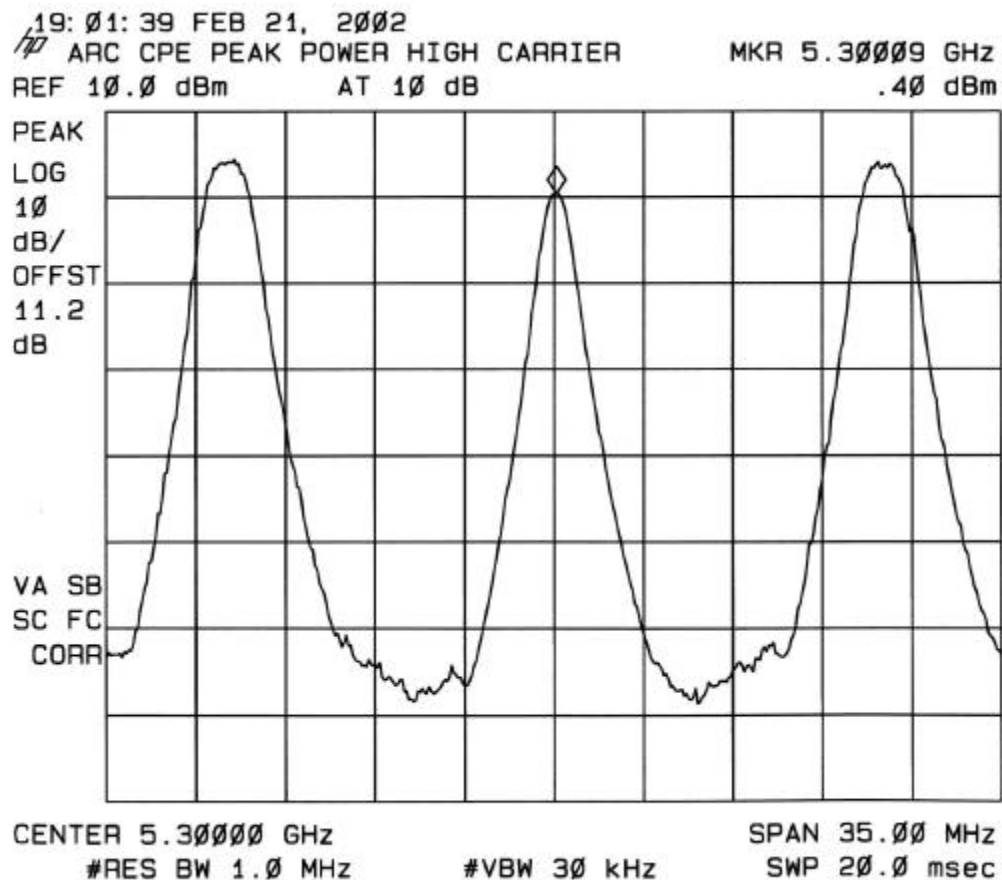
Peak Power = Carrier Power + Lower Sideband Power + Upper Sideband Power

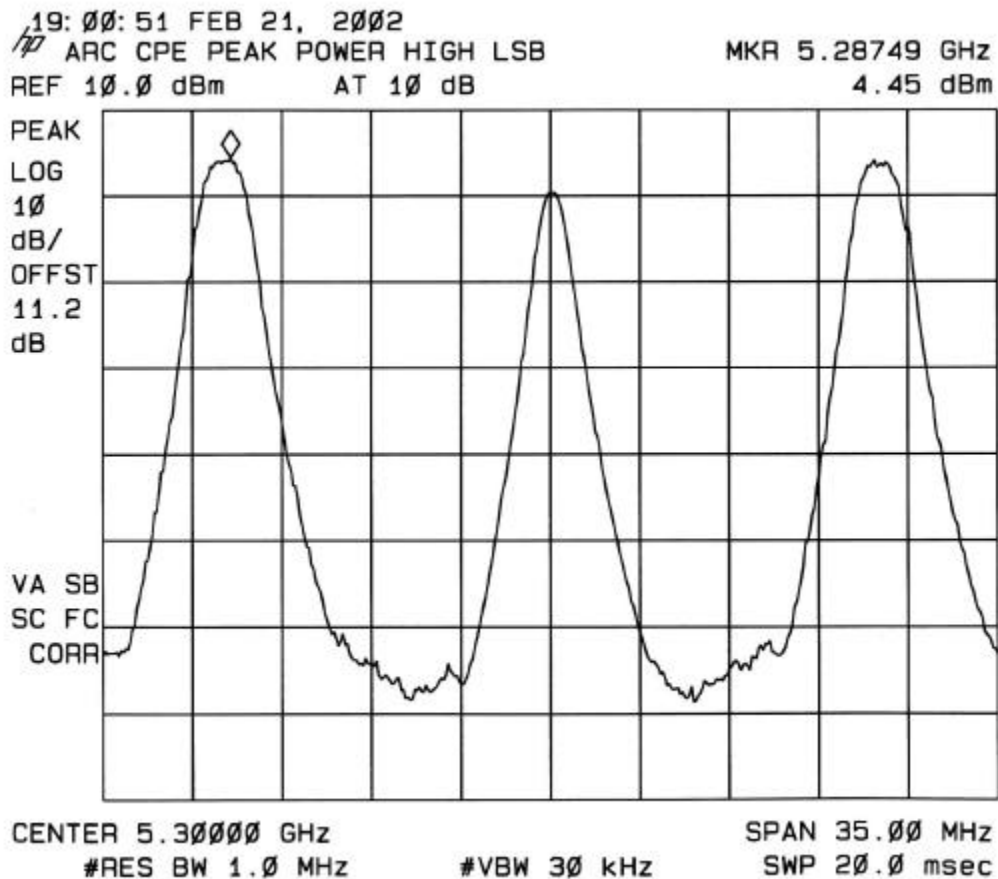
Modem TX 6.4 MHz

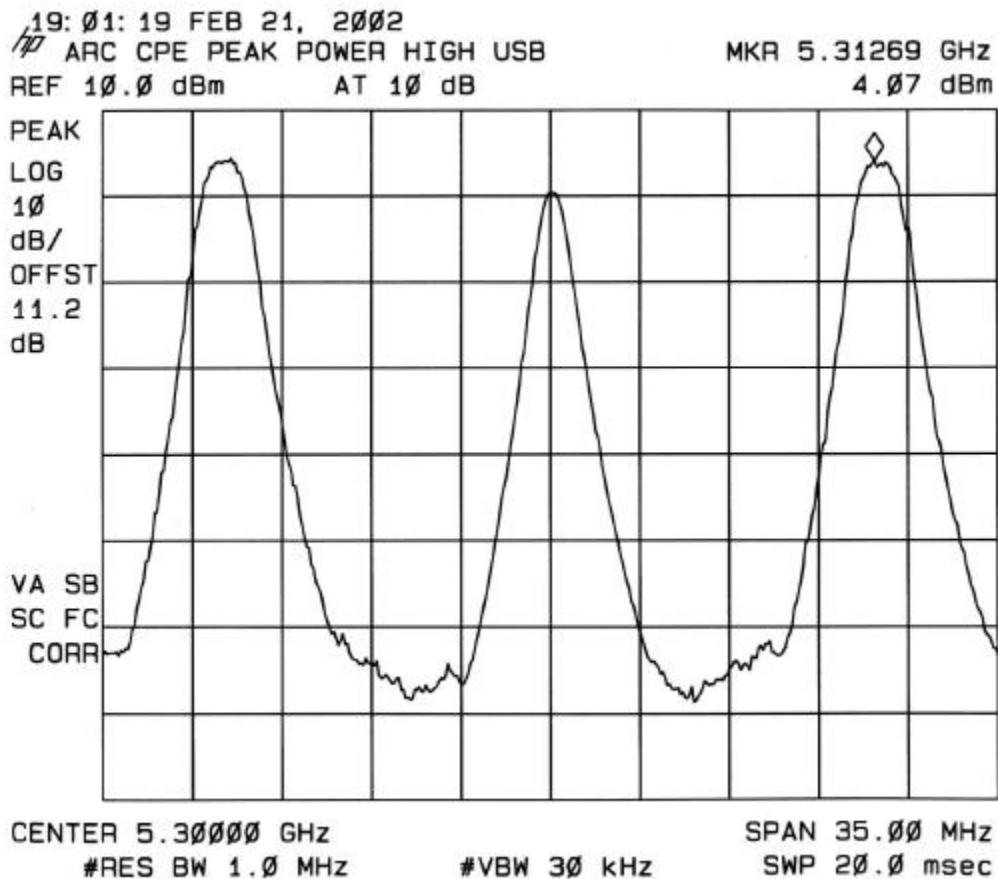
Signal	Frequency (MHz)	Measured Power (dBm)	B (MHz)	Power
Upper Sideband	5306.4	4.62	3.2	(9.67 dBm) 9.27 mW
Lower Sideband	5293.6	4.9	3.2	(9.95 dBm) 9.89 mW
Carrier	5300	0.49	N/A	(0.49 dBm) 1.12 mW
Total Peak Power				20.28 mW (13.07 dBm)

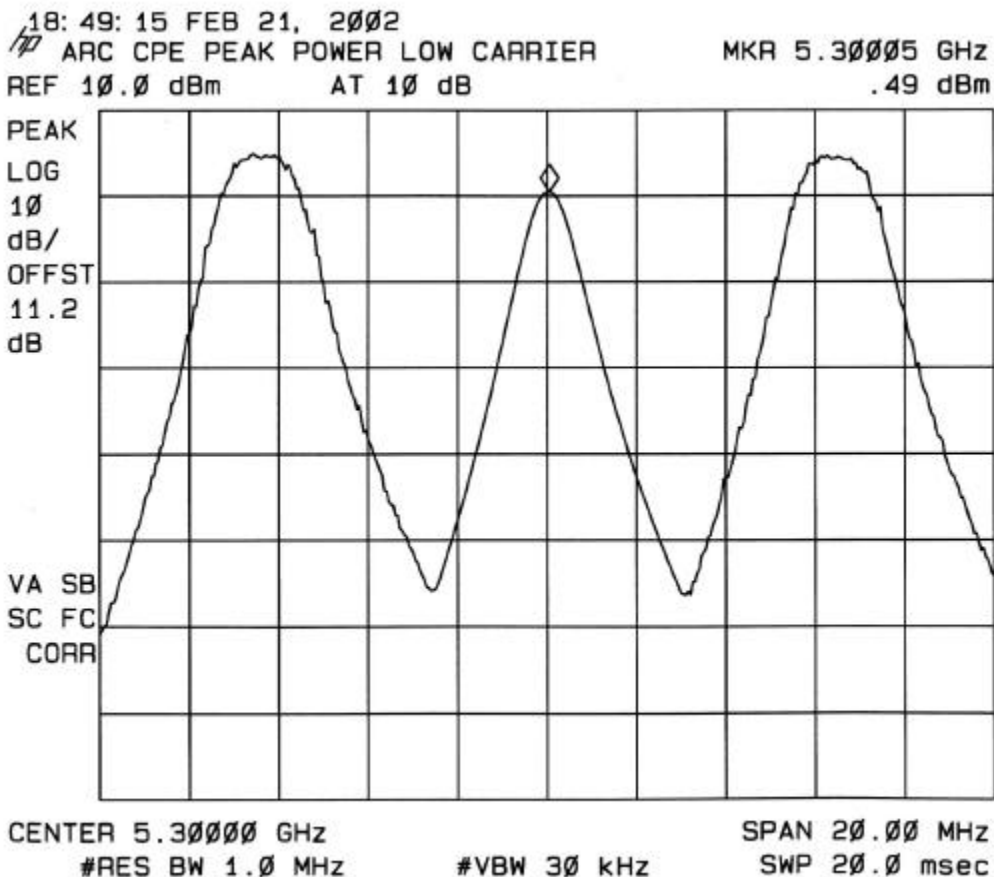
Modem TX 12.8 MHz

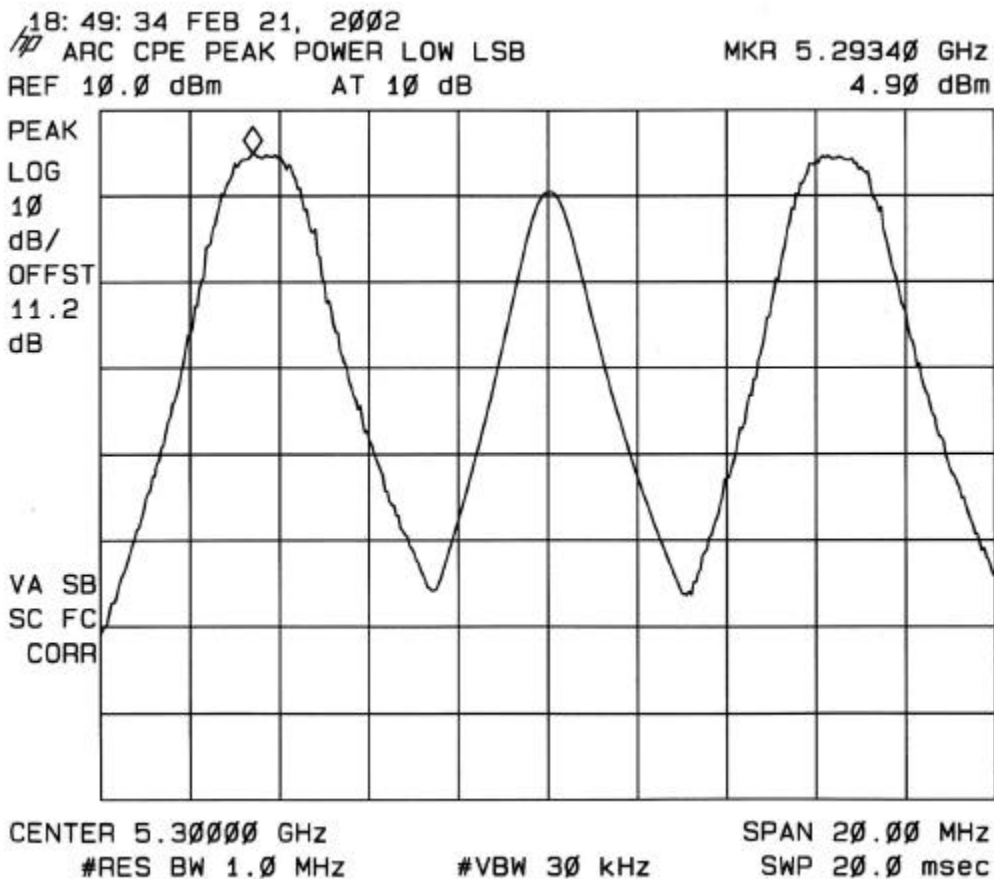
Signal	Frequency (MHz)	Measured Power (dBm)	B (MHz)	Power
Upper Sideband	5306.4	4.07	3.22	(9.15 dBm) 8.22 mW
Lower Sideband	5293.6	4.45	3.26	(9.58 dBm) 9.08 mW
Carrier	5300	0.4	N/A	(0.4 dBm) 1.10 mW
Total Peak Power				18.4 mW (12.65 dBm)

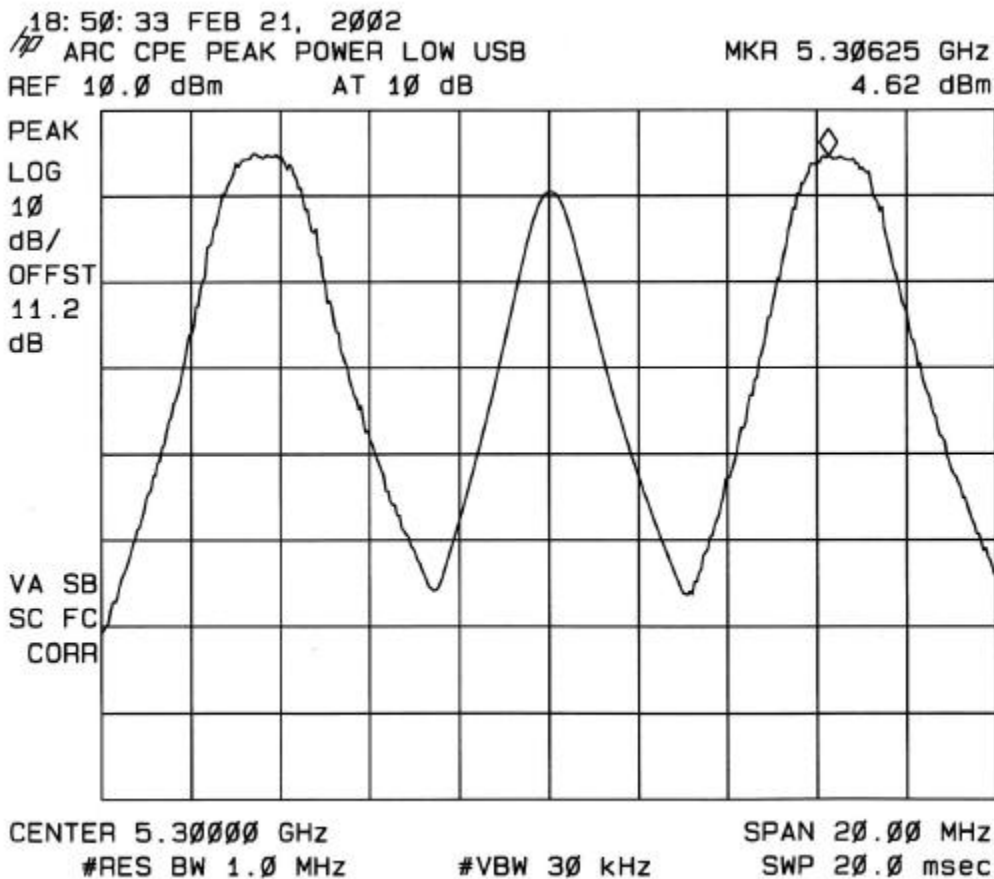










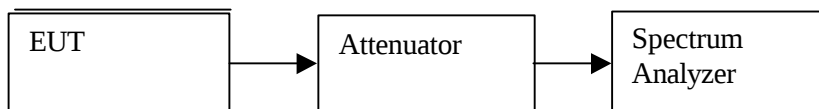


9.3. PEAK POWER SPECTRAL DENSITY

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer through an attenuator. The U-NII test procedures specified by the FCC call for RES BW = VID BW = 1 MHz for this test, and the use of the video averaging function for VID AVE = 100. The procedure specifically disallows the use of a reduced VID BW to achieve averaging. Since normal operational mode of the EUT is burst output, video averaging will record an unrealistically low value for PSD.

An attempt was made to place the CPE modem input signal (from the DOCSIS protocol modem) into a continuous (i.e., non-bursting) stream or pseudorandom modulated QPSK at the 2.560 Msymbols/sec (3.2 MHz channel BW) used by the ARC radio. However, it was determined from observation (and confirmed by the manufacturer of the DOCSIS modem) that the continuous stream test mode firmware would not support the desired bandwidth.

Because the test firmware was not capable of producing continuous transmission at the bandwidth specified for the EUT, PSD testing was performed in the following alternative manner:

1. Analyzer settings: RES BW = VID BW = 1 MHz, MAX HOLD, SWEEP CONT
2. Set test software to burst mode at 2.560 Msymbols/sec
3. Continue recording data until display has been "painted in".
4. Using PEAK SEARCH function determine maximum value of envelope.
5. Apply peak to average correction to determine the PSD level equivalent to that which would have been obtained if VID AVE setting could have been used: For the QPSK filter with root raised cosine (beta = 0.25) shaping filter, as defined in DOCSIS upstream, the effective peak-to-average ratio is 4.5 dB.

Therefore, PSD corr = PSD max (from plot) – 4.5 dB

Result:

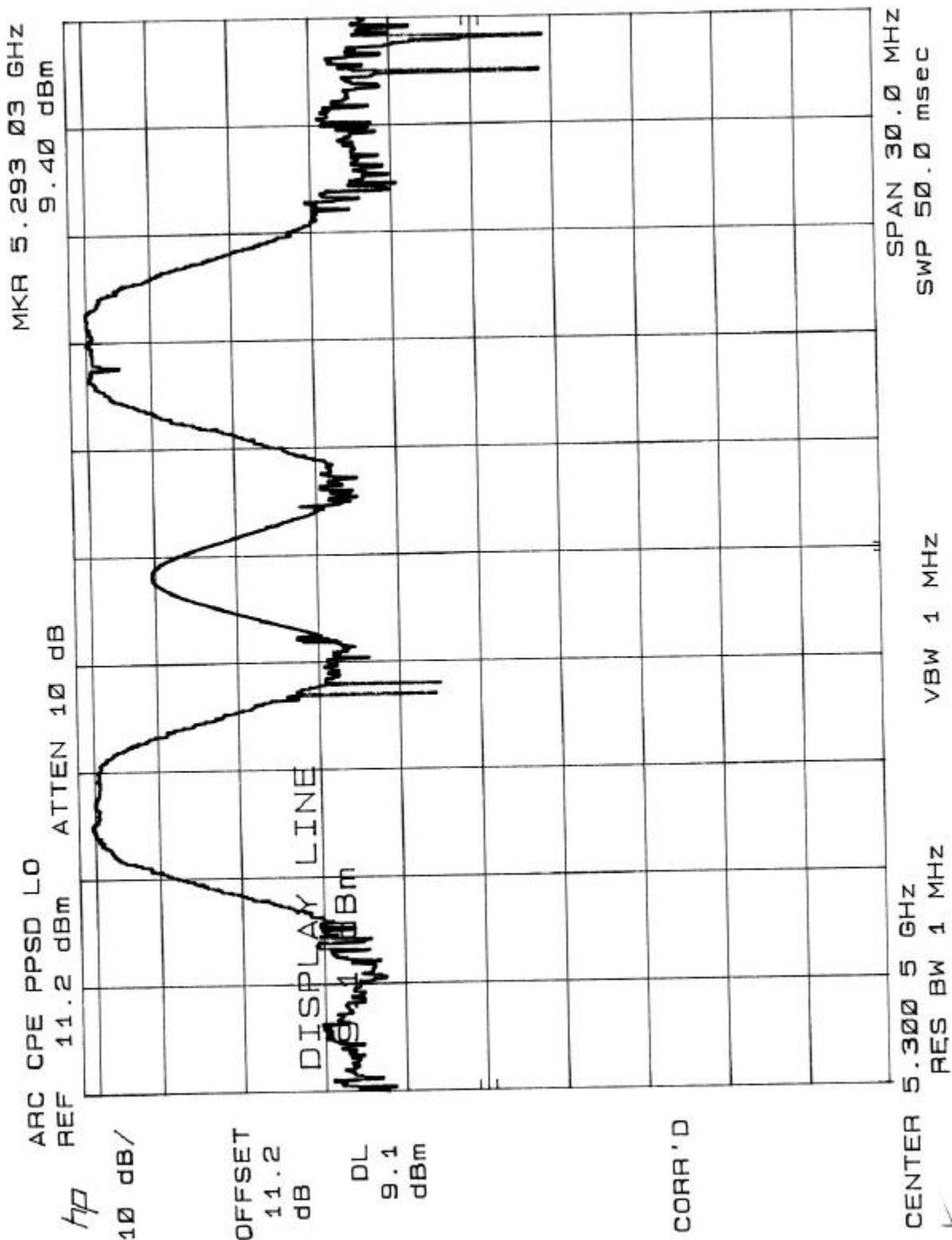
No non-compliance noted. See plots:

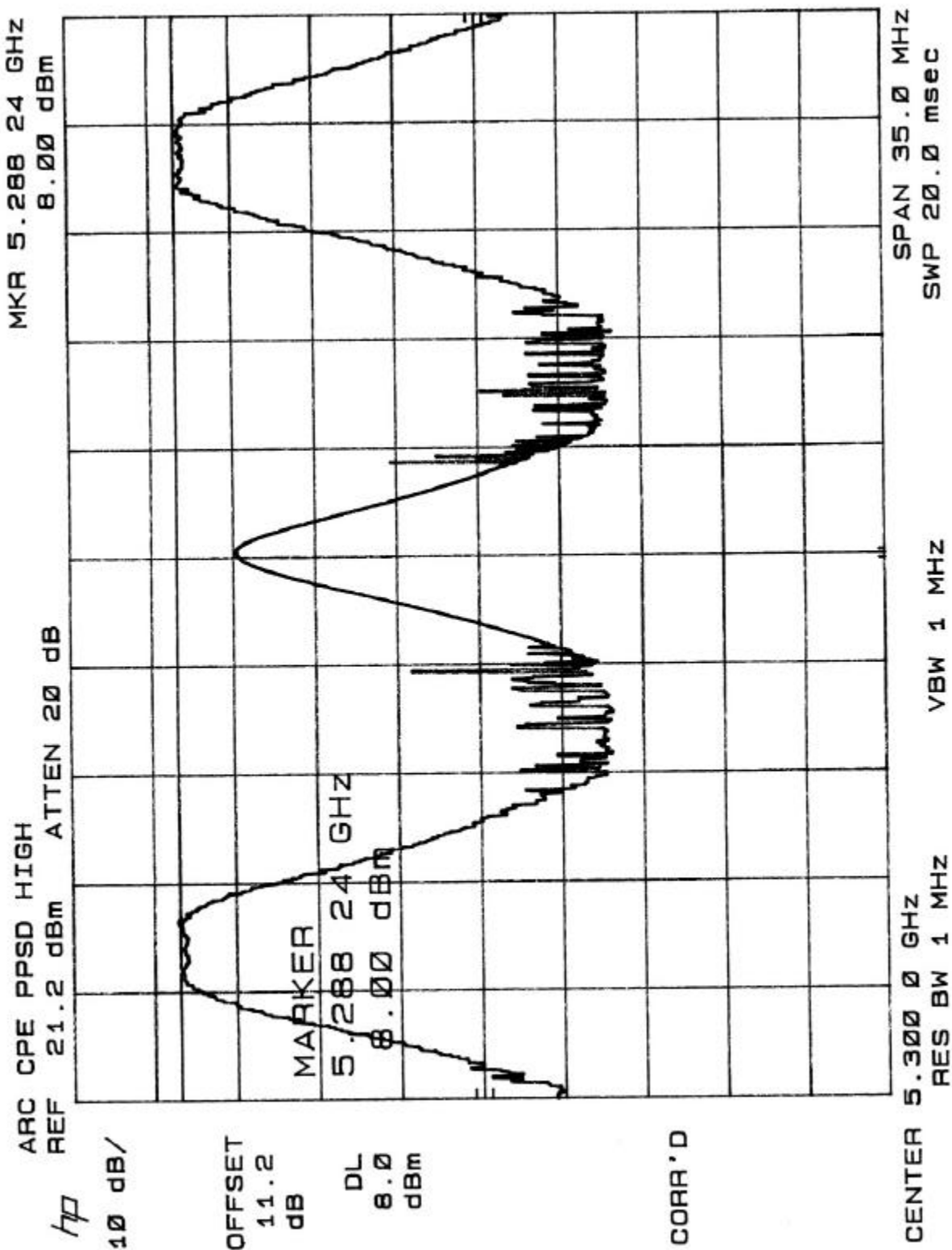
Modem TX 6.4 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>PPSD Results (dBm)</i>
<i>Upper</i>	<i>5306.4</i>	<i>4.9</i>
<i>Lower</i>	<i>5293.6</i>	<i>4.6</i>

Modem TX 12.8 MHz

<i>Carrier</i>	<i>Frequency (MHz)</i>	<i>PPSD Results (dBm)</i>
<i>Upper</i>	<i>5312.8</i>	<i>3.5</i>
<i>Lower</i>	<i>5287.2</i>	<i>3.5</i>



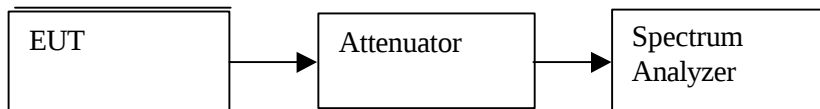


9.4. PEAK EXCURSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak	☒ 1 MHz	☒ 1 MHz
	☒ Average	☒ 1 MHz	☒ 30 Hz

TEST SETUP



TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer through an attenuator. The spectrum analyzer is set to 1 MHz RESOLUTION BW and 1MHz VIDEO BW. Trace A is set to Max Hold, then to View. The VIDEO BW is readjusted to 30 kHz, and the signal under this measurement condition is captured in Trace B.

The difference between the traces is investigated. The marker is placed at the frequency which shows the largest difference. The amplitude delta between the traces at this frequency is the peak excursion.

Result:

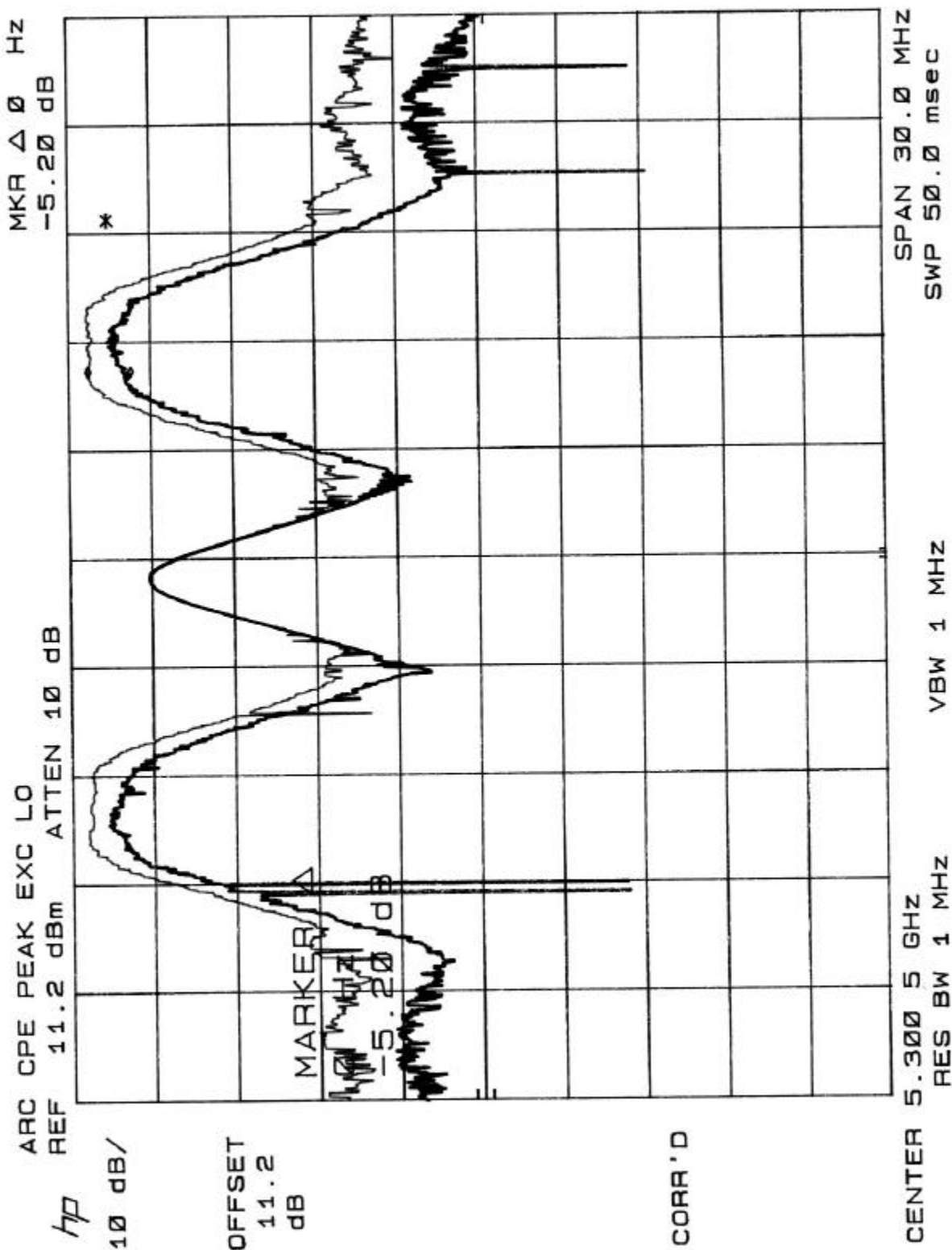
No non-compliance noted. See plots:

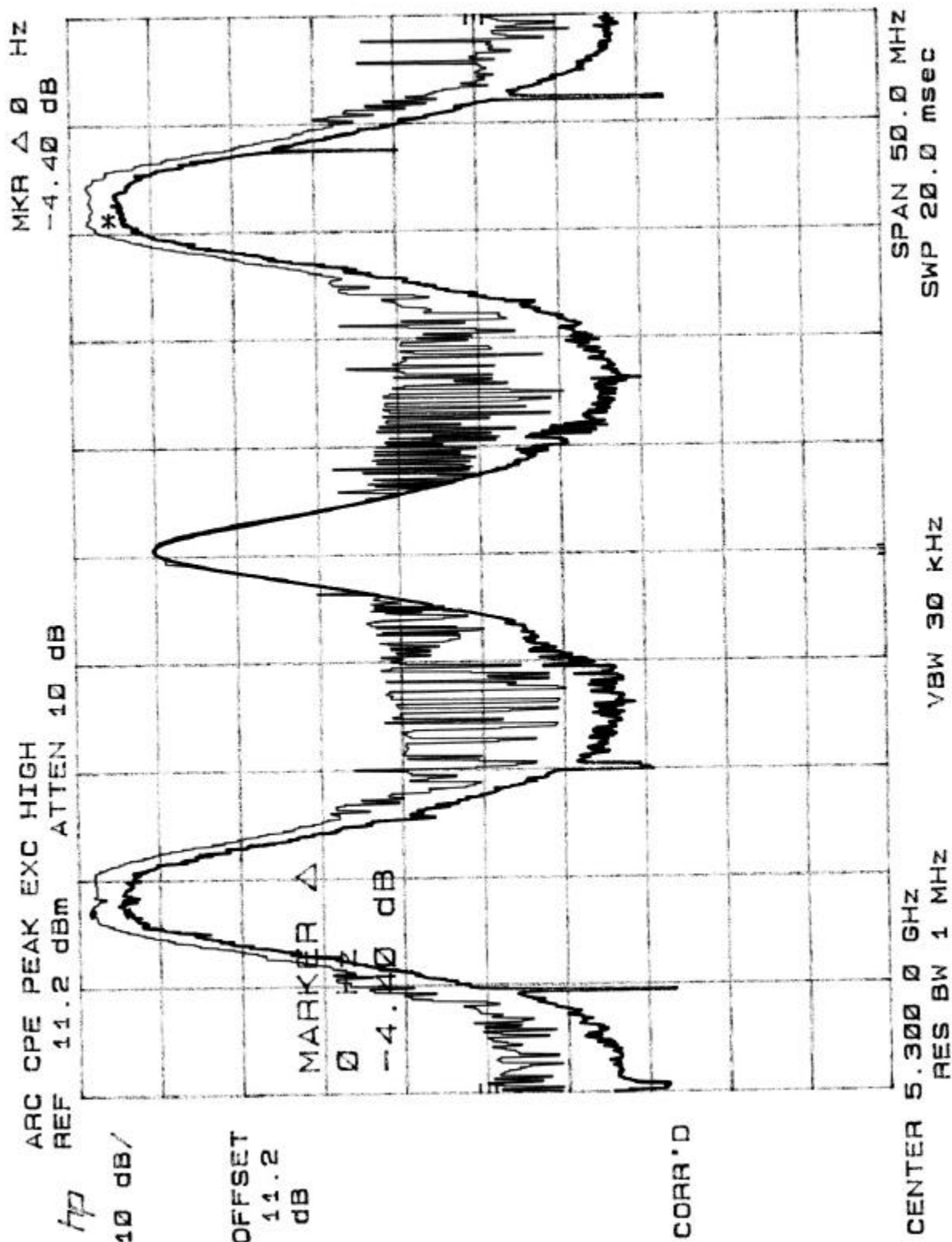
Modem TX 6.4 MHz

Carrier	Frequency (MHz)	Results (dB)
Upper	5306.4	5.2
Lower	5293.6	5.2

Modem TX 12.8 MHz

Carrier	Frequency (MHz)	Results (dB)
Upper	5312.8	4.4
Lower	5287.2	4.4





9.5. UNDESIRABLE EMISSION - BAND EDGE

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 1 MHz ☐ 1 MHz	☒ 1 MHz ☐ 10 Hz

TEST SETUP



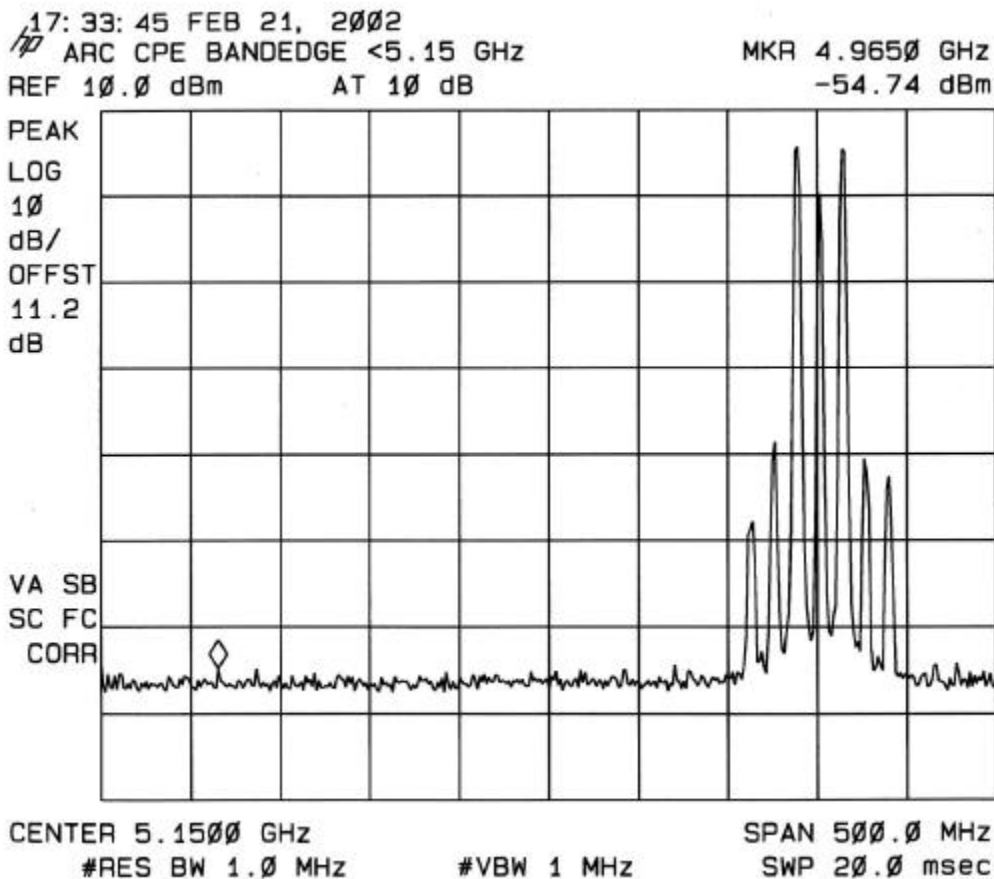
TEST PROCEDURE

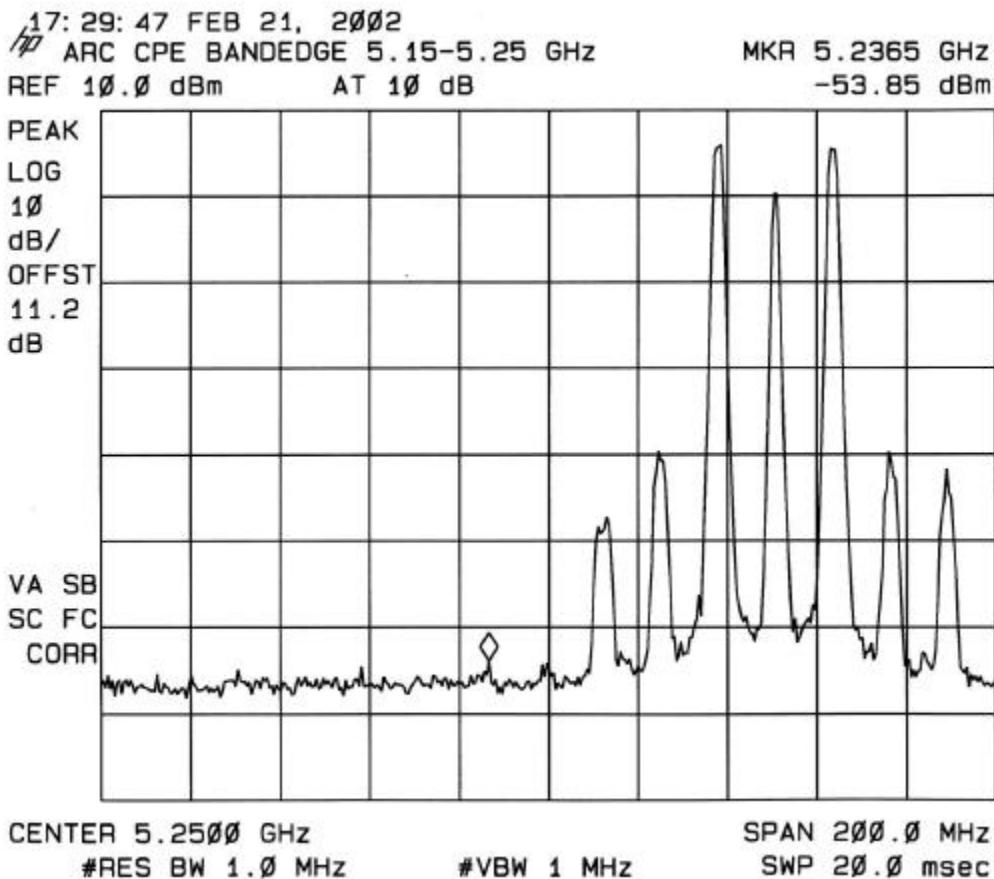
The transmitter output was connected to the spectrum analyzer through an attenuator. The resolution and video bandwidth were set to 1MHz. The lower and upper band edge is investigated.

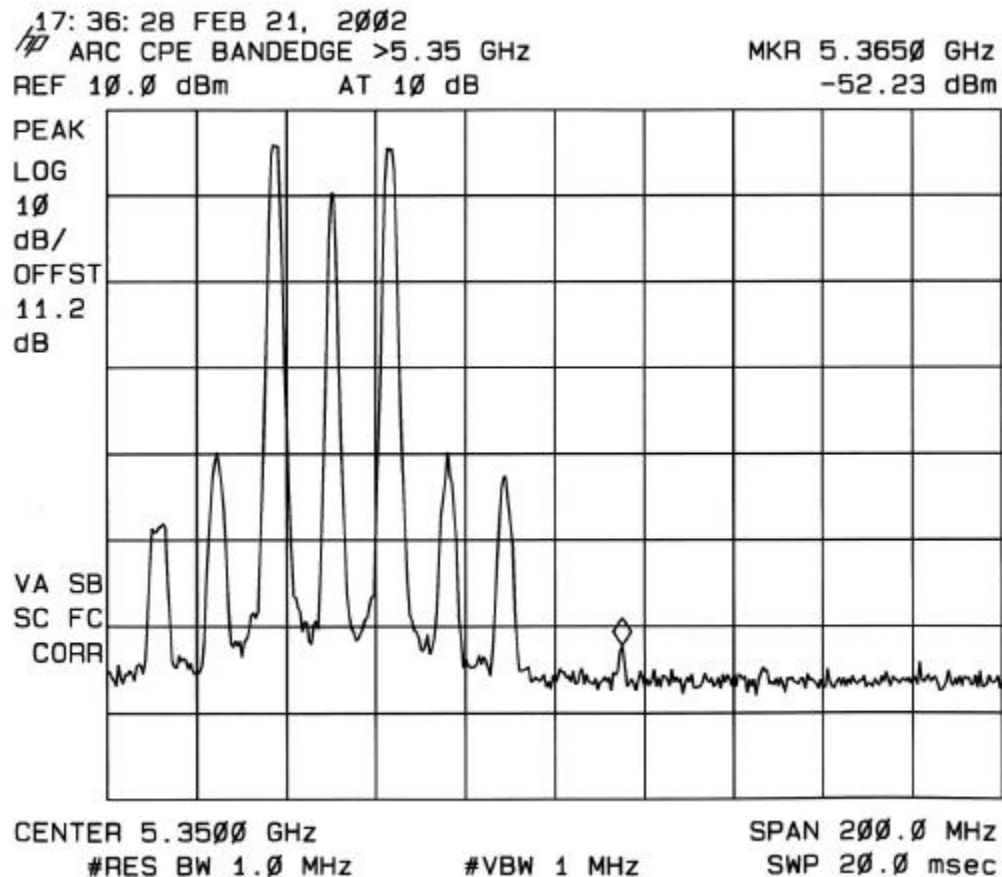
RESULT

No non-compliance noted. See plots:

Band Edge	Reading (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
below 5.15 GHz	-54.94	13	-41.94	-27	-14.94
5.15 to 5.25 GHz	-52.23	13	-39.23	-27	-12.23
above 5.35 GHz	-53.85	13	-40.85	-27	-13.85

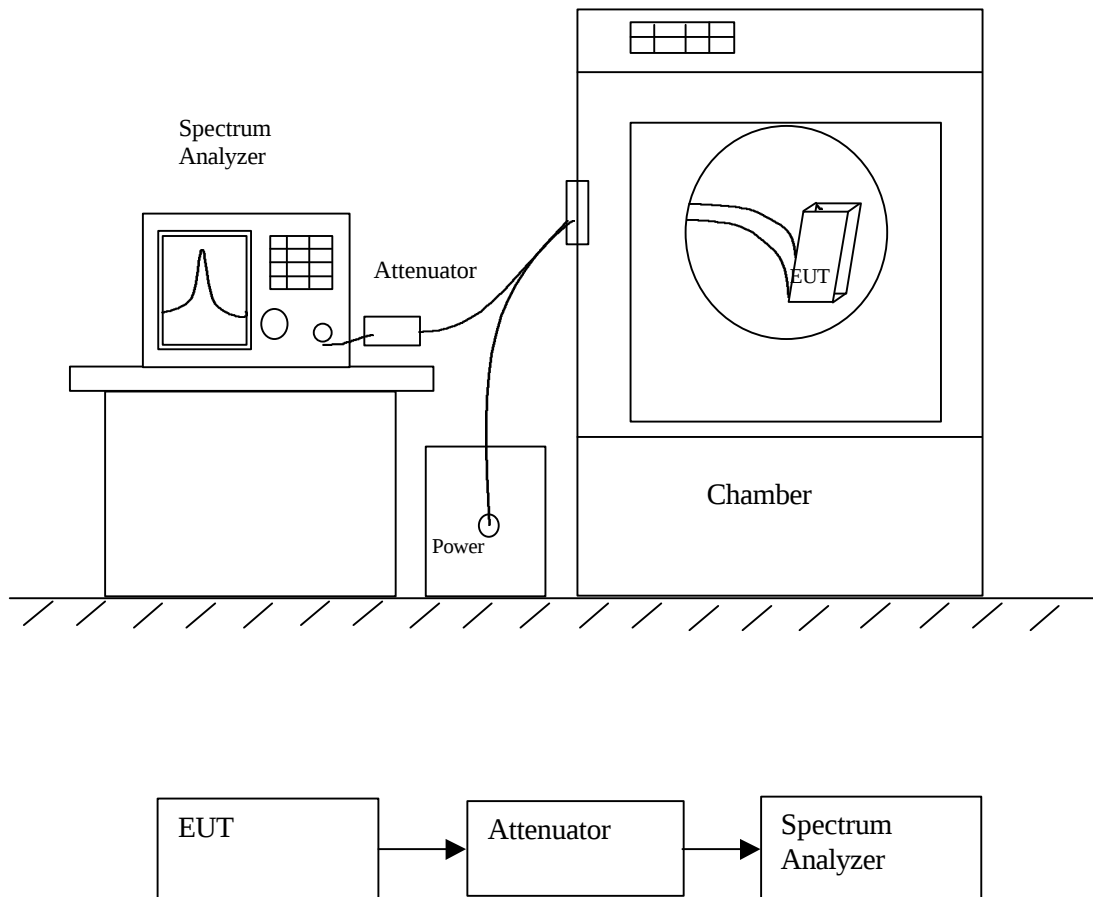






9.6. FREQUENCY STABILITY

TEST SETUP



TEST PROCEDURE

- 1 Place the EUT in the environmental chamber. All measuring equipment is placed outside the environmental chamber.
- 2 Connect the transmitter output to the spectrum analyzer through the attenuator.
- 3 Turn the EUT on and set to 12.8 MHz modem.
- 4 Set SA Resolution Bandwidth to 10 KHz and Video Bandwidth to 100 KHz. Set SA center frequency to display the lower sideband of the signal. Record the frequency of the lower edge of the lower sideband. Set SA center frequency to display the upper sideband of the signal. Record the frequency of the upper edge of the upper sideband.
- 5 Set the temperature of chamber to -30°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. Set SA center frequency to display the lower sideband of the EUT signal. Record the frequency of the lower edge of the lower sideband. Set SA center frequency to display the upper sideband of the EUT signal. Record the frequency of the upper edge of the upper sideband.
- 6 Repeat step 5 with the temperature of the chamber set to +50°C.

Result:

No non-compliance noted. See data :

<i>Temperature</i>	<i>Edge / Sideband</i>	<i>Edge Frequency (MHz)</i>	<i>Limit Frequency(MHz)</i>
+25°C (ref)	<i>Lower Edge of LSB</i>	<i>5287.0342</i>	<i>5250 to 5350</i>
+25°C (ref)	<i>Upper Edge of USB</i>	<i>5312.8660</i>	<i>5250 to 5350</i>
-30°C	<i>Lower Edge of LSB</i>	<i>5287.0383</i>	<i>5250 to 5350</i>
-30°C	<i>Upper Edge of USB</i>	<i>5312.8636</i>	<i>5250 to 5350</i>
+50°C	<i>Lower Edge of LSB</i>	<i>5287.0259</i>	<i>5250 to 5350</i>
+50°C	<i>Upper Edge of USB</i>	<i>5312.8604</i>	<i>5250 to 5350</i>

9.7. UNDESIRABLE EMISSION

Conducted RF measurements of the transmitter output were made over the 0 to 2.9 GHz band and the 2.75 to 26 GHz band in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site. Signals that are outside the 15.205 restricted bands are measured for compliance with the out-of-band EIRP limit using the substitution method. Signals that are within the 15.205 restricted bands are measured for compliance with 15.209 limits.

MEASUREMENT PROCEDURE (Substitution Method)

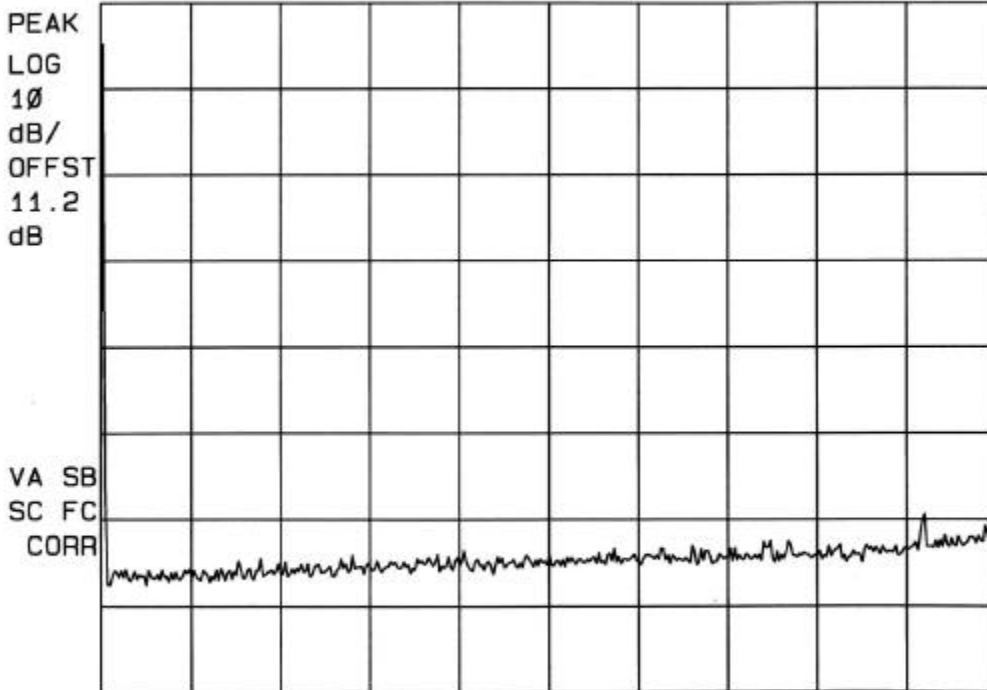
- 1). On a test site, the EUT shall be placed on a turntable, and in the position closest to the normal use as declared by the user.
- 2). The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the frequency of the transmitter.
- 3). The output of the test antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- 4). The transmitter shall be switched on, if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- 5). The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 6). The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- 7). The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
- 8). The maximum signal level detected by the measuring receiver shall be noted.
- 9). The transmitter shall be replaced by a tuned dipole (substitution antenna). For frequencies above 1 GHz, at which a tuned dipole is impracticable, a horn antenna shall be used.
- 10). The substitution antenna shall be oriented for vertical polarization and the length of the dipole substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
- 11). The substitution antenna shall be connected to a calibrated signal generator.

- 12). If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- 13). The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- 14). The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- 15). The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- 16). The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.
- 17). The measure of the effective radiated power is the larger of the two levels recorded, at the input to the substitution antenna, corrected for the gain of the substitution antenna if necessary.

17:40:49 FEB 21, 2002

ARC CPE SPURIOUS

REF 10.0 dBm AT 10 dB



START 0 Hz

#RES BW 1.0 MHz

#VBW 1 MHz

STOP 2.900 GHz

SWP 58.0 msec

17:39:16 FEB 21, 2002

ARC CPE SPURIOUS

REF 10.0 dBm

AT 10 dB

PEAK

LOG

10

dB/

OFFST

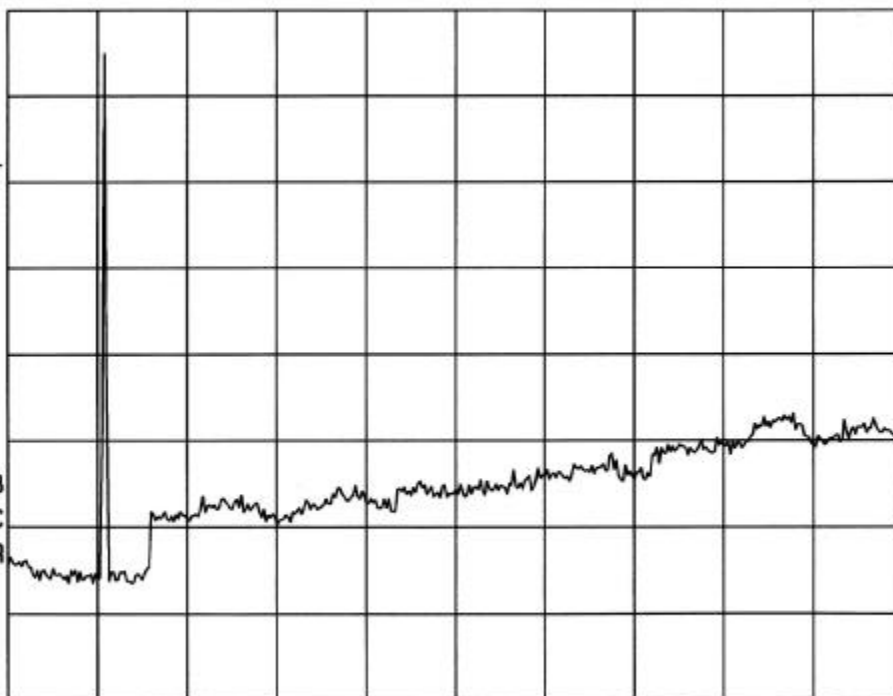
11.2

dB

VA SB

SC FC

CORR



START 2.75 GHz

#RES BW 1.0 MHz

#VBW 1 MHz

STOP 26.00 GHz

SWP 483 msec

The signal in the 0 to 2.9 GHz conducted spurious plot was identified as the subharmonic of the 5300 MHz prescaler. A radiated measurement of the out-of-band EIRP level of the subharmonic feedthru was made using the substitution method. The vertically polarized signal was the strongest.

Vertical polarization – substitution measurement

Signal: Prescaler Subharmonic	Spectrum Analyzer Reading	Signal Generator Level	Cable	Antenna Gain	EIRP	Limit	Margin
Freq (MHz)	(dBm)	(dBm)	(dB)	(dBi)	(dBm)	(dBm)	(dB)
2.650 GHz	-40.93	-52.6	-1.2	8.9	-44.9	-27	-17.9

The signal in the 2.75 to 26 GHz conducted spurious plot was identified as the intended transmit signal.

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Below 1000	☒ Peak	☒ 100 kHz	☒ 100 kHz
	☐ Q.P.	☐ 1 MHz	☐ 10 Hz
Above 1000	☒ Peak	☒ 1 MHz	☒ 1 MHz
	☐ Average	☐ 1 MHz	☐ 10 Hz

TEST SETUP

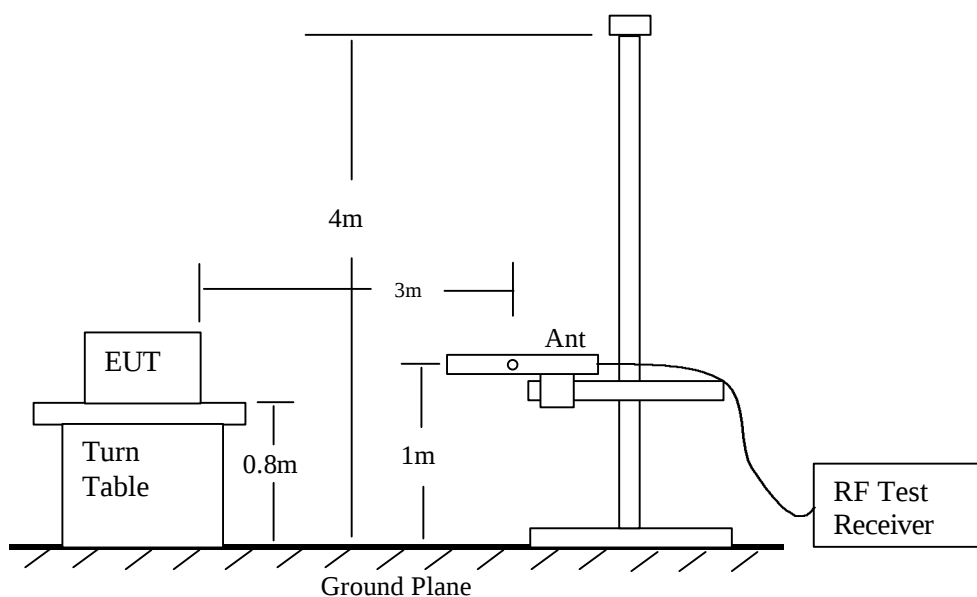


Fig 1: Radiated Emission Measurement 30 to 1000MHz.

TEST SETUP

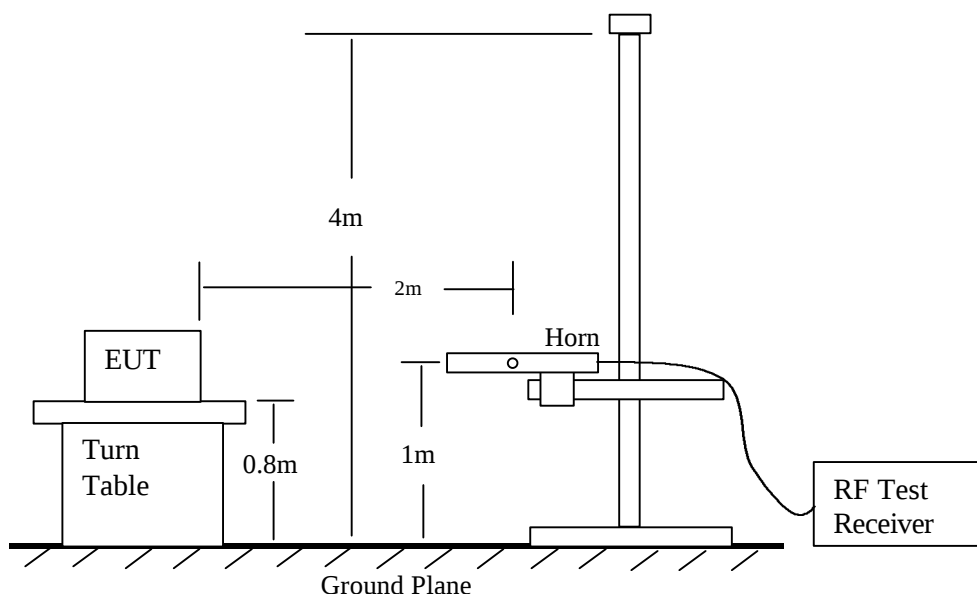


Fig 2: Radiated Emission Above 1000MHz

TEST PROCEDURE

The EUT and all other support equipment were placed on a wooden table 80 cm above the ground screen. The antenna to EUT distance was 10 meters. During the test, the table was rotated 360 degrees to maximize emissions and the antenna was positioned from 1 to 4 meters above the ground screen to further maximize emissions. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

The EUT test configuration was according to Section 8 of ANSI C63.4/1992.

The following procedure was used to make the measurements: The frequency range of interest was monitored at a fixed antenna height and EUT azimuth. The Frequency span was set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT was rotated through 360 degrees to maximize emissions received. During the rotation if emission increased by more than 1 dB, or if another emission appeared that was greater by 1 dB, the EUT was returned to the azimuth where the maximum occurred, and additional cable manipulation was performed to further maximize received emissions.

The antenna was moved up and down to further maximize the suspected highest amplitude signal. If the emission increased by 1 dB or more, or if another emission appeared that was greater by 1dB or more, the antenna was returned to the height where maximum signal was observed, and, cables were manipulated to produce highest emissions, noting frequency and amplitude.

RESULT

No non-compliance noted.

FCC Measurement															
Compliance Certification Services , Morgan Hill Open Field Site															
Advance Radio Cells					12/21/01										
	Cable length														
		17.0		feet											
	Distance to Antenna														
		6.6		feet											
Average Measurements:					Peak Measurements:										
	1 MHz Resolution Bandwidth						1MHz Resolution Bandwidth								
	10Hz Video Bandwidth						1MHz Video Bandwidth								
	Low Channel:														
	L.O. = 5.3Ghz														
	LowSideband=5293.6MHz					HighSideband=5306.4MHz									
f	Peak R.	Avg. R.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Peak Mar	Avg Mar	Notes	
GHz	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB		
10.587	44.7	34.4	38.4	10.1	-39.2	-3.5	1.0	51.5	41.2	74.0	54.0	-22.5	-12.8	H	
10.600	50.0	38.3	38.4	10.1	-39.2	-3.5	1.0	56.8	45.1	74.0	54.0	-17.2	-8.9	H	
10.612	46.1	34.5	38.4	10.1	-39.2	-3.5	1.0	52.9	41.3	74.0	54.0	-21.1	-12.7	H	
10.587	44.7	34.4	38.4	10.1	-39.2	-3.5	1.0	51.5	41.2	74.0	54.0	-22.5	-12.8	V	
10.600	50.0	38.3	38.4	10.1	-39.2	-3.5	1.0	56.8	45.1	74.0	54.0	-17.2	-8.9	V	
10.612	46.1	34.5	38.4	10.1	-39.2	-3.5	1.0	52.9	41.3	74.0	54.0	-21.1	-12.7	V	
15.880	49.1	38.3	38.1	13.2	-44.4	-3.5	1.0	53.6	42.8	74.0	54.0	-20.4	-11.2	H	
15.900	49.0	37.9	38.1	13.2	-44.4	-3.5	1.0	53.5	42.4	74.0	54.0	-20.5	-11.6	H	
15.919	46.0	36.2	32.5	13.2	-44.4	-3.5	1.0	44.9	35.1	74.0	54.0	-29.1	-18.9	H	
15.880	49.1	38.3	38.1	13.2	-44.4	-3.5	1.0	53.6	42.8	74.0	54.0	-20.4	-11.2	V	
15.900	49.0	37.9	38.1	13.2	-44.4	-3.5	1.0	53.5	42.4	74.0	54.0	-20.5	-11.6	V	
15.919	46.0	36.2	32.5	13.2	-44.4	-3.5	1.0	44.9	35.1	74.0	54.0	-29.1	-18.9	V	
21.174	44.7	34.4	32.6	16.4	-44.3	-3.5	1.0	46.9	36.6	74.0	54.0	-27.1	-17.4	Noise Floor	
21.200	50.0	38.3	32.6	16.4	-44.3	-3.5	1.0	52.2	40.5	74.0	54.0	-21.8	-13.5	Noise Floor	
21.225	46.1	34.5	32.6	16.4	-44.3	-3.5	1.0	48.3	36.7	74.0	54.0	-25.7	-17.3	Noise Floor	
26.468	49.1	38.3	34.0	20.4	-44.3	-3.5	1.0	56.7	45.9	74.0	54.0	-17.3	-8.1	Noise Floor	
26.500	49.0	37.9	34.0	20.4	-44.3	-3.5	1.0	56.6	45.5	74.0	54.0	-17.4	-8.5	Noise Floor	
26.532	46.0	36.2	32.5	20.4	-44.3	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor	
31.726	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor	
31.800	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor	
31.838	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor	
37.055	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.0	42.2	74.0	54.0	-22.0	-11.8	Noise Floor	
37.100	38.5	28.6	24.2	20.4	-44.4	-3.5	1.0	36.2	26.3	74.0	54.0	-37.8	-27.7	Noise Floor	
37.144	38.8	27.9	24.2	20.4	-44.4	-3.5	1.0	36.5	25.6	74.0	54.0	-37.5	-28.4	Noise Floor	
f	Measurement Frequency							HPF		High Pass filter					
Peak R.	Analyzer Peak Reading							Peak		Calculated peak field Strength					
Avg. R.	Analyzer Avg. Reading							Avg		Calculated average field Strength					
AF	Antenna Factor							Pk Lim		Peak Field Strength Limit					
CL	Cable Loss							Avg Lim		Average Field Strength Limit					
Amp	Pre amp gain							Pk Mar		Margin vs. Peak Limit					
D Corr	Discorrections to 2 meter							Avg Mar		Margin vs. Average Limit					

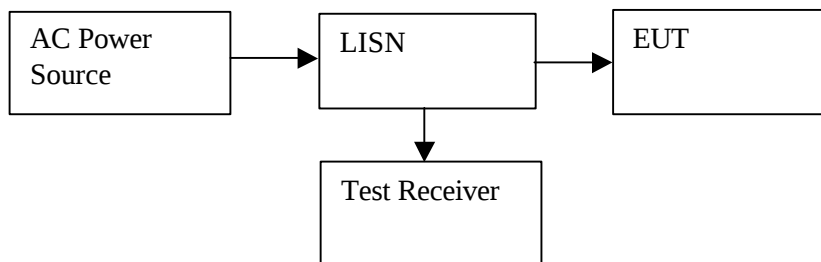
FCC Measurement																
Compliance Certification Services , Morgan Hill Open Field Site																
Advance Radio Cells					12/21/01											
	Cable length															
		17.0		feet												
	Distance to Antenna															
		6.6		feet												
Average Measurements:					Peak Measurements:											
	1 MHz Resolution Bandwidth					1MHz Resolution Bandwidth										
	10Hz Video Bandwidth					1MHz Video Bandwidth										
	High Channel															
	L.O. = 5.3Ghz															
	LowSideband=5287.2MHz				HighSideband=5312.8MHz											
f	Peak R.	Avg. R.	AF	CL	Amp	D Corr	HPF	Peak	Avg	Pk Lim	Avg Lim	Peak Mar	Avg Mar	Notes		
GHz	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB			
10.574	44.7	34.4	38.4	10.1	-39.3	-3.5	1.0	51.5	41.2	74.0	54.0	-22.5	-12.8	H		
10.600	50.0	38.3	38.4	10.1	-39.2	-3.5	1.0	56.8	45.1	74.0	54.0	-17.2	-8.9	H		
10.625	46.1	34.5	38.4	10.1	-39.2	-3.5	1.0	52.9	41.3	74.0	54.0	-21.1	-12.7	H		
10.574	44.7	34.4	38.4	10.1	-39.3	-3.5	1.0	51.5	41.2	74.0	54.0	-22.5	-12.8	V		
10.600	50.0	38.3	38.4	10.1	-39.2	-3.5	1.0	56.8	45.1	74.0	54.0	-17.2	-8.9	V		
10.625	46.1	34.5	38.4	10.1	-39.2	-3.5	1.0	52.9	41.3	74.0	54.0	-21.1	-12.7	V		
15.861	49.1	38.3	38.1	13.2	-44.4	-3.5	1.0	53.6	42.8	74.0	54.0	-20.4	-11.2	H		
16.900	49.0	37.9	42.7	13.9	-44.1	-3.5	1.0	59.0	47.9	74.0	54.0	-15.0	-6.1	H		
15.938	46.0	36.2	32.5	13.2	-44.3	-3.5	1.0	44.9	35.1	74.0	54.0	-29.1	-18.9	H		
15.861	49.1	38.3	38.1	13.2	-44.4	-3.5	1.0	53.6	42.8	74.0	54.0	-20.4	-11.2	V		
16.900	49.0	37.9	42.7	13.9	-44.1	-3.5	1.0	59.0	47.9	74.0	54.0	-15.0	-6.1	V		
15.938	46.0	36.2	32.5	13.2	-44.3	-3.5	1.0	44.9	35.1	74.0	54.0	-29.1	-18.9	V		
21.149	44.7	34.4	32.6	16.4	-44.3	-3.5	1.0	46.8	36.5	74.0	54.0	-27.2	-17.5	Noise Floor		
21.200	50.0	38.3	32.6	16.4	-44.3	-3.5	1.0	52.2	40.5	74.0	54.0	-21.8	-13.5	Noise Floor		
21.251	46.1	34.5	32.6	16.4	-44.3	-3.5	1.0	48.3	36.7	74.0	54.0	-25.7	-17.3	Noise Floor		
26.436	49.1	38.3	34.0	20.4	-44.3	-3.5	1.0	56.6	45.8	74.0	54.0	-17.4	-8.2	Noise Floor		
26.500	49.0	37.9	34.0	20.4	-44.3	-3.5	1.0	56.6	45.5	74.0	54.0	-17.4	-8.5	Noise Floor		
26.564	46.0	36.2	32.5	20.4	-44.3	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor		
31.723	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor		
31.800	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor		
31.877	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.1	42.3	74.0	54.0	-21.9	-11.7	Noise Floor		
37.010	46.0	36.2	32.5	20.4	-44.4	-3.5	1.0	52.0	42.2	74.0	54.0	-22.0	-11.8	Noise Floor		
37.100	38.5	28.6	24.2	20.4	-44.4	-3.5	1.0	36.2	26.3	74.0	54.0	-37.8	-27.7	Noise Floor		
37.189	38.8	27.9	24.2	20.4	-44.4	-3.5	1.0	36.5	25.6	74.0	54.0	-37.5	-28.4	Noise Floor		
f	Measurement Frequency							HPF		High Pass filter						
Peak R.	Analyzer Peak Reading							Peak		Calculated peak field Strength						
Avg. R.	Analyzer Avg. Reading							Avg		Calculated average field Strength						
AF	Antenna Factor							Pk Lim		Peak Field Strength Limit						
CL	Cable Loss							Avg Lim		Average Field Strength Limit						
Amp	Pre amp gain							Pk Mar		Margin vs. Peak Limit						
D Corr	Disrections to 2 meter							Avg Mar		Margin vs. Average Limit						

9.8. POWER LINE CONDUCTED EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
450 KHz to 30 MHz	☒ Peak ☐ CISPR Quasi Peak	☒ 9 KHz	☒ 9 KHz

TEST SETUP



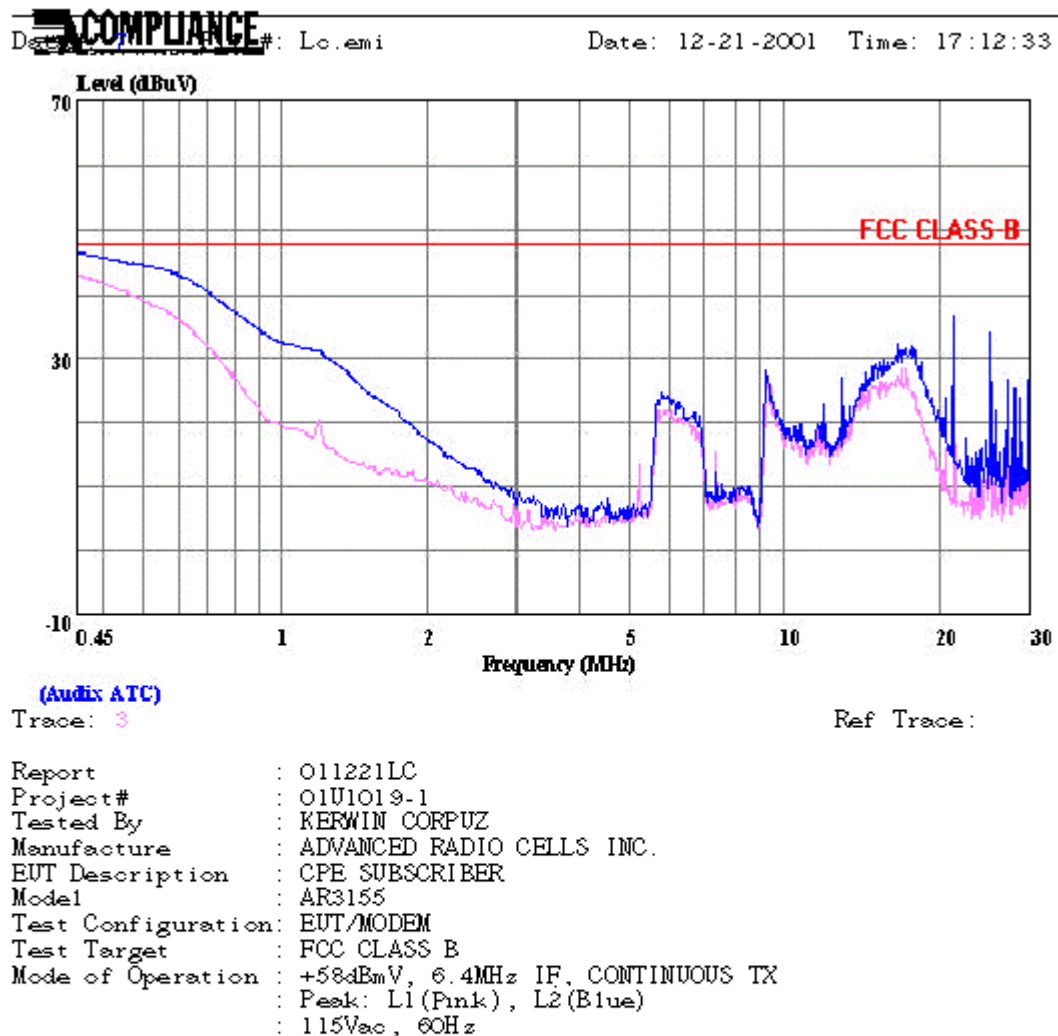
TEST PROCEDURE

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in a continuous mode.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

RESULT

No non-compliance noted. See plot Line Conduction.

CONDUCTED EMISSIONS DATA for CPE (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit		Margin		Remark
	PK (dBuV)	OP (dBuV)	AV (dBuV)		OP	AV	OP (dB)	AV (dB)	
0.45	43.08	--	--	0.00	48.00	--	-4.92	--	L1
5.98	21.81	--	--	0.00	48.00	--	-26.19	--	L1
9.45	28.01	--	--	0.00	48.00	--	-19.99	--	L1
0.45	46.00	--	--	0.00	48.00	--	-2.00	--	L2
5.08	24.80	--	--	0.00	48.00	--	-23.20	--	L2
21.44	37.06	--	--	0.00	48.00	--	-10.94	--	L2
6 Worst Data									



9.9. RADIATED EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak	☒ 100 KHz	☒ 100 KHz
	☐ Quasi Peak	☐ 120 KHz	☐ 120 KHz
Above 1000	☒ Peak	☒ 1 MHz	☒ 1 MHz
	☐ Average	☐ 1 MHz	☐ 10 Hz

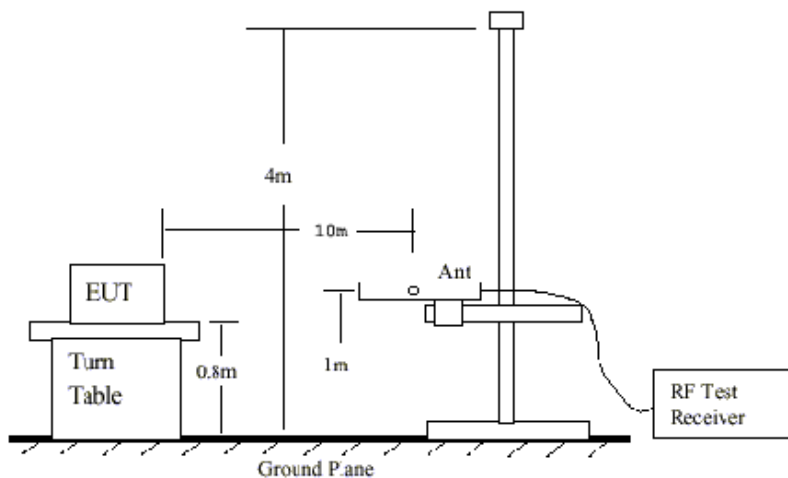


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

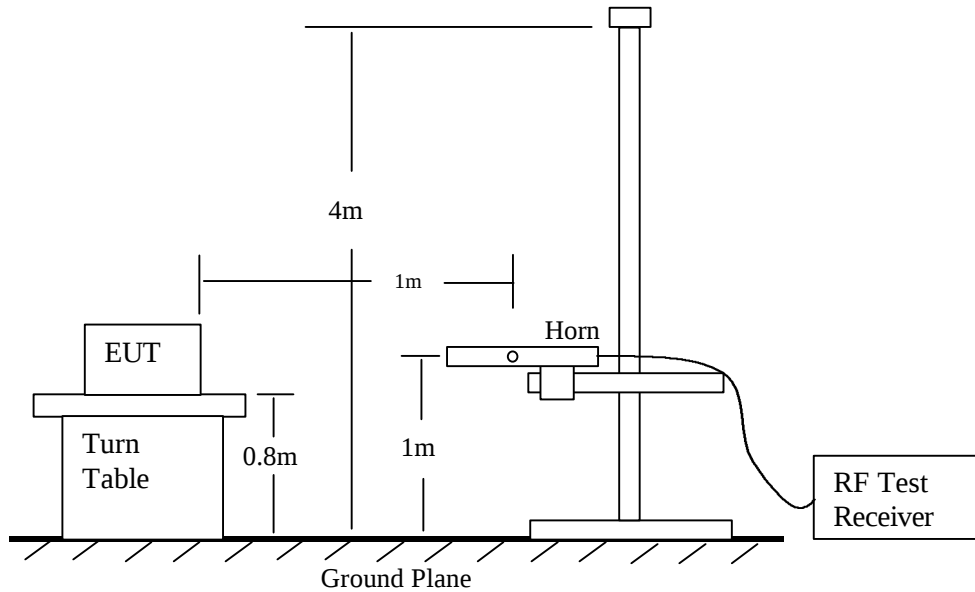


Fig 2: Radiated Emission Above 1000MHz

TEST SETUP & PROCEDURE

1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures C ~ F. If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
8. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures C ~ F for frequency band from 1 GHz to 10 times carrier frequency.

9. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures C ~ F. If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

RESULT

No non-compliance noted, as shown below.



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 #: 01U1019-1
Report #: 011220c
Date & Time: 12/20/01 3:35 PM
Test Engr: HLV

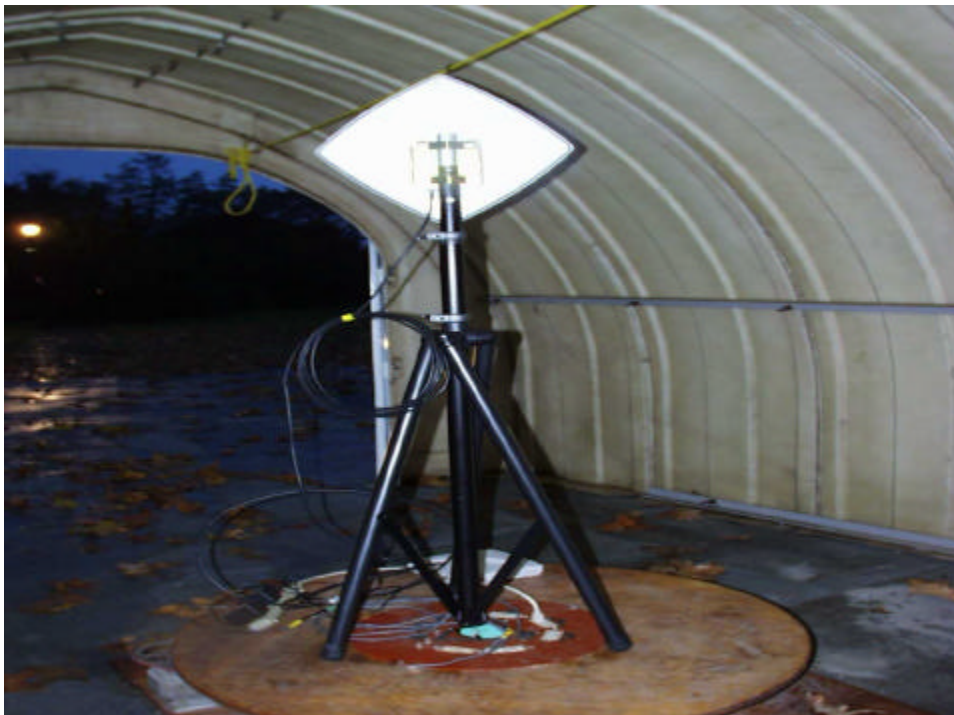
Company: Adeanced Rradio Cell
EUT Description: Broadband fixed wireless internet delivery system
Test Configuration : EUT/Laptop/Modem
Type of Test: FCC Class B
Mode of Operation: TX

☐ A-Site ☐ B-Site ☒ C-Site ☐ F-Site

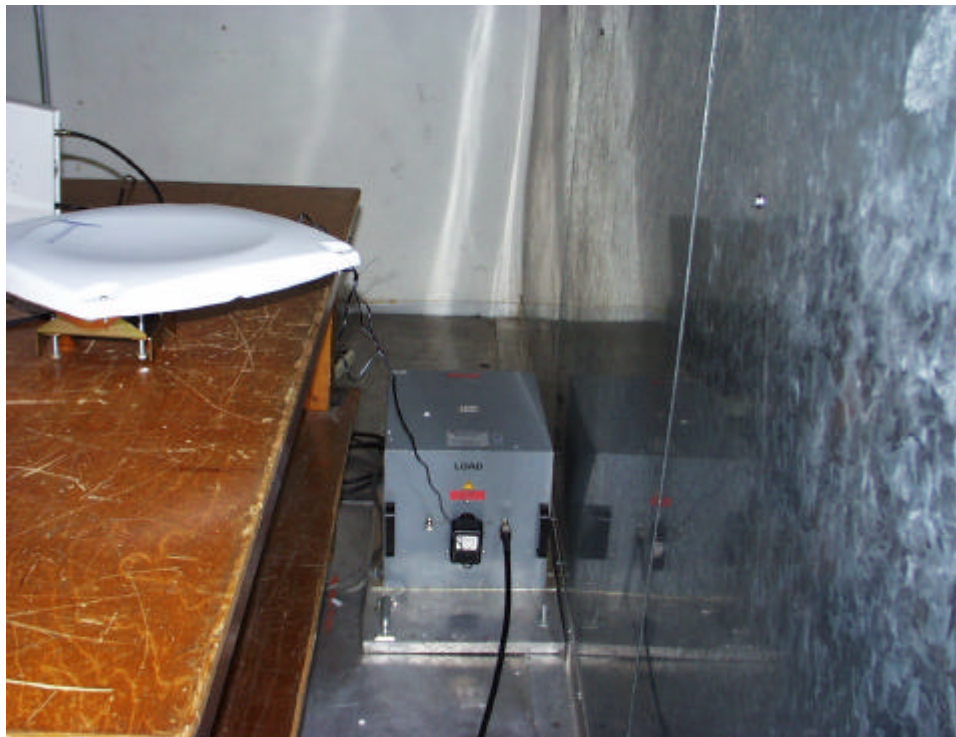
Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
79.00	34.70	9.34	1.07	27.41	17.70	40.00	-22.30	3mV	90.00	1.00	P
85.00	34.50	10.28	1.11	27.39	18.50	40.00	-21.50	3mV	90.00	1.00	P
159.00	33.50	18.39	1.65	27.09	26.44	43.50	-17.06	3mV	90.00	1.00	P
499.00	34.90	18.14	3.46	27.95	28.54	46.00	-17.46	3mV	90.00	1.00	P
583.00	35.70	18.38	3.78	28.09	29.78	46.00	-16.23	3mV	90.00	1.00	P
72.90	34.90	7.11	1.03	27.42	15.62	40.00	-24.38	3mH	90.00	1.00	P
80.00	34.90	8.69	1.08	27.41	17.26	40.00	-22.74	3mH	90.00	1.00	P
239.00	34.20	12.89	2.13	26.71	22.51	46.00	-23.49	3mH	90.00	1.00	P
Total data #: 8											
V.2c											

9.10. SETUP PHOTOS

Radiated Emission photos



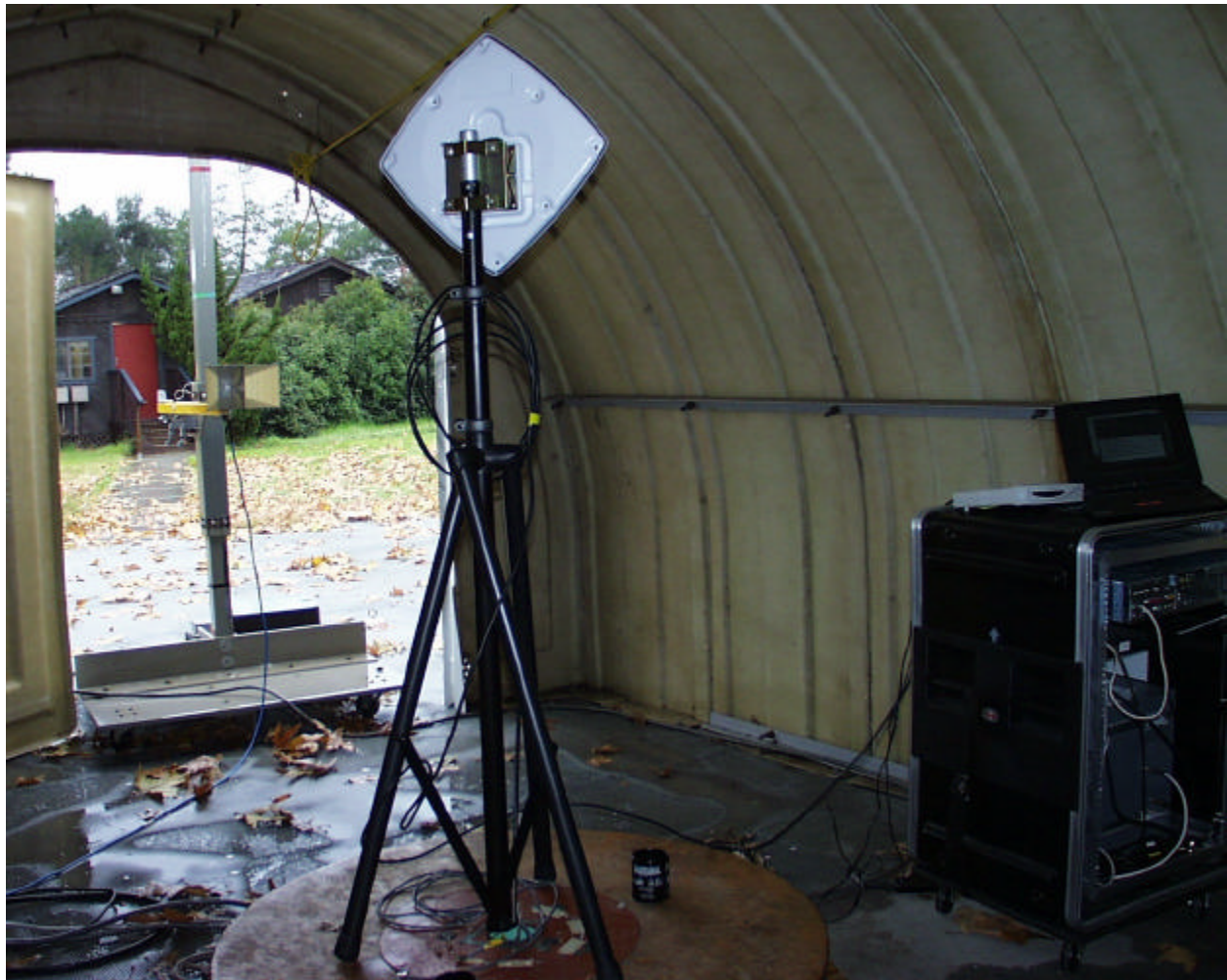
Conducted Emission Photos



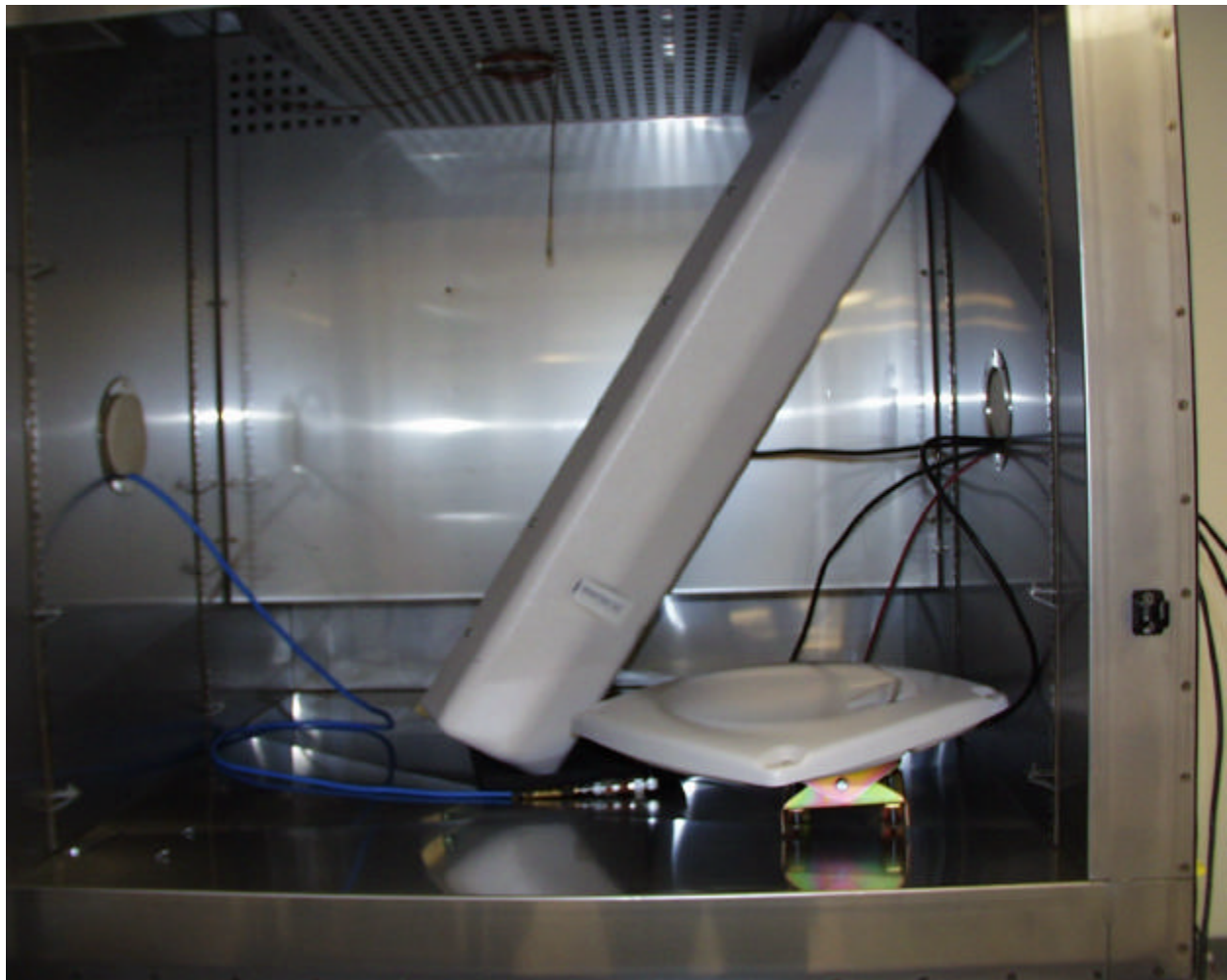
FCC testing to antenna port



FCC testing above 1GIGHz



Frequency Stability



ATTACHMENTS

EUT PHOTOGRAPHS

PROPOSED FCC ID LABEL

MPE CALCULATION

REQUEST FOR CONFIDENTIALITY

AGENT AUTHORIZATION LETTER

ANTENNA SPECIFICATION

USER'S MANUAL

PRODUCT SPECIFICATION

THEORY OF OPERATION

BLOCK DIAGRAM & SCHEMATIC DIAGRAM