

**FCC CFR47 PART 24 SUBPART E
CERTIFICATION REPORT**



FOR

CDMA WLL (Wireless Local Loop) PHONE TERMINAL, 1900MHz

MODEL NAME: ACW-T1900

BRAND NAME: AXESSTEL

FCC ID: PH7ACWT1900

Prepared For
AXESSTEL, INC.
6480 WEATHERS PLACE SUITE 300
SAN DIEGO, CA 92121
USA

Prepared By
Compliance Certification Services
561F Monterey Road
Morgan Hill CA 95037
USA

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Date:2/15/02



Total number of pages: 69

REPORT REVISION HISTORY

Date	Revision	Page No

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ATTACHMENTS

- EUT PHOTOGRAPHS
- PROPOSED FCC ID LABEL FORMAT
- REQUEST OF CONFIDENTIALITY LETTER
- THEORY OF OPERATION
- TUNE UP PROCEDURE
- PRODUCT DESCRIPTION & ANTENNA SPECIFICATION
- PART LIST
- BLOCK DIAGRAMS & SCHEMATICS
- USER'S MANUAL

TEST RESULT CERTIFICATION

COMPANY NAME: AXESSTEL, INC.
6480 WEATHERS PLACE SUITE 300
SAN DIEGO, CA 92121, USA

CONTACT PERSON: MR. Mr. D.S. Kim

TELEPHONE NO: 858-625-2100

EUT DESCRIPTION: CDMA WLL (WIRELESS LOCAL) LOOP PHONE TERMINAL,1900MHZ

MODEL NAME: ACW-T1900

DATE TESTED: NOVEMBER 5, 2001

TYPE OF EQUIPMENT	CDMA WIRELESS LOCAL LOOP PHONE TERMINAL
APPLICATION PROCEDURE	CERTIFICATION
FCC RULE PARTS	FCC Part 2, 15, and 24
MEASUREMENT PROCEDURE	FCC Parts 2, 24 and ANSI C63.4

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirements set forth in FCC Parts 2, 15 and 24. The said equipment, in the configuration described in this report, fulfills the technical characteristics of the specified standard.

Warning : 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.

Tested By:



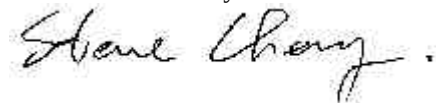
FRANK IBRAHIM
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Tested By:



HUE VANG
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:



STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part2, Subpart J, Sections 2.1033 – 2.1055.

2.1033(c)(1): Applicant: AXESSTEL, INC.
6480 WEATHERS PLACE SUITE 300
SAN DIEGO, CA 92121, USA

Contact person: Mr. D.S. Kim

Telephone number: 858-625-2100

2.1033(c)(2) FCC ID: PH7ACWT1900

2.1033(c)(3) Instructions/Installation Manual

Refer to **Attachment:** User's Manual.

2.1033(c)(4) Type of Emissions

1M25F9W

2.1033(c)(5) Frequency Range

Transmit:**1851.25MHz to 1908.75MHz**

Receive:**1930MHz to 1990MHz**

2.1033(c)(6) Range of Operation Power

low:200mW, High:1W.

See Attachment: *Schematics Page 13 section Power Supply Regulator (U41, U39, U40)*
Means for variation of operating power.

2.1033(c)(7) Maximum Power Rating

Maximum 1 Watts

2.1033(c)(8) Applied voltage and currents into the final transistor elements

See Attachment: *Circuit Description Page 15 Power Supply Regulator (U42), DC voltage and current of final amplifying device.*

2.1033(c)(9) Tune-up/Optimizations Procedure

See Attachment: *Tune Up Procedure Pages 1-51, Tune-up procedure over the power range.*

2.1033(c)(10) Complete Circuit Diagrams and Functional Diagram

Functional diagram: See Attachment: *Block Diagram Page21 section 3.2 RF Block Diagram, Description of modulation system used.*

Complete circuit diagrams: See Attachment: Schematics and Parts list.

2.1033(c)(10a) Means for Frequency Stabilization

See Attachment: *Schematics Page 12 section Voltage Controlled Temperature Compensated Crystal Oscillator and Page 15 section 2.3.3, Description of frequency determining and stabilizing circuitry.*

2.1033(c)(10b) Means for Suppressing of Spurious radiation.

See Attachment: *Circuit Description Page 17 section Spurious Radiation Suppressin Circuit, Description of circuit emulated for suppression of spurious radiations.*

2.1033(c)(10c) Means for Limiting Modulation.

See Attachment: *Circuit Description Page 9 section MSM3000 Interface, Description of modulation system used.*

2.1033(c)(10d) Means for Limiting Power.

See Attachment: *Schematics Page 13 section Power Supply Regulator (U41, U39, U40), Means for variation of operating power.*

2.1033(c)(11) Equipment Identification

A drawing of the equipment identification nameplate appears under **Attachment:** PROPOSED FCC ID LABEL FORMAT.

2.1033(c)(12) Photographs

Photographs of the equipment, internal and external views, are found in the **Attachment:** Eut Photographs.

2.1033(c)(13) Description of Digital Modulation Techniques

See Attachment: *Circuit Description Page 9 section MSM3000 Interface Description of modulation system used.*

2.1033(c)(14) Standard Test Condition

The EUT was operated in Test Mode during testing. See Attachment: *Circuit Description & Tune-Up Procedure over the power range*, for a description of the Test Mode.

EUT DESCRIPTION

The ACW-T1900 terminal is a CDMA Wireless Local Loop (WLL) phone. Its basic purpose is for use to provide voice communication and data communication such as fax or modem if connected to a computer. It transmits from 1850 MHz to 1910 MHz and receives from 1930 MHz to 1990 MHz. The RF power is rated at 0.2- 1W. The omni-directional dipole antenna has a rated gain of 2.0+/-1dBi.

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.

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))

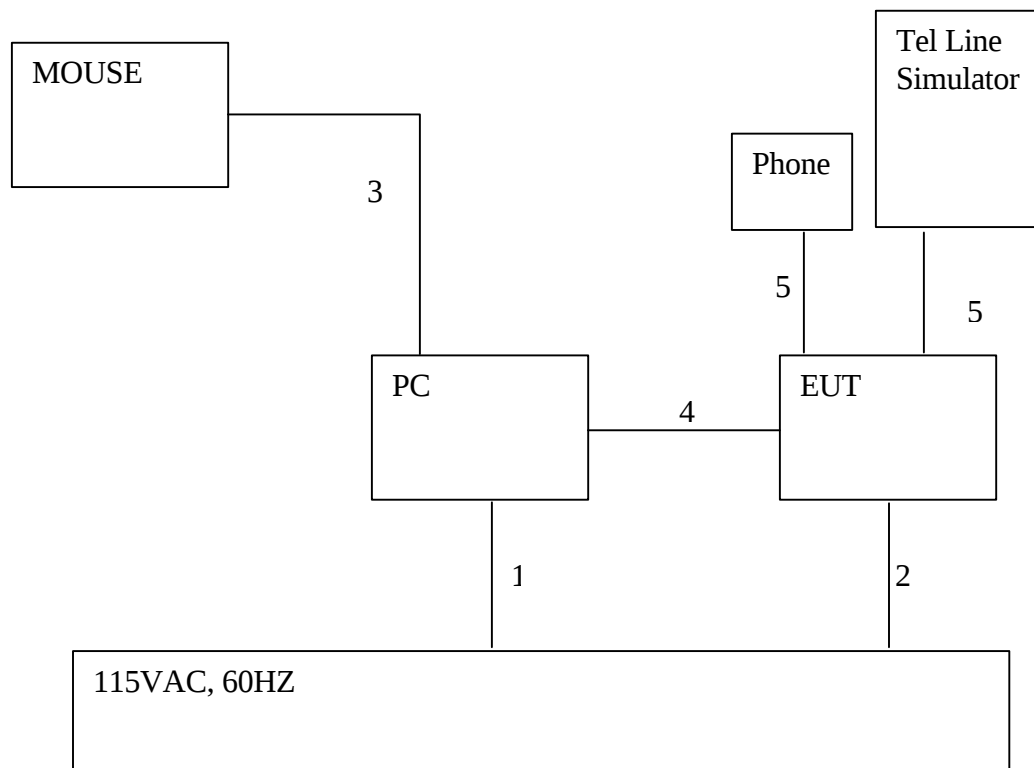
MEASURING INSTRUMENT CALIBRATION

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.

MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Horn Antenna(1 - 18GHz)	EMCO	3115	2238	6/20/02
Pre-Amplifier	MITEQ1-26GHz	NSP2600-44	646456	4/12/02
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/4/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01335	5/4/02
30 dB Attenuator	Not Available	Not Available	2616	N/A
HPF	Not Available	Not Available	3	N/A
HPF	Not Available	Not Available	577	N/A
Signal Generator	Rohde & Schwarz	SMP04	DE34210	8/30/04
Amplifier	Miteq	AM-3A-000110	438844	No Cal Label
Attenuator,70 dB	HP	8495B	106872	N.C.R.
Antenna, Tuned Dipole,(30M - 1GHz)	ComplianceDesign	Roberts	116	5/5/02
EMC Receiver (9K-26.5GHz)	HP	8593EM	3710A00205	6/20/02

FCC PART 15 TEST RESULT CONFIGURATION BLOCK DIAGRAM



EXTERNAL I/O CABLE CONSTRUCTION DESCRIPTION

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	No	N/A
2	AC	1	US 115V	Un-shielded	2m	No	Yes	N/A
3	Mouse	1	PS/2	Un-shielded	2m	Yes	No	N/A
4	Serial	1	DB9	Shielded	1m	Yes	No	N/A
5	Phone	2	RJ11	Unshielded	2m, 30m	Yes	No	N/A

RADIATED EMISSION

FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #:
Report #: 01u1001-1
Date & Time: 011024b
Test Engr: 10/25/01 2:19 PM
Hue Ly Vang

Company:
EUT Description: Axesstel Inc.
Test Configuration : CDMA WLL Phone (M#:ACWT1900)
Type of Test: EUT/Laptop/Telephone
Mode of Operation: FCC Class B
Redial through RS232 / Talking on phone

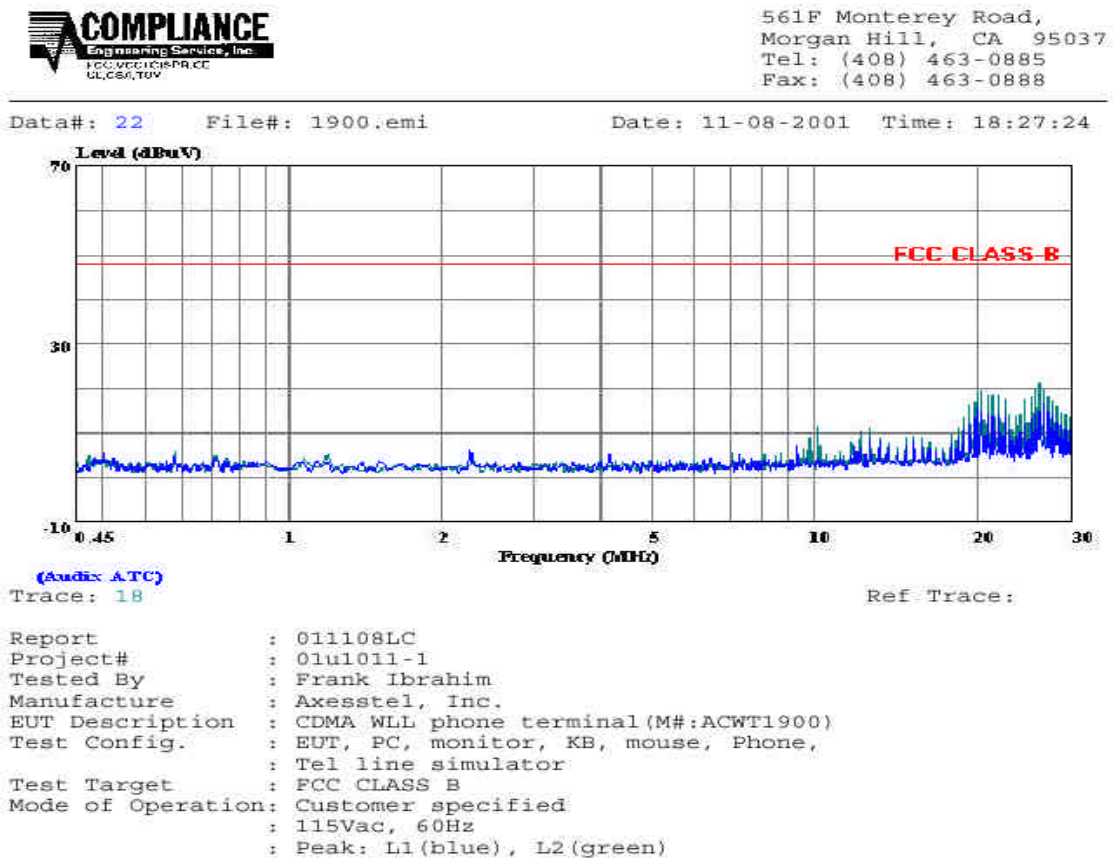
☐ A-Site
 ☒ B-Site
 ☐ C-Site
 ☐ F-Site
 6 Worst
 Descending
 10/25/01

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)
40.65	46.40	11.68	1.62	29.69	30.01	40.00	-9.99	3mH	90.00	1.00	P
44.90	55.00	10.39	1.67	29.68	37.38	40.00	-2.62	3mH	90.00	1.00	P
44.90	49.00	10.39	1.67	29.68	31.38	40.00	-8.62	3mH	90.00	1.00	QP
120.00	44.00	11.40	2.36	29.51	28.25	43.50	-15.25	3mH	90.00	1.00	P
80.00	37.00	6.43	2.07	29.60	15.90	40.00	-24.10	3mV	90.00	1.00	P
166.00	41.00	8.97	2.71	29.32	23.36	43.50	-20.14	3mV	90.00	1.00	P
224.00	45.60	10.77	3.17	29.03	30.51	46.00	-15.49	3mV	90.00	1.00	P

CONDUCTED EMISSION

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit		Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
25.68	20.20	--	--	0.00	48.00		-27.80		L1
22.08	14.09	--	--	0.00	48.00		-33.91		L1
26.67	16.73	--	--	0.00	48.00		-31.27		L1
25.68	20.20	--	--	0.00	48.00		-27.80		L2
26.12	21.02	--	--	0.00	48.00		-26.98		L2
26.67	20.30	--	--	0.00	48.00		-27.70		L2

LINE CONDUCTION PLOT



SETUP PHOTOS



Radiated Emissions Setup, Front View



Radiated Emissions Setup, Rear View



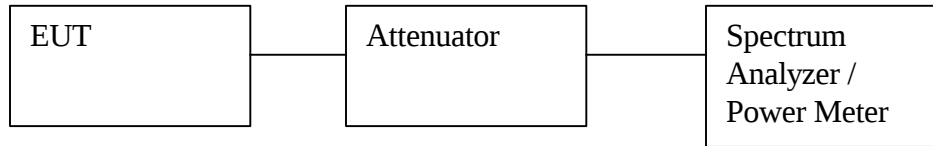
Conducted Emissions Setup, Front View



Conducted Emissions Setup, Rear View

FCC PART 2 CERTIFICATION TEST RESULTS:

Test Set-up for the following antenna port conducted tests:



SECTION 2.1046: RF POWER OUTPUT

Minimum Requirement:

24.232(B); Mobile / Portable stations are limited to 2Watts EIRP peak power.

Test Procedure conducted:

The EUT was setup to maximum output power (maximum gain) at its lowest channel. The output power was measured using a power meter. The measurements are repeated for the highest and a middle channel.

Test Result:

Complies.

Calculations are shown below:

Conducted measurements:

Channel 25 : 26.87dBm

Channel 575 : 25.53dBm

Channel 1175: 24.86dBm

SECTION 2.1047: MODULATION CHARACTERISTICS

A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

Not Applicable. No modulation limit for PCS. PCS licensees may provide any mobile communications services on their assigned spectrum (FCC 24.3)

SECTION 2.1049: OCCUPIED BANDWIDTH

Test Procedure:

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

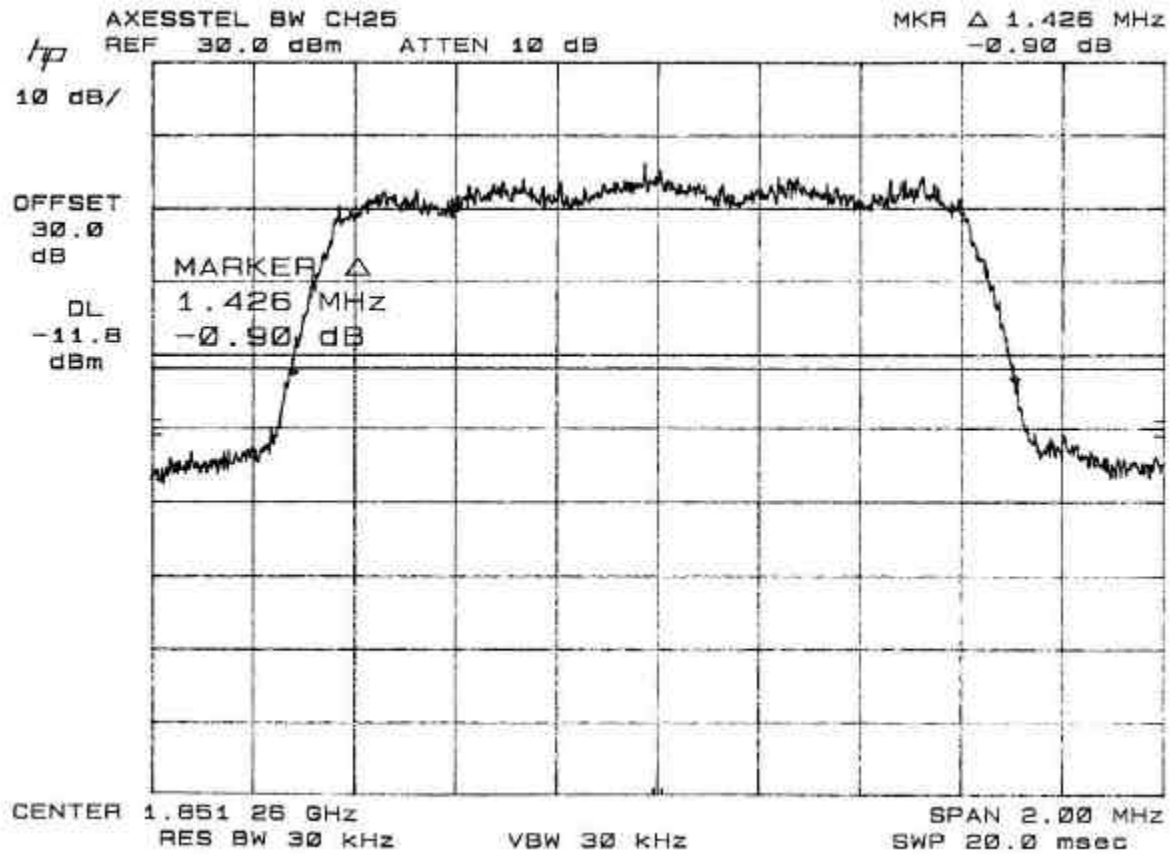
Test Result:

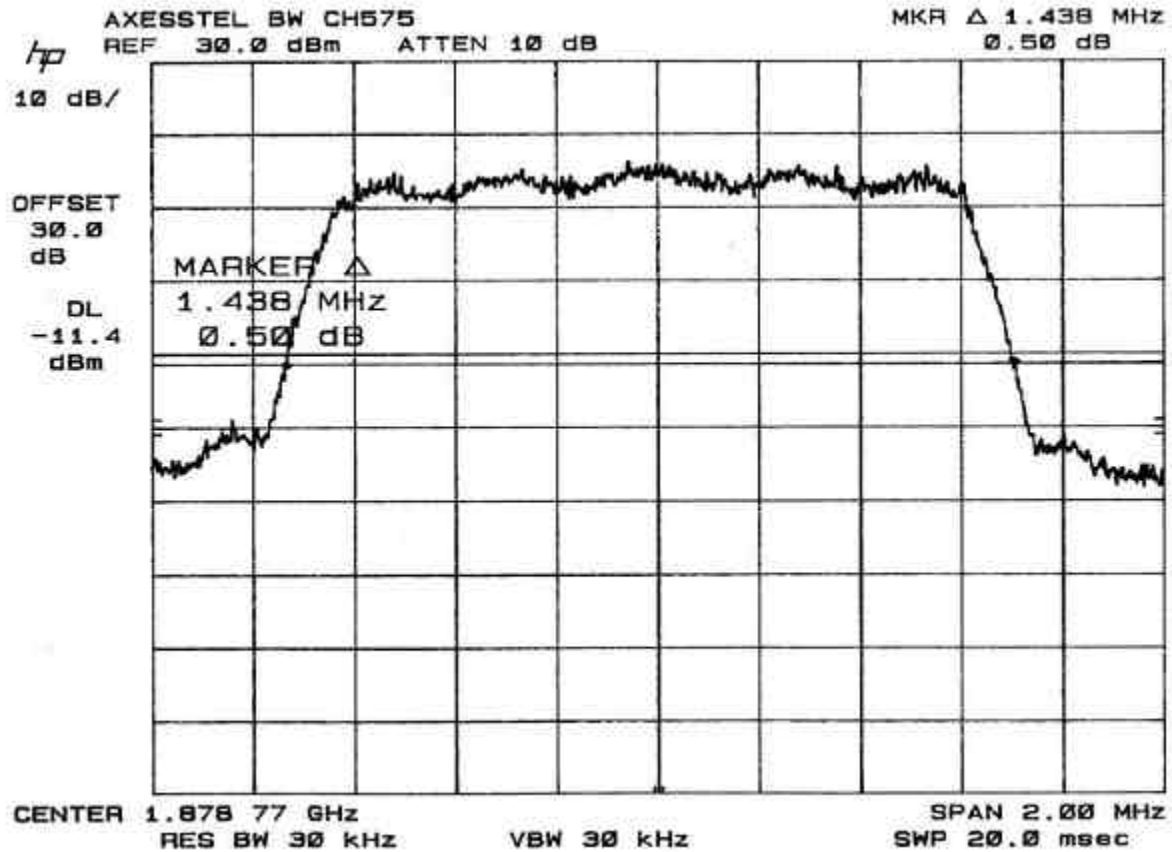
Channel 25 :1.426 MHz

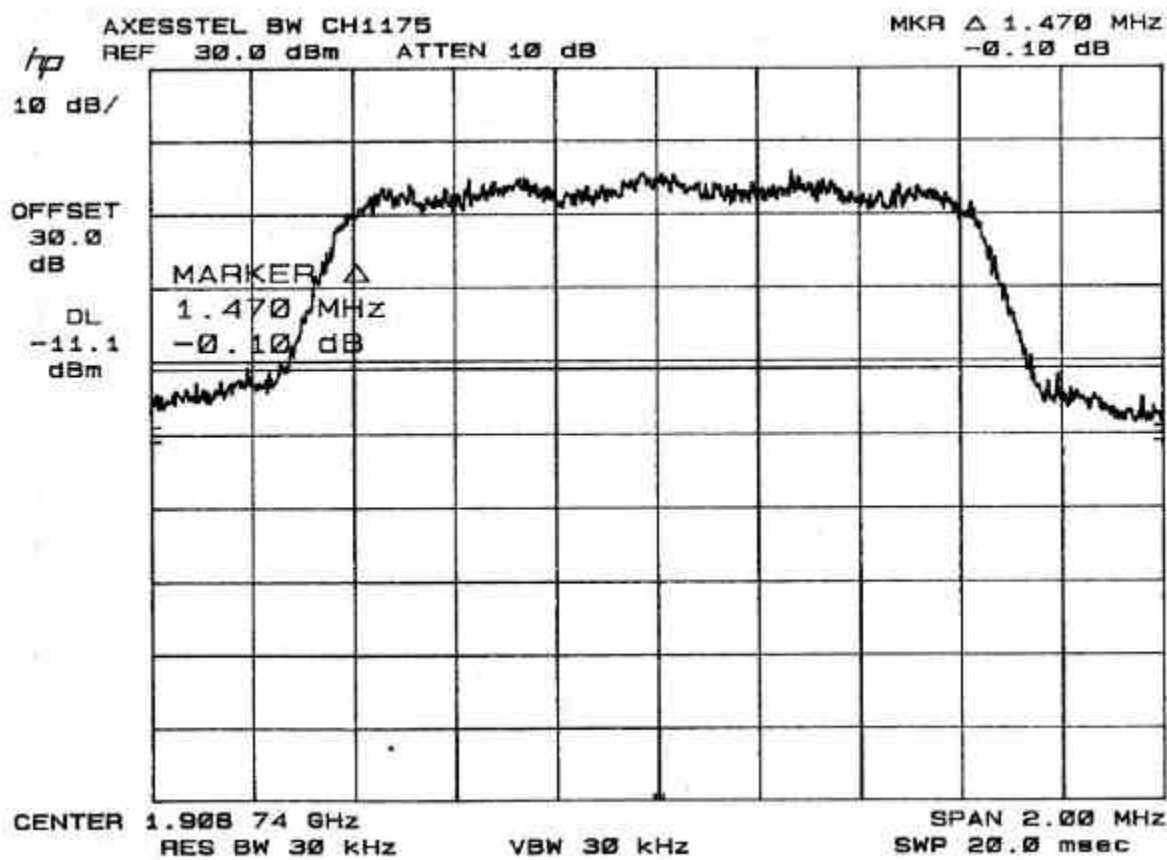
Channel 575:1.438 MHz

Channel 1175:1.470 MHz

Plots of the EUT's output bandwidth are shown below.







SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

Minimum Standard:

FCC 24.238(a); On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. Limit equivalent to -13 dBm, calculation shown below.

$$43 + 10 \log (0.4864W) = 39.87\text{dB}$$
$$26.87\text{dBm} - 39.87\text{dB} = -13\text{dBm}$$

FCC 24.238(b):

Compliance with the out-of-band emissions requirement is based on test being performed with an analyzer resolution bandwidth of 1 MHz. However in the 1 MHz band immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the fundamental emissions bandwidth may be employed.

CDMA:

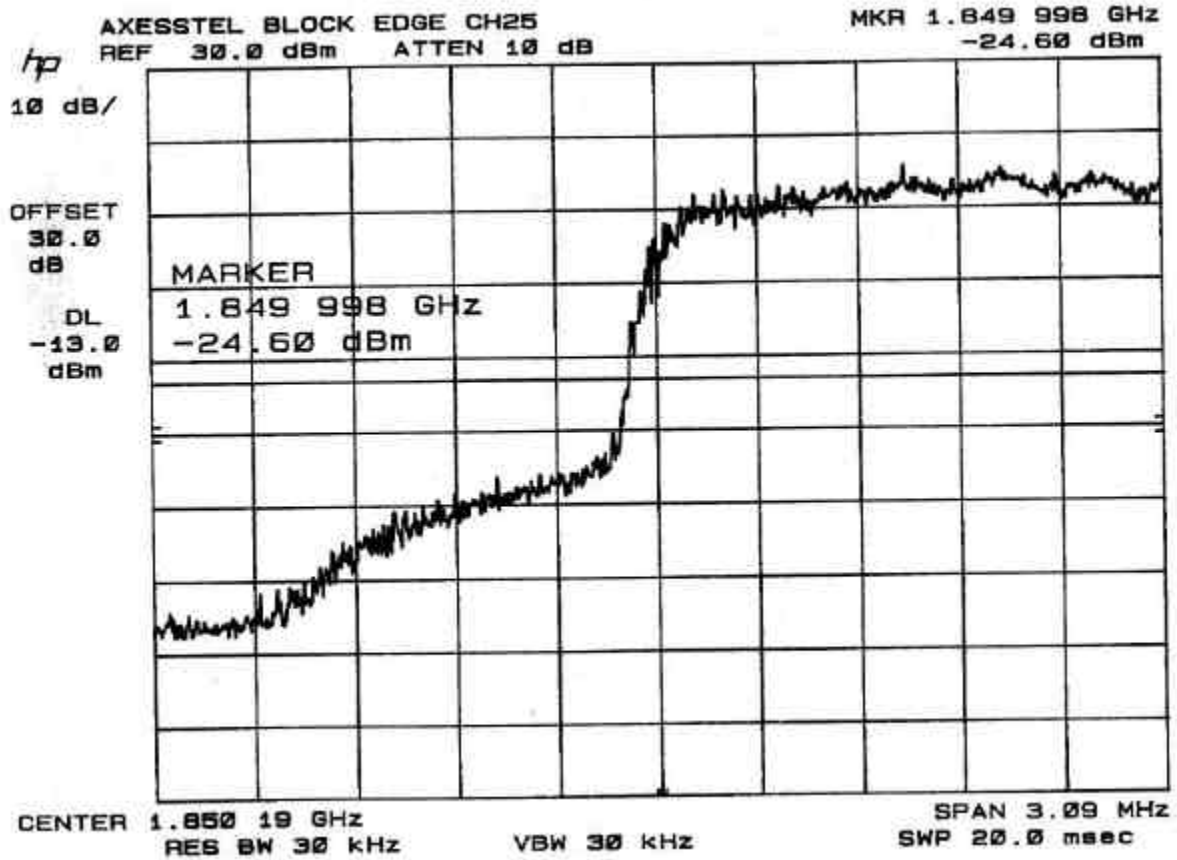
$0.01 \times 1.43 = 14.3$ kHz. A RES BW of 30 kHz was used for measurement at the block edges.

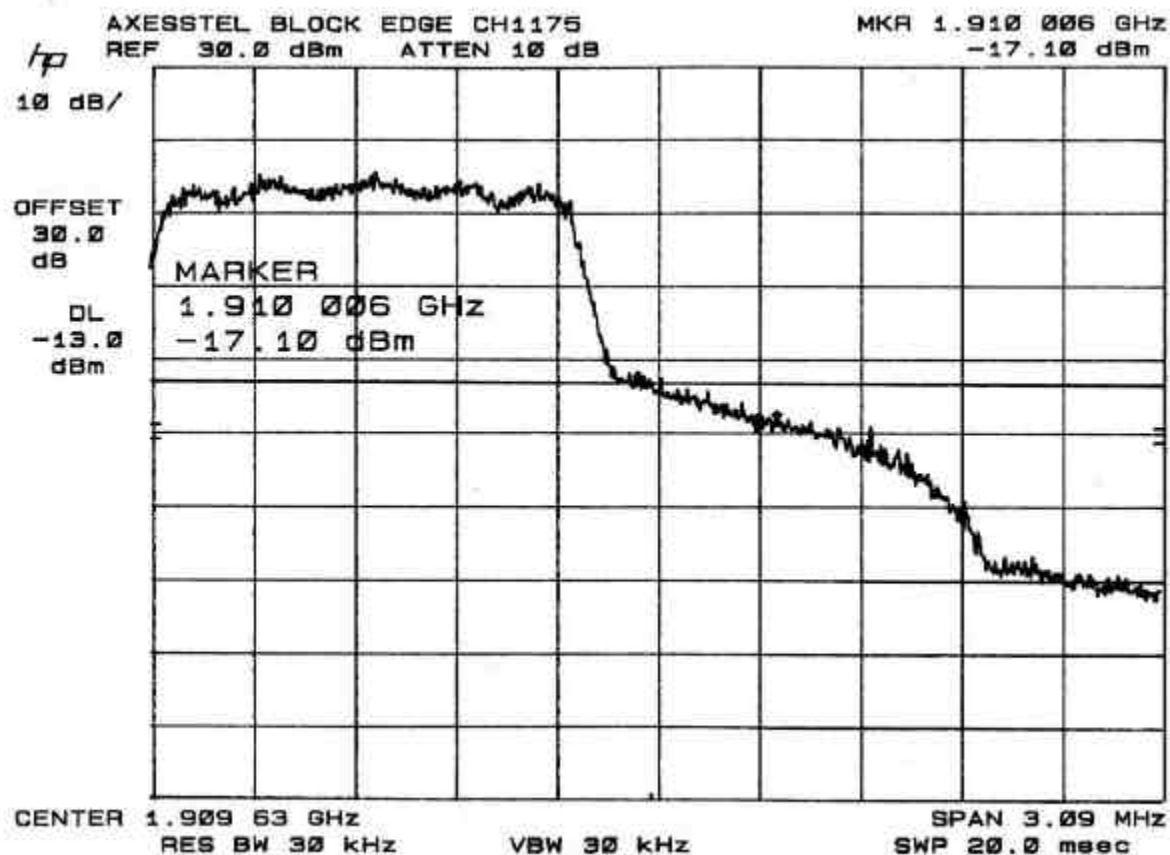
Test Procedure:

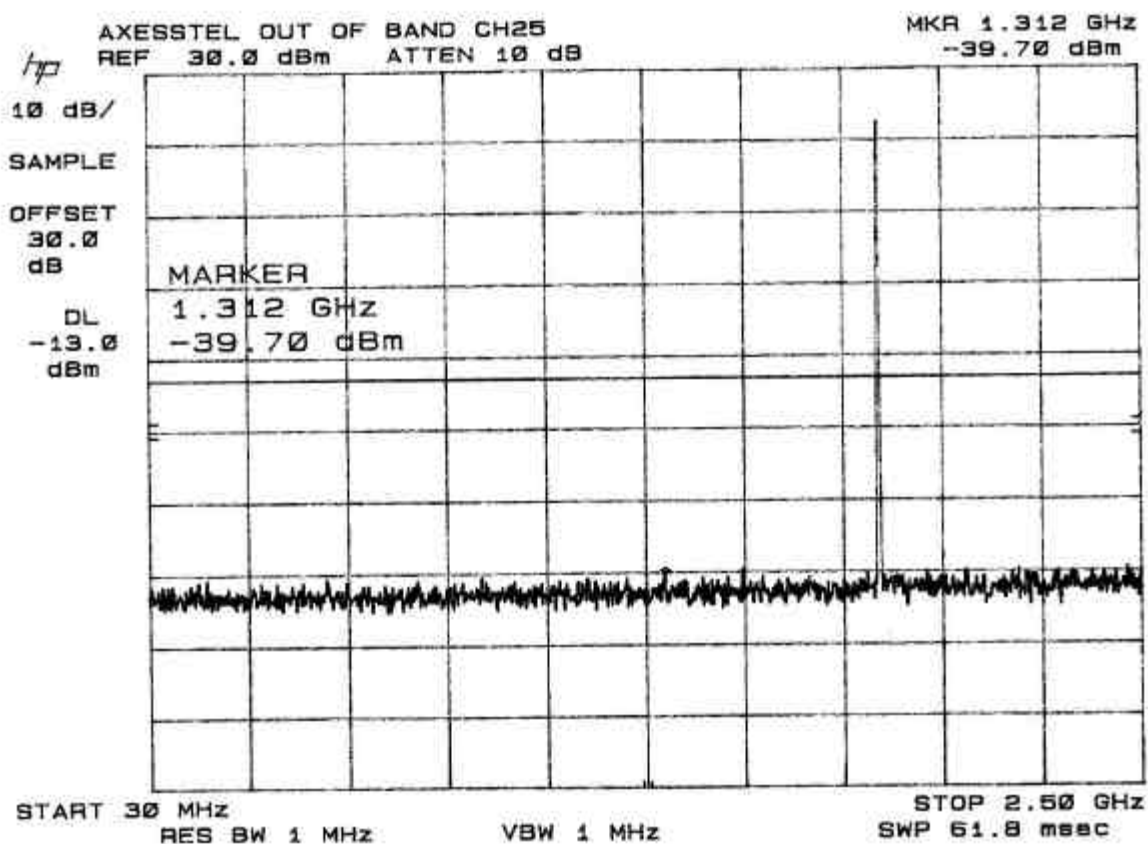
The EUT was setup to maximum output power. A spectrum analyzer was used to scan from 30 MHz to 20GHz. A display line was placed at -13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements. The base station frequency range was scanned while the EUT operated at its highest channel.

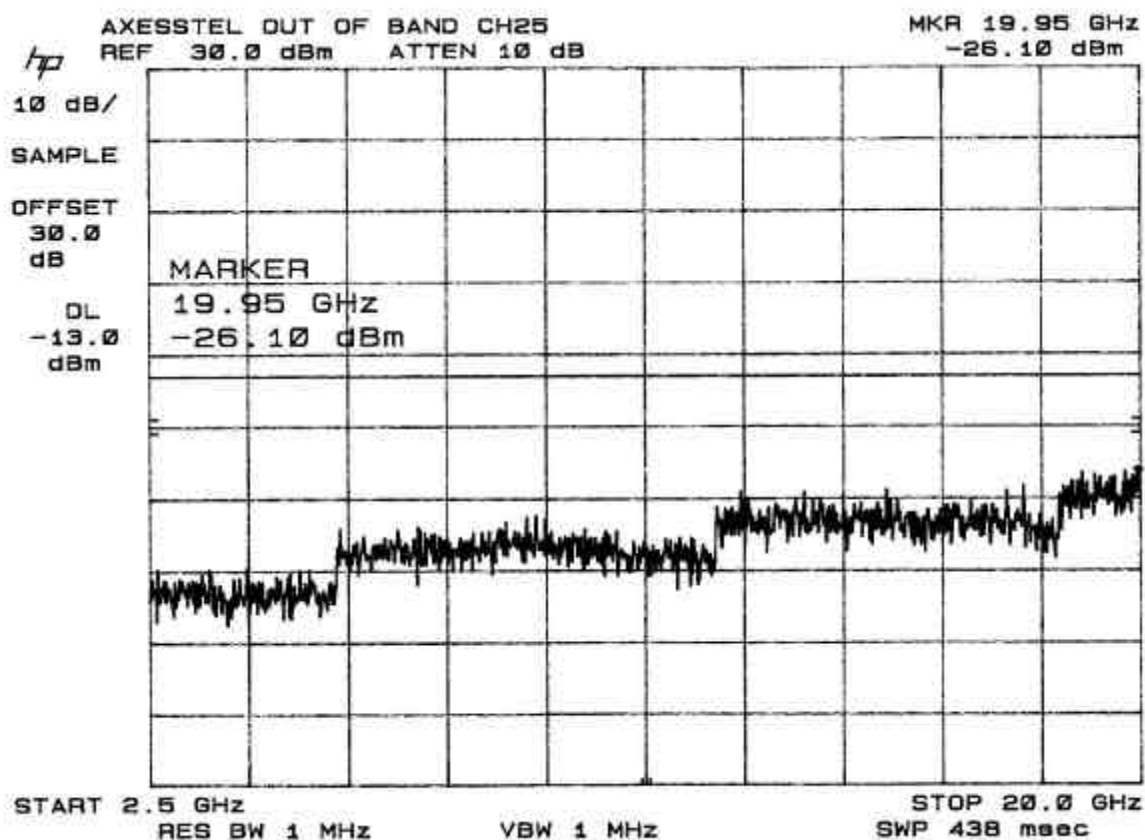
Test Results:

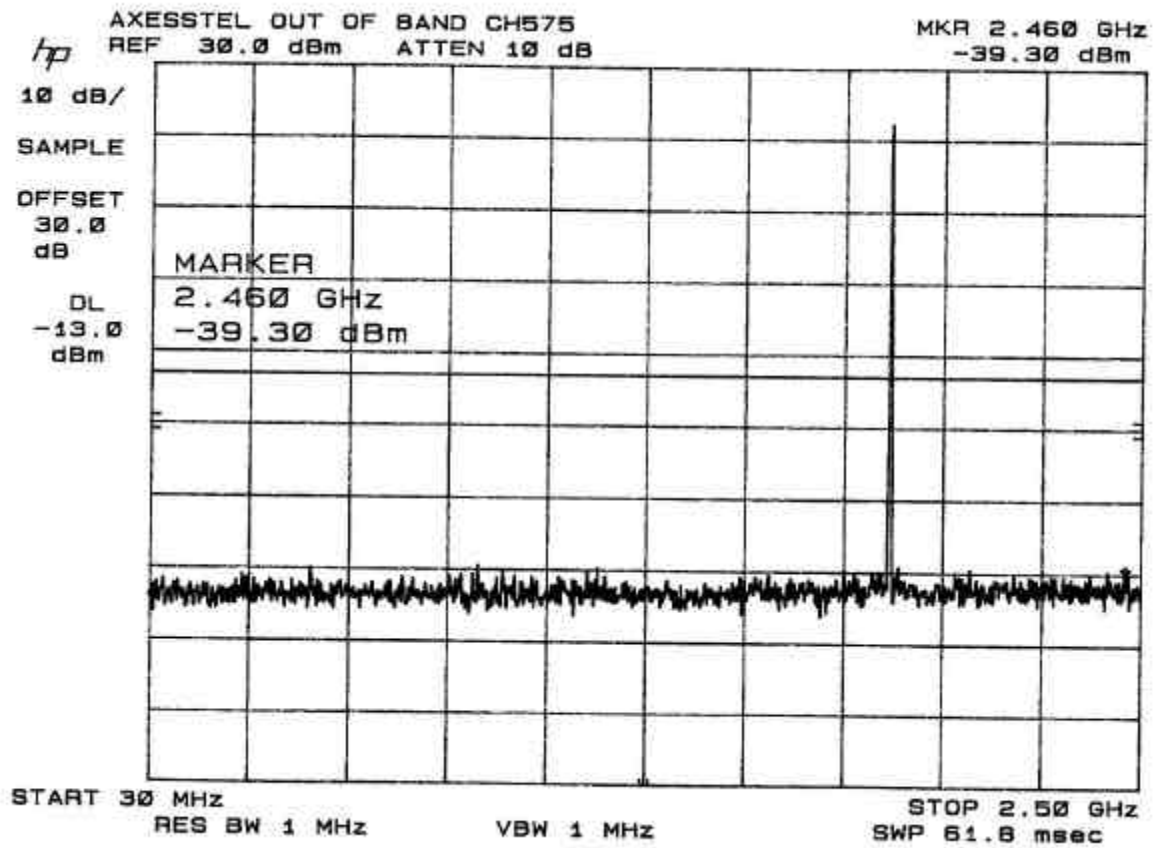
Complies. Plots are shown below.

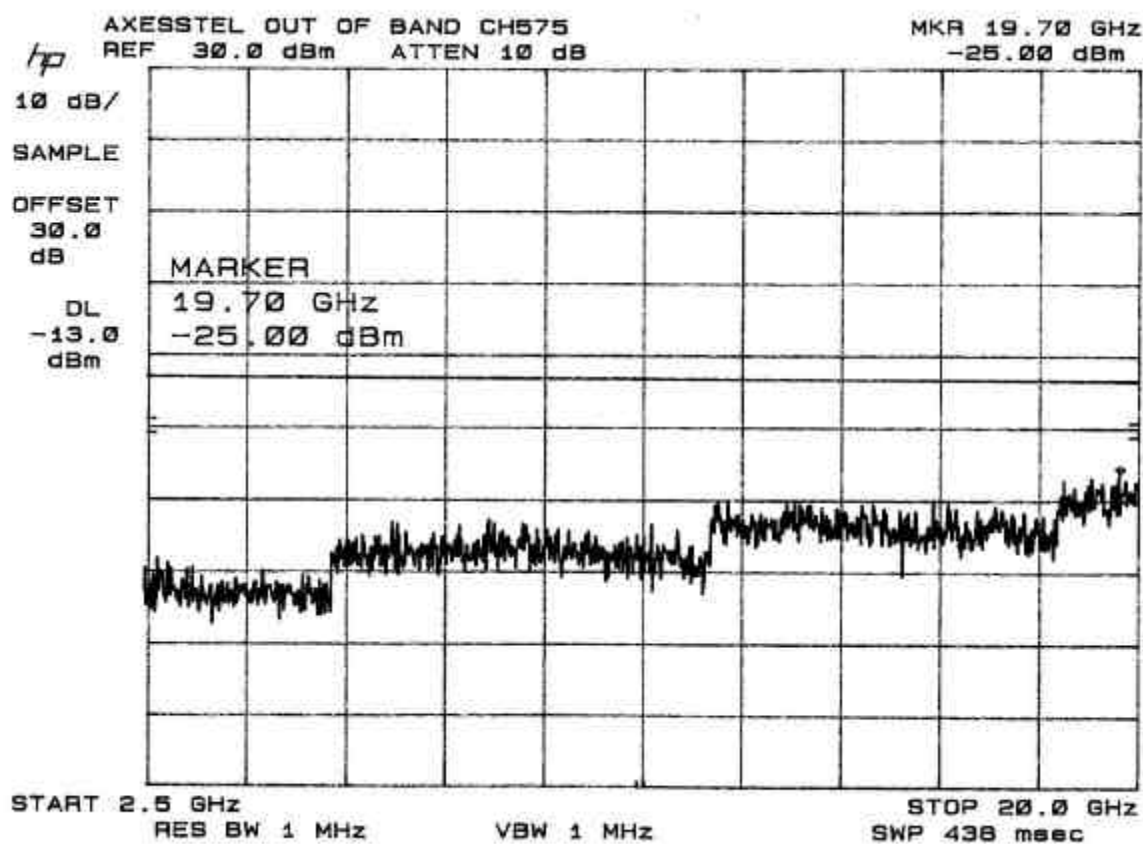


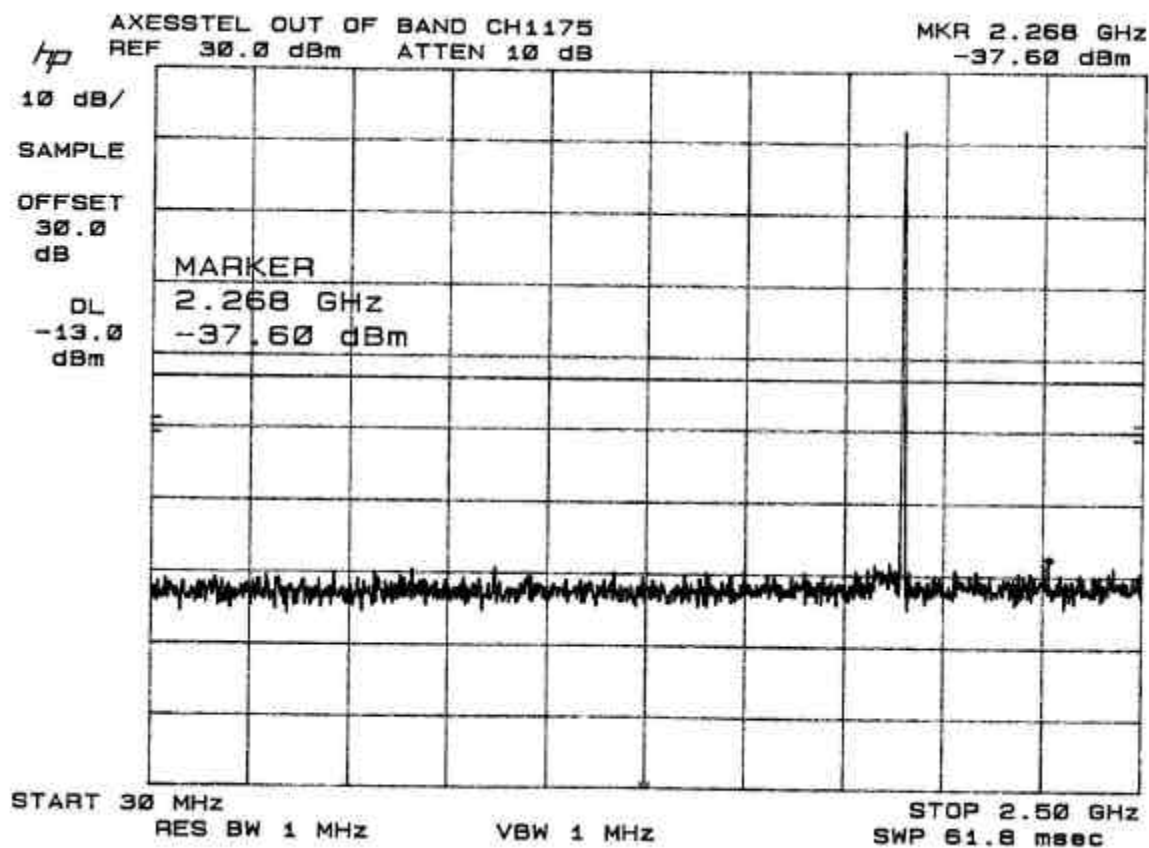


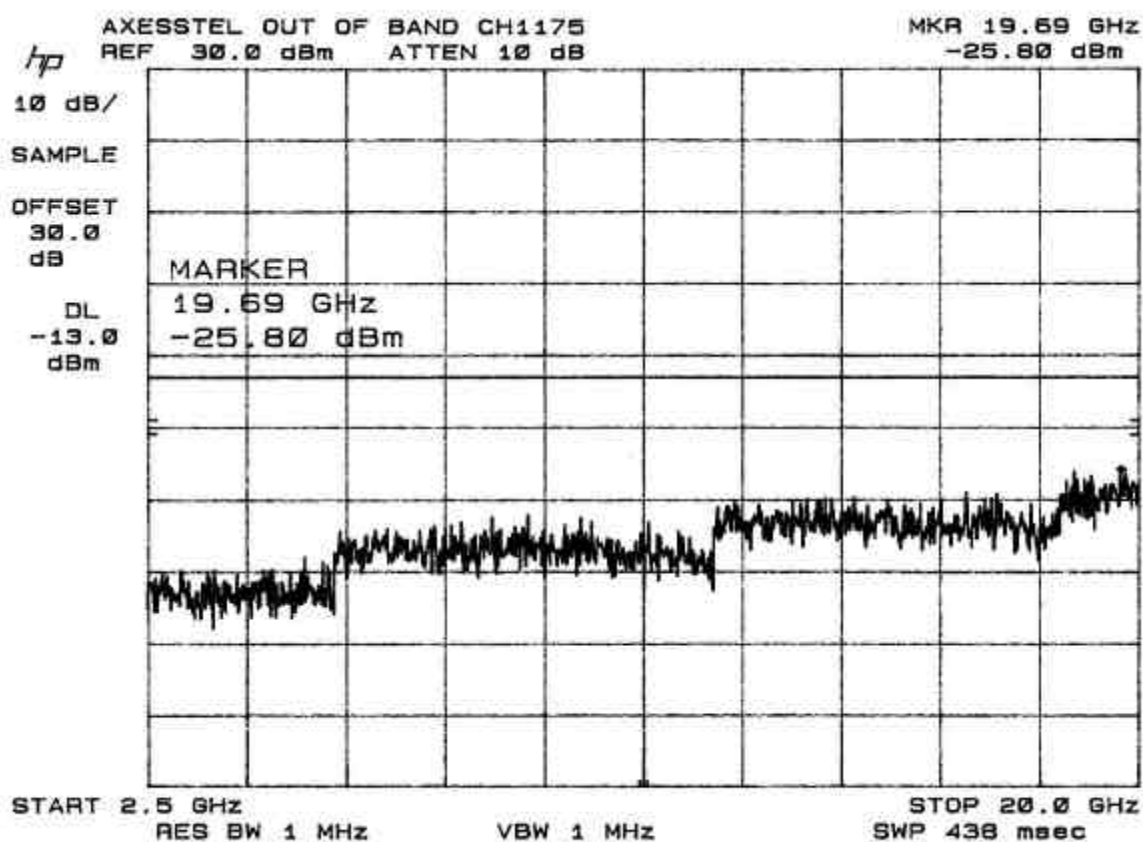


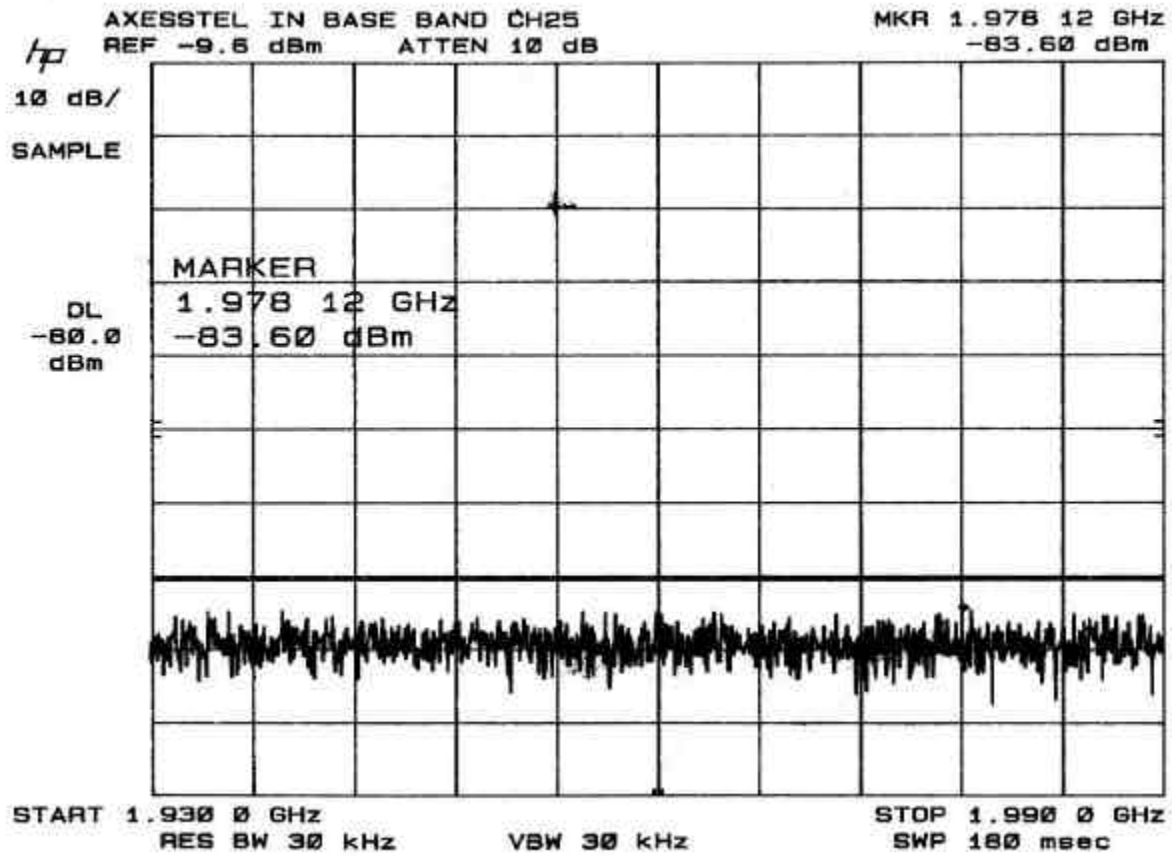


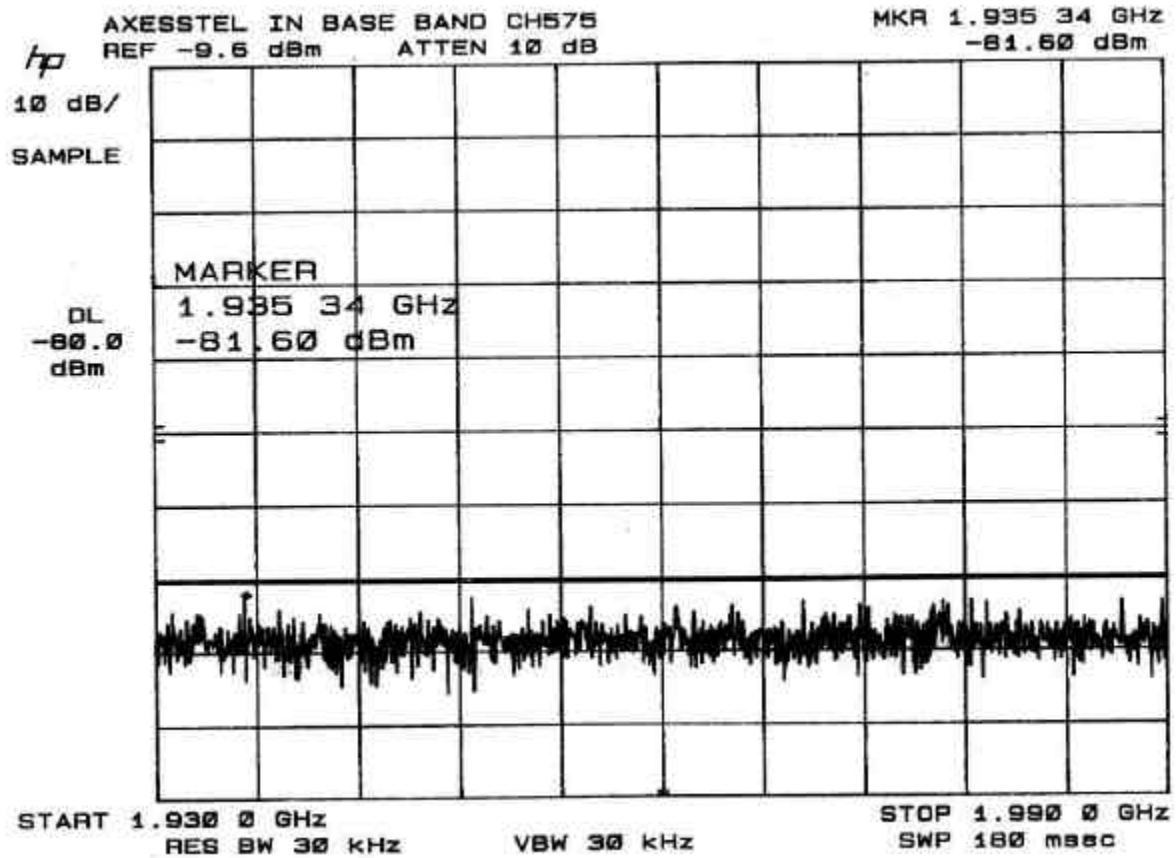


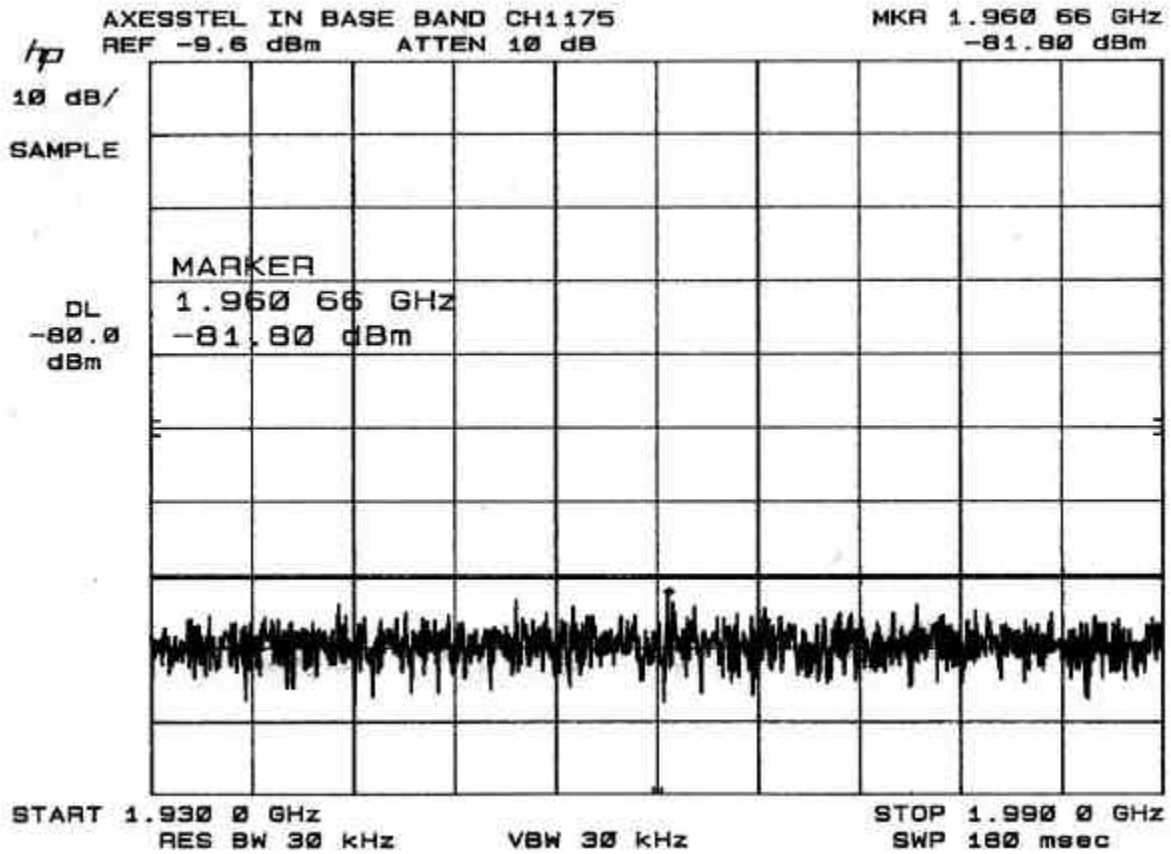










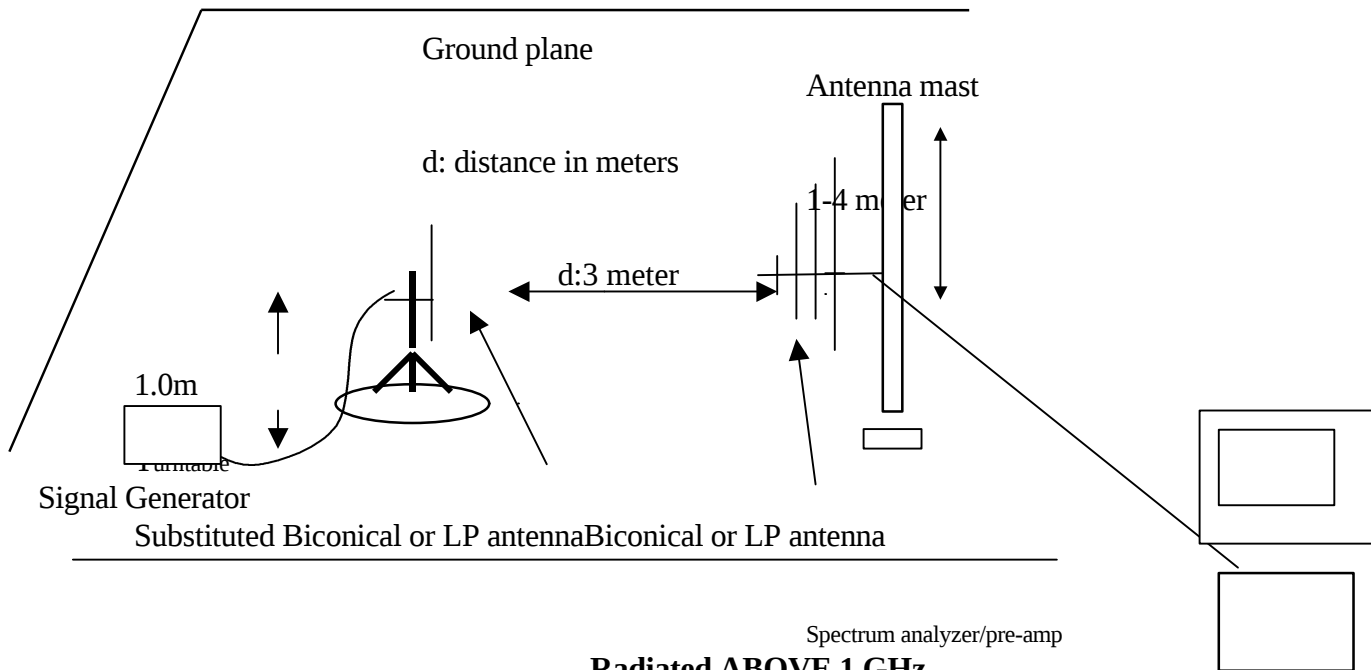


SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION

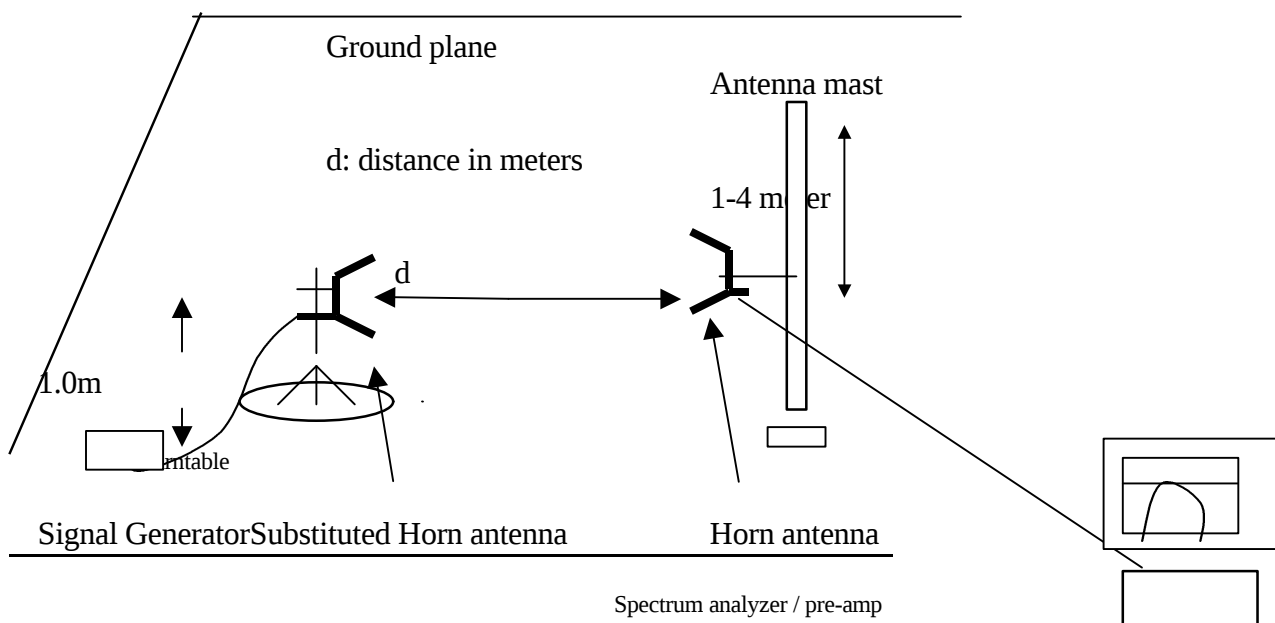
SUBSTITUTION METHOD: (Radiated Emissions)

Test Set-up:

Radiated BELOW 1GHz



Radiated ABOVE 1 GHz



The actual signal generated by the measured equipment may be determined by means of a substitution measurement in which a known signal source replaces the device to be measured.

The substitution antenna will replace the EUT antenna in the same position and in vertical polarization. The frequency of the signal generator shall be set to the frequencies that were measured on the EUT. The test antenna shall be raised and lowered, if necessary, to ensure that the maximum signal is still being received. The signal generator, output level, shall be adjusted until an equal or a known related level to what was measured from the EUT is obtained in the spectrum analyzer.

The radiated power is equal to the power supplied by the signal generator

The formula, to calculate the true reading, is: True reading = dBm + GdBd - CL

dBm = signal generator output level

GdBd = the gain in dBd of the substitution antenna

CL = the cable loss

The calculated True reading is then compared to the limit and should not exceed the limit. This method must be performed for every emission measured from the EUT. This shall also be repeated for horizontal polarization.

Minimum Requirement:

The magnitude of each spurious and harmonic emissions detected as being radiated from the EUT must be at a level no more than $43 + 10 \log$ (mean output power, watts) dB below the mean power output.

Test procedure:

EUT's antenna port was terminated with a 50-ohm load. The EUT was placed on a wooden table on the outdoor ground plane. The search antenna was placed 1 meter from the EUT. The EUT was setup to its maximum output power at its lowest channel. All spurious emissions were measured. The measurements are repeated for the highest and a middle channel.

Test Result:

Complies. Spreadsheet shown below.

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1851	17.03	1.4	7.98	23.61	33.01	-9.4
3702	-37.0	1.4	9.25	-29.15	-13	-16.15
5553	-44.9	1.75	9.35	-37.3	-13	-24.3
7404	-31.7	1.9	9.15	-24.45	-13	-11.45
9255	-30.6	2.15	9.35	-23.40	-13	-10.40
11106	-27.8	2.4	10.35	-19.85	-13	-6.85
12957	-22.4	2.65	11.05	-14.00	-13	-1.00
14808	-25.2	3.0	11.35	-16.85	-13	-3.85
16659	-33.8	3.25	11.95	-25.10	-13	-12.10
18510	-32.0	3.65	10.35	-25.30	-13	-12.30

CH25, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1851	4.53	1.4	7.98	11.11	33.01	-21.90
3702	-40.0	1.4	9.25	-32.15	-13	-19.15
5553	-45.1	1.75	9.35	-37.50	-13	-24.50
7404	-25.8	1.9	9.15	-18.55	-13	-5.55
9255	-24.5	2.15	9.35	-17.30	-13	-4.30
11106	-23.7	2.4	10.35	-15.75	-13	-2.75
12957	-26.9	2.65	11.05	-18.50	-13	-5.50
14808	-26.7	3.0	11.35	-18.35	-13	-5.35
16659	-33.8	3.25	11.95	-25.10	-13	-12.10
18510	-33.5	3.65	10.35	-26.80	-13	-13.80

CH25, Horizontal

RBW=1MHz

VBW=1MHz

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1879	16.43	1.4	7.98	23.01	33.01	-10.00
3757	-39.5	1.4	9.25	-31.65	-13	-18.65
5636	-49.5	1.75	9.35	-41.90	-13	-28.90
7516	-30.0	1.9	9.15	-22.75	-13	-9.75
9395	-29.5	2.15	9.35	-22.30	-13	-9.30
11274	-27.0	2.4	10.35	-19.05	-13	-6.05
13152	-34.2	2.65	11.05	-25.80	-13	-12.80
15031	-35.4	3.0	11.35	-27.05	-13	-14.05
16910	-40.0	3.25	11.95	-31.30	-13	-18.30
18789	-38.0	3.65	10.35	-31.30	-13	-18.30

CH575, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1879	3.33	1.4	7.98	9.91	33.01	-23.10
3757	-37.1	1.4	9.25	-29.25	-13	-16.25
5636	-49.0	1.75	9.35	-41.40	-13	-28.40
7516	-30.8	1.9	9.15	-23.55	-13	-10.55
9395	-30.3	2.15	9.35	-23.10	-13	-10.10
11274	-29.5	2.4	10.35	-21.55	-13	-8.55
13152	-24.5	2.65	11.05	-16.10	-13	-3.10
15031	-25.9	3.0	11.35	-17.55	-13	-4.55
16910	-30.0	3.25	11.95	-21.30	-13	-8.30
18789	-28.0	3.65	10.35	-21.30	-13	-8.30

CH575, Horizontal

RBW=1MHz

VBW=1MHz

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1908	17.00	1.4	7.98	23.58	33.01	-9.43
3816	-38.7	1.4	9.25	-30.85	-13	-17.85
5724	-57.0	1.75	9.35	-49.40	-13	-36.40
7632	-32.6	1.9	9.15	-25.35	-13	-12.35
9540	-26.7	2.15	9.35	-19.50	-13	-6.50
11448	-24.6	2.4	10.35	-16.65	-13	-3.65
13356	-24.0	2.65	11.05	-15.60	-13	-2.60
15264	-29.5	3.0	11.35	-21.15	-13	-8.15
17172	-30.0	3.25	11.95	-21.30	-13	-8.30
19.080	-30.0	3.65	10.35	-23.30	-13	-10.30

CH1175, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1908	4.23	1.4	7.98	10.81	33.01	-22.20
3816	-39.5	1.4	9.25	-31.65	-13	-18.65
5724	-52.7	1.75	9.35	-45.10	-13	-32.10
7632	-28.8	1.9	9.15	-21.55	-13	-8.55
9540	-25.6	2.15	9.35	-18.40	-13	-5.40
11448	-24.2	2.4	10.35	-16.25	-13	-3.25
13356	-23.3	2.65	11.05	-14.90	-13	-1.90
15264	-27.5	3.0	11.35	-19.15	-13	-6.15
17172	-30.0	3.25	11.95	-21.30	-13	-8.30
19.080	-30.0	3.65	10.35	-23.30	-13	-10.30

CH1175, Horizontal

RBW=1MHz

VBW=1MHz

SECTION 2.1055: FREQUENCY STABILITY

SECTION 24.235: FREQUENCY STABILITY

Minimum standard:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure frequency/temperature:

The EUT was setup in a temperature chamber. The EUT was setup to its maximum output power at its lowest channel and highest channel. The temperature was varied in 10 degree steps from -30° C to +50° C. Enough time was allowed for the EUT's temperature to stabilize at each temperature. A spectrum analyzer was used to measure the frequency tolerance and block edge emissions. The procedure described in the Spurious Emissions at Antenna Terminal section for measuring block emissions was used.

Test Procedure frequency/voltage AC:

Band Edge emissions were measured with the AC voltage to the EUT's SMPS adjusted to 85% and 115% of nominal. The procedure described in the Spurious Emissions at Antenna Terminal section for measuring block emissions was used.

Test Results:

Temperature	Delta from assigned frequency kHz
-30 Celsius Centigrade	-0.50
-20 Celsius Centigrade	-0.48
-10 Celsius Centigrade	-0.38
0.0 Celsius Centigrade	-0.28
10 Celsius Centigrade	-0.80
20 Celsius Centigrade	0.0
30 Celsius Centigrade	0.0
40 Celsius Centigrade	0.46
50 Celsius Centigrade	0.65
Voltage:	
93.5 VAC	0.48
138 VAC	0.74
Battery end point :	
7.6 VDC	0.0