

**FCC CFR47 PART 22 SUBPART H
CERTIFICATION REPORT**



FOR

CDMA WLL (Wireless Local Loop) PHONE TERMINAL, 800MHz

MODEL NAME: ACW-T800

BRAND NAME: AXESSTEL

FCC ID: PH7ACWT800

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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REPORT REVISION HISTORY

Date	Revision	Page No

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TEST RESULT CERTIFICATION

COMPANY NAME: AXES STEL, 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, 800MHZ

MODEL NAME: ACW-T800

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 22
MEASUREMENT PROCEDURE	FCC Parts 2, 22 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 22. 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:

Tested By:

FRANK IBRAHIM
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

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: PH7ACWT800

2.1033(c)(3) Instructions/Installation Manual

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

2.1033(c)(4) Type of Emissions

1M40F9W

2.1033(c)(5) Frequency Range

Transmit: **824.64MHz to 848.37MHz**

Receive: **869.64MHz to 893.37MHz**

2.1033(c)(6) Range of Operation Power

< -50dBm to 30dBm,

< 0.00001WATTS to 1.0 WATTS.

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 Page 21 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-T800 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 824 MHz to 849 MHz and receives from 869 MHz to 894 MHz. The RF power is rated at 1W. The omni-directional dipole antenna has a rated gain of 3.0dBi.

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))

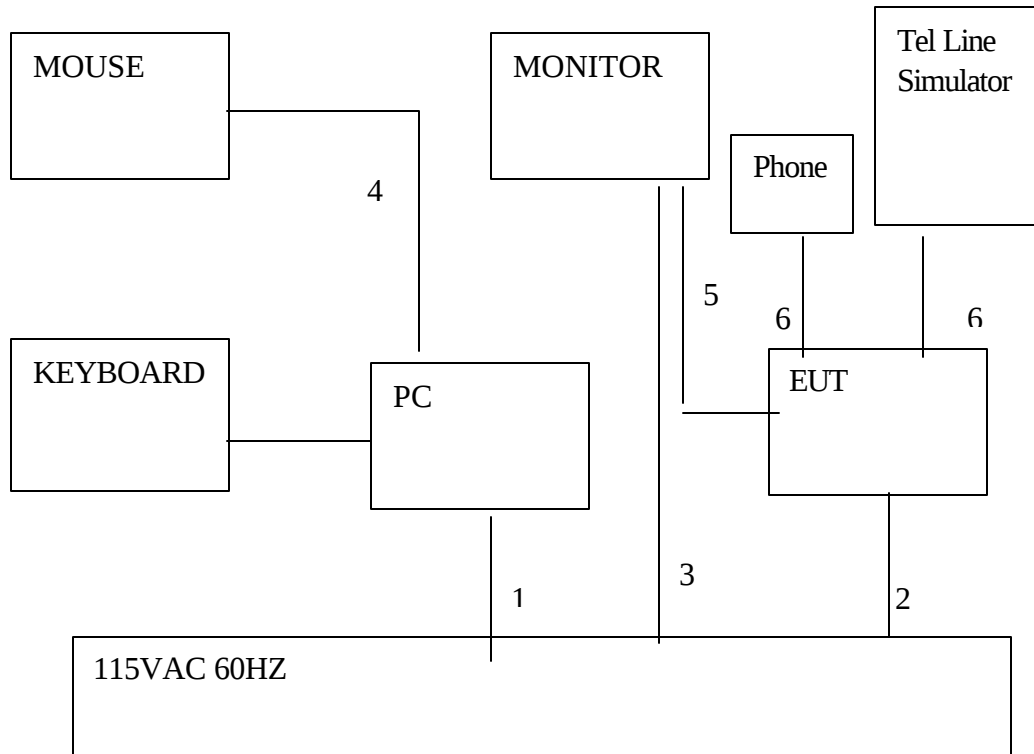
MEASURING INSTRUMENT CALIBRATION

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

RADIATED EMISSION

		Project #: 01U1011-1 Report #: 011024b Date & Time: 10/25/01 12:12 PM Test Engr: Hue Ly Vang									
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											
Company: Axceltel Inc. EUT Description: CDMA WLL Phone Terminal Test Configuration: EUT/Laptop/Mouse/Phone Type of Test: FCC Class B Mode of Operation: Dialing through RS232 / Talking											
☐ A-Site		☒ B-Site									
☐ C-Site		☐ F-Site									
6 Worst Data		Descending									
Freq (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
53.89	51.60	5.47	1.81	29.66	29.21	40.00	-10.79	3mV	99.00	1.00	P
266.00	46.50	12.04	3.51	28.89	33.16	46.00	-12.84	3mV	90.00	1.00	P
45.00	50.00	10.36	1.67	29.68	32.35	40.00	-7.65	3mH	190.00	1.00	P
212.00	50.50	9.34	3.07	29.08	33.83	43.50	-9.67	3mH	90.00	1.00	P
218.00	49.50	9.80	3.12	29.05	33.36	46.00	-12.64	3mH	90.00	1.00	P
266.00	51.10	12.78	3.51	28.89	38.50	46.00	-7.50	3mH	90.00	1.00	P
Total data #: 6											
V.2b											

CONDUCTED EMISSION

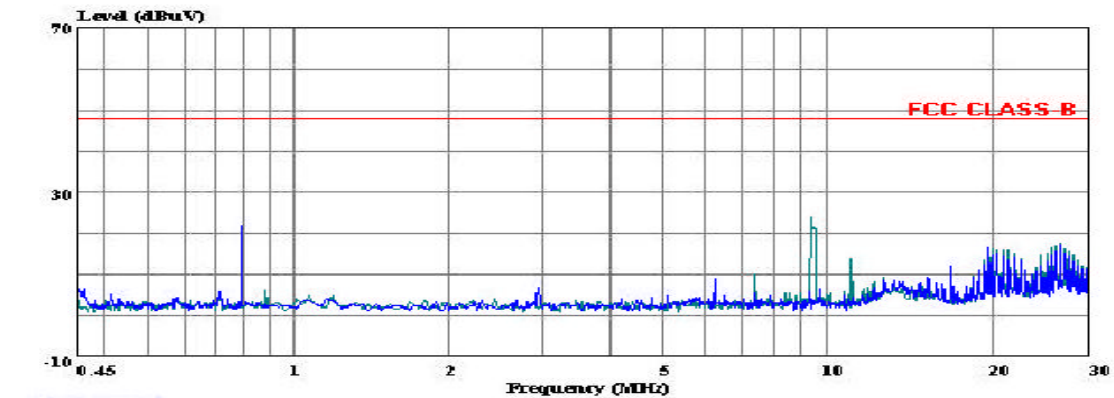
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit		Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
9.45	23.98	--	--		48.00		-24.02		L1
9.61	21.34	--	--		48.00		-26.66		L1
26.67	17.76	--	--		48.00		-30.24		L1
0.89	21.88	--	--		48.00		-26.12		L2
19.71	16.75	--	--		48.00		-31.25		L2
26.67	17.25	--	--		48.00		-30.75		L2
6 Worst Data									

LINE CONDUCTION PLOT



561F Monterey Road,
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 12 File#: Lc1.emi Date: 11-08-2001 Time: 17:14:12



(Auxiliary ATC)

Trace: 8

Ref Trace:

Report : 011108LC
Project# : 01u1010-1
Tested By : Frank Ibrahim
Manufacture : Axesstel, Inc.
EUT Description : CDMA WLL Phone Terminal
Model : ACW-T800
Test Config. : EUT, PC, monitor, mouse, KB, phone,
Telephone line simulator
Test Target : FCC Class B
Mode of Operation: EUT standby
115VAC, 60Hz
peak : L1 (Green), L2 (Blue)

SETUP PHOTOS



Radiated Emissions Setup, Front View



Radiated Emissions Setup, Rear View



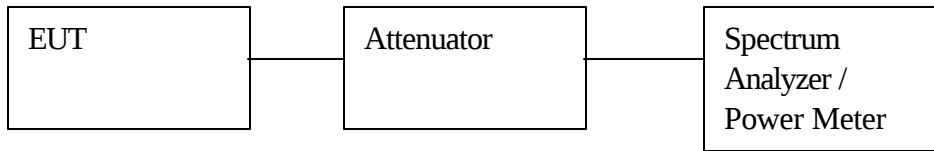
Conducted Emissions Setup, Front View



Conducted Emissions Setup, Rear View

FCC PART 2 CERTIFICATION TEST RESULTS:

Test Set-up for the following conducted tests:



SECTION 2.1046: RF POWER OUTPUT

Section 22.913 (a); Maximum ERP. The effective radiated power (ERP) of mobile transmitters must not exceed 7 Watts

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. The ERP is then calculated by adding the EUT's antenna's gain in dBd to the EUT's power in dBm. The EUT's antenna gain was rated at 3.0dBi.
 $3.0\text{dBi} - 2.2\text{dB} = +0.8\text{dBd}$ is used for calculating ERP

Test Result:

Complies.

Calculations are shown below:

Conducted measurements:

Channel 29 : $26.81\text{dBm} + 0.8 = 27.61\text{dBm}$ ERP or 577mW ERP

Channel 365 : $27.21\text{dBm} + 0.8 = 28.01\text{dBm}$ ERP or 632mW ERP

Channel 750 : $26.68\text{dBm} + 0.8 = 27.48\text{dBm}$ ERP or 560mW ERP

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.

FCC 22.915: Modulation Requirement:

Cellular systems must be capable of providing service using the types of modulation described in the cellular system compatibility specification.

For a description of the modulation system see Attachment: *Circuit Description, Description of modulation system used.*

SECTION 2.1049: OCCUPIED BANDWIDTH

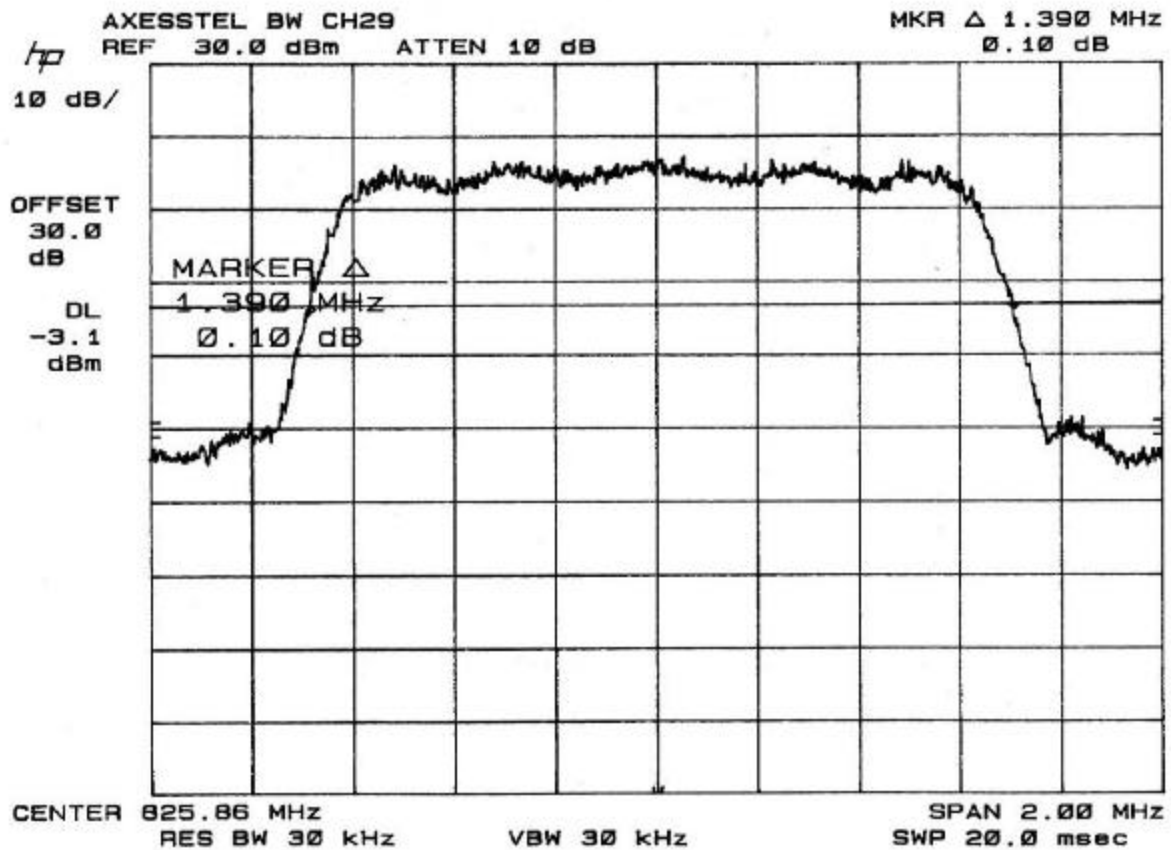
Test Procedure:

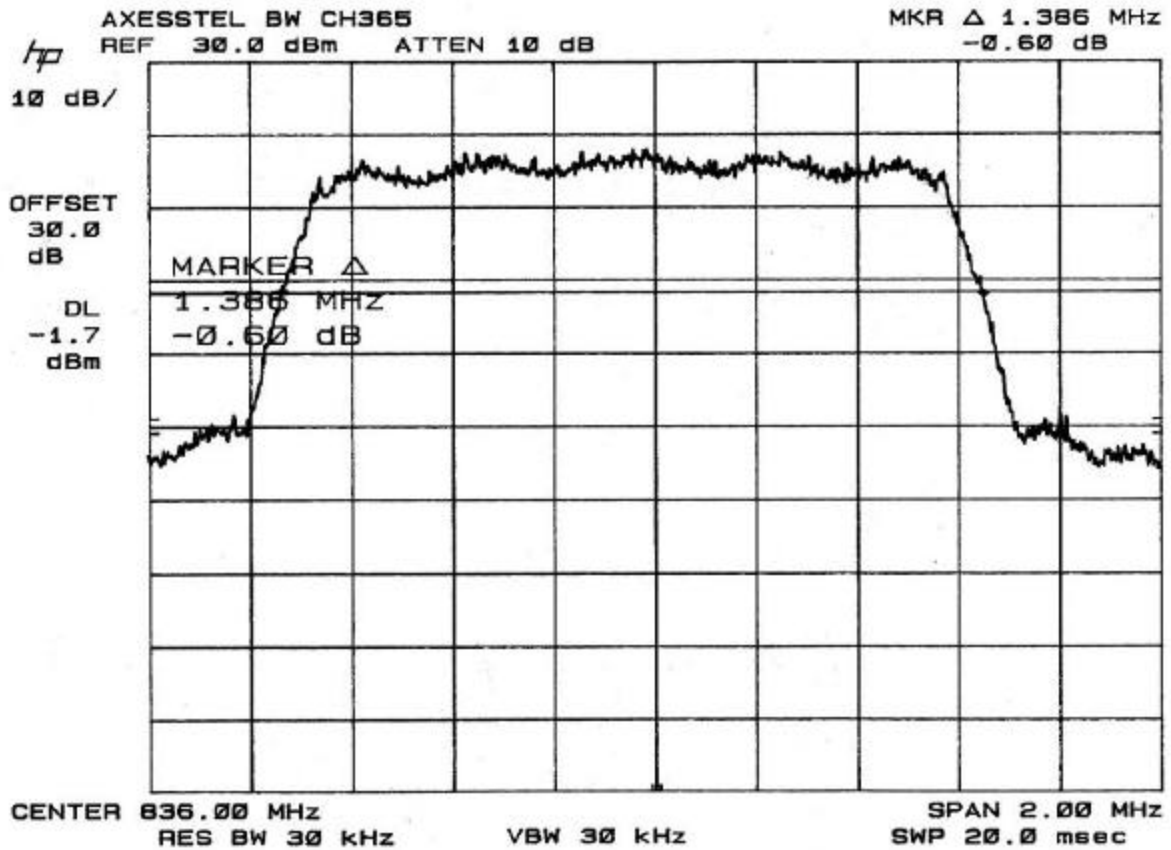
The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 20 dB below the transmitter power.

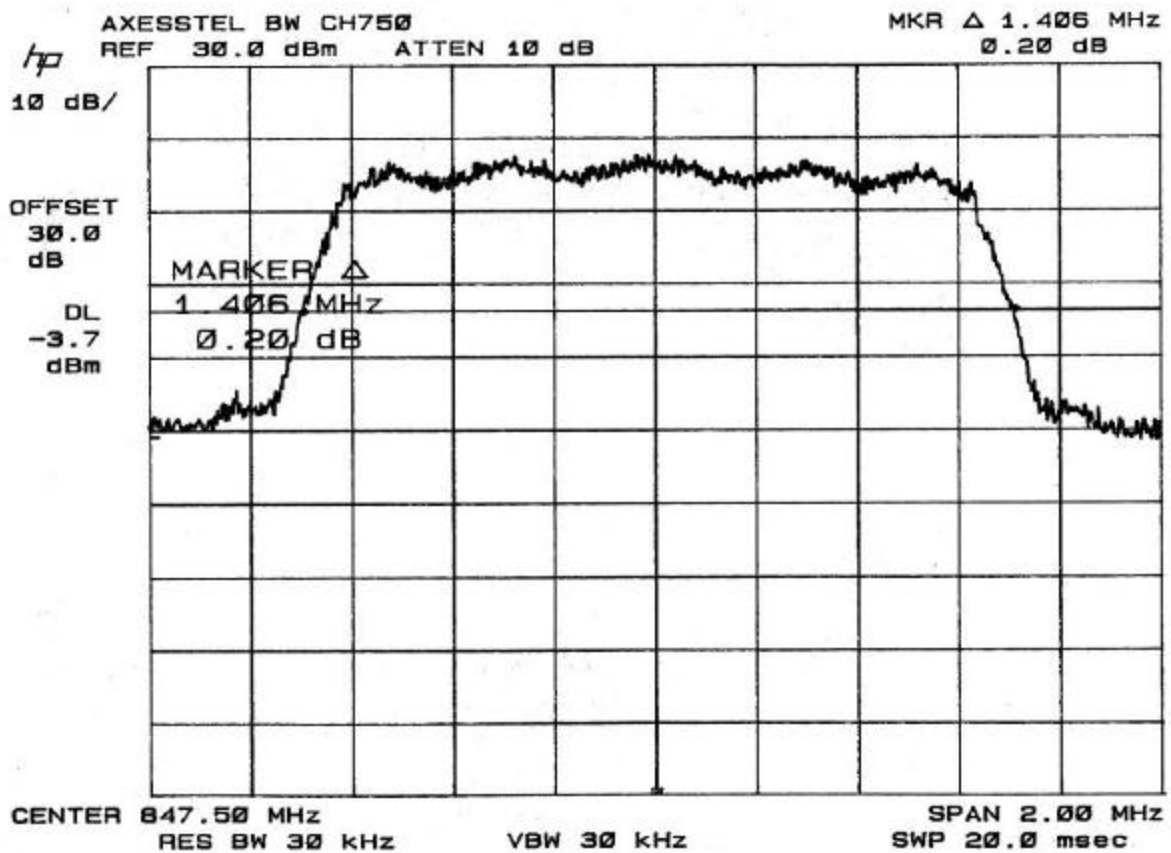
Test Result:

Channel 29 : 1.390 MHz
Channel 365: 1.386 MHz
Channel 750: 1.406 MHz

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







SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

22.917(e); The mean power of emissions must be attenuated below the mean power (P) of the unmodulated carrier by at least $43 + 10 \log (P)$ dB. Limit equivalent to -13 dBm.

22.917(f) Mobile emissions in the base band:

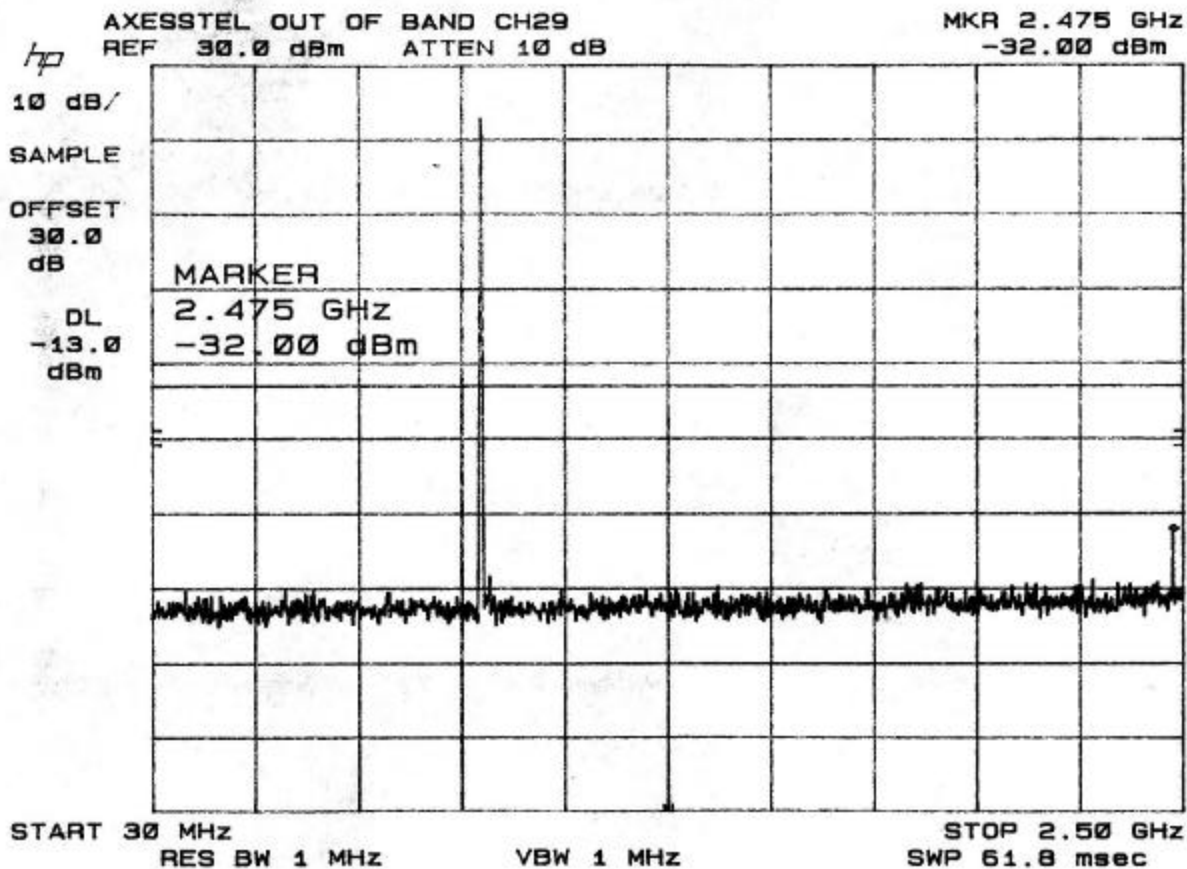
The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitter operated must be attenuated to a level not to exceed -80 dBm at the antenna connector.

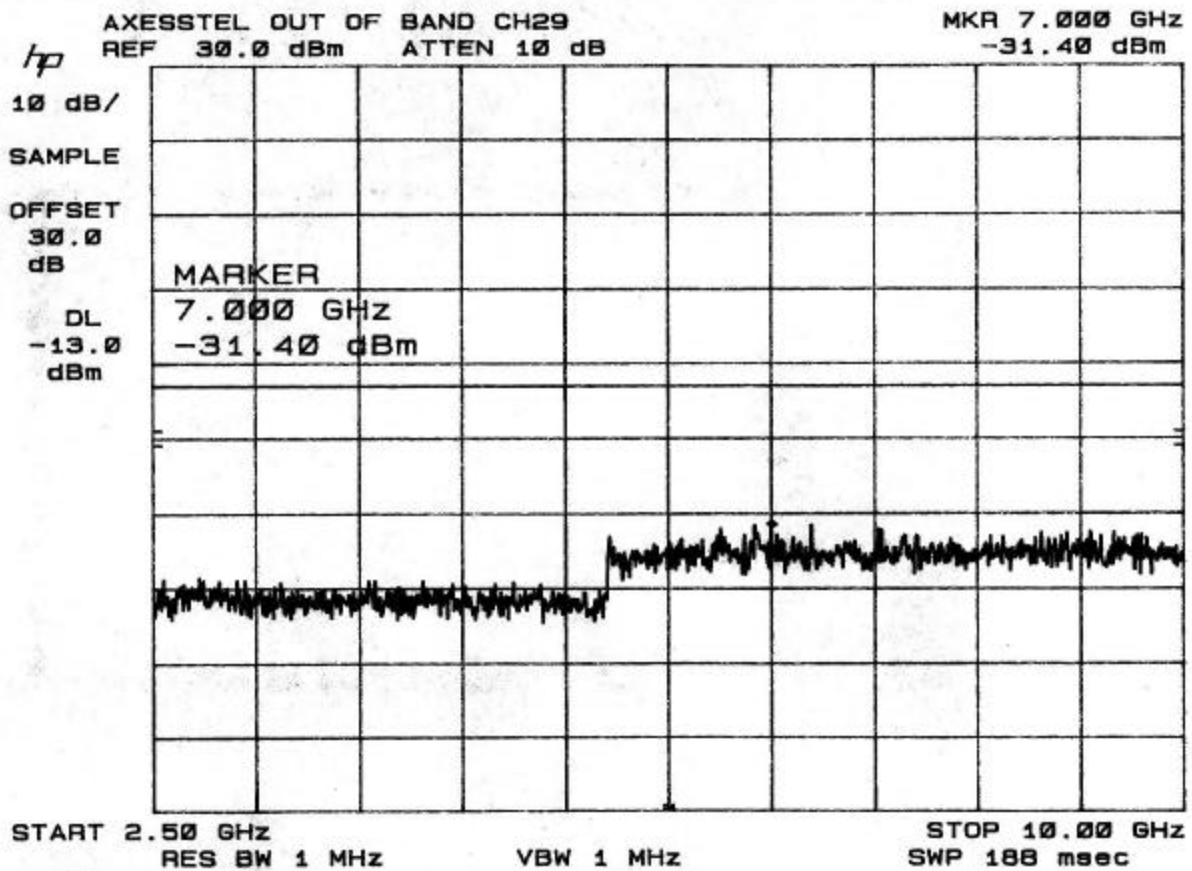
Test Procedure:

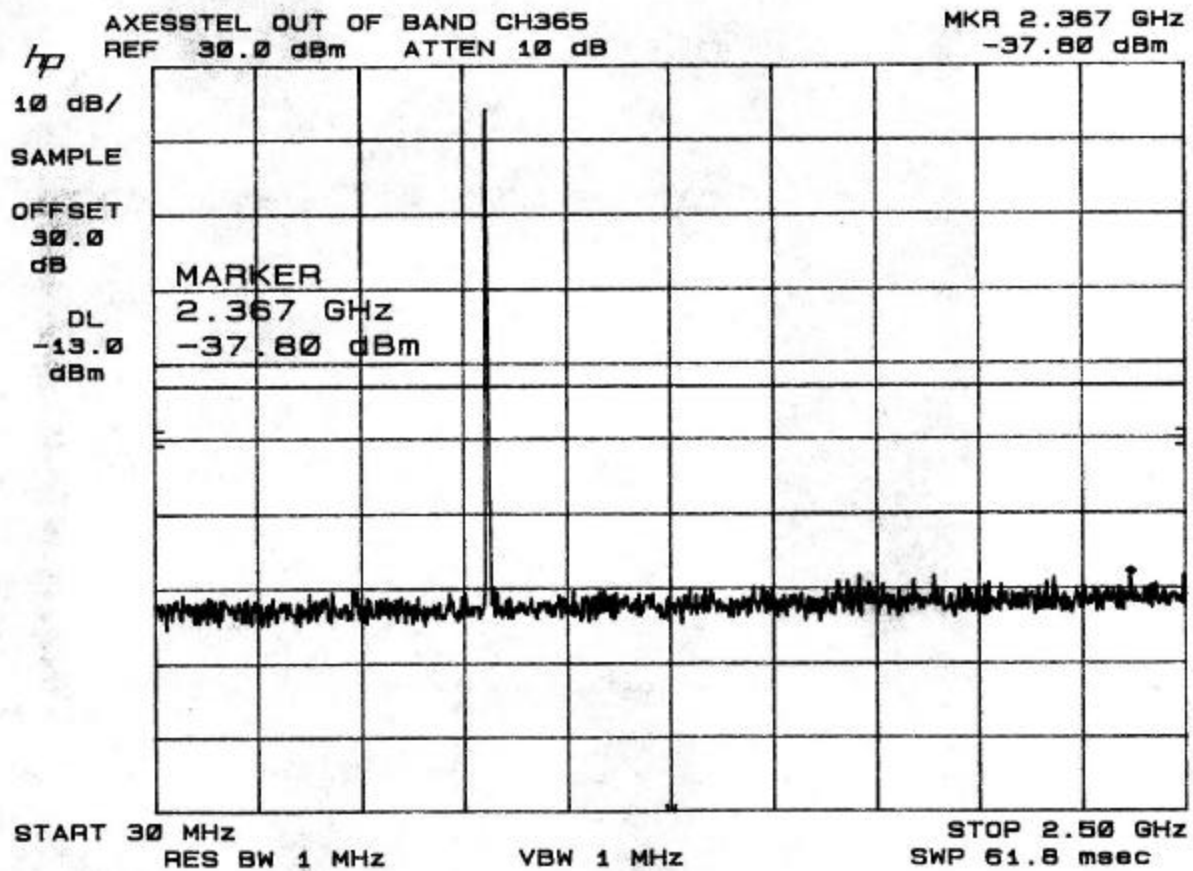
The EUT was setup to maximum output power. A spectrum analyzer was used to scan from 30 MHz to 10GHz. A display line was placed at -13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements. The bases station frequency range was scanned while the EUT operated at its highest channel.

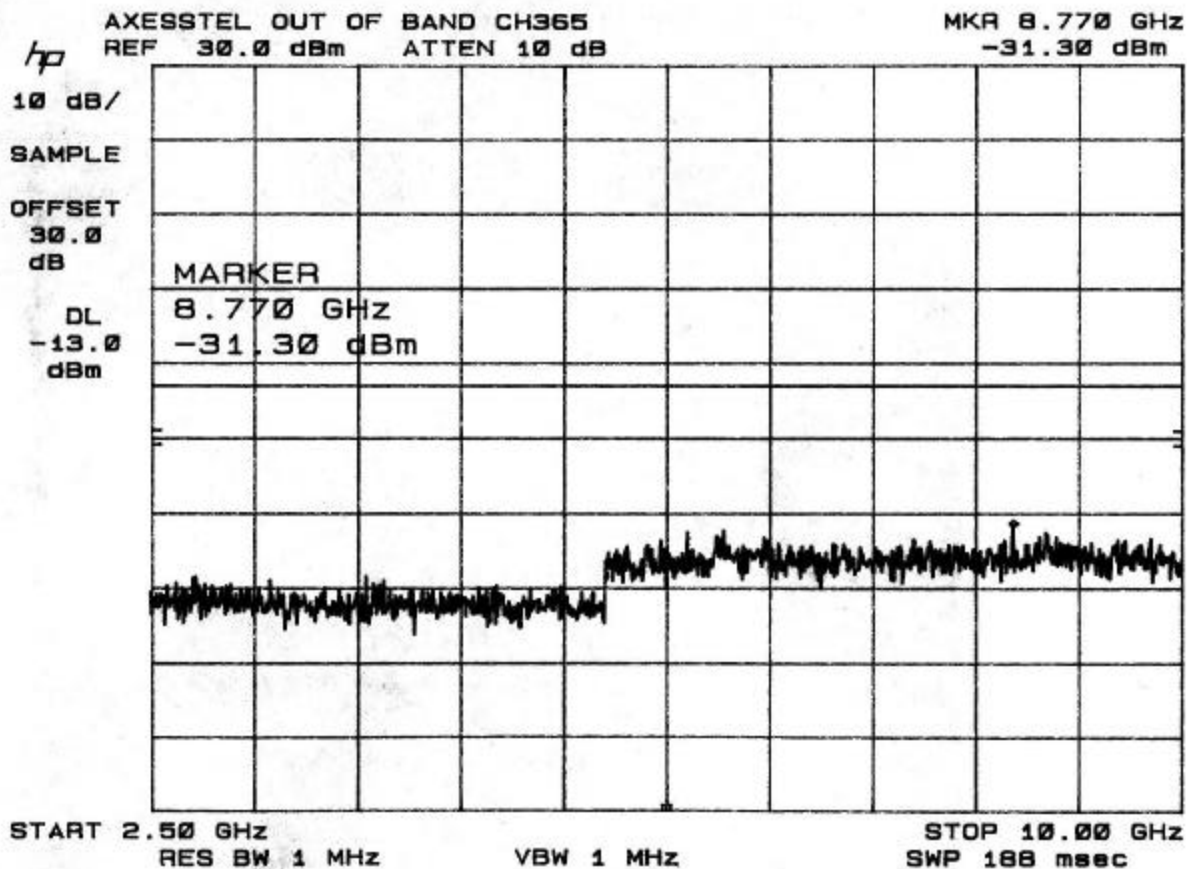
Test Results:

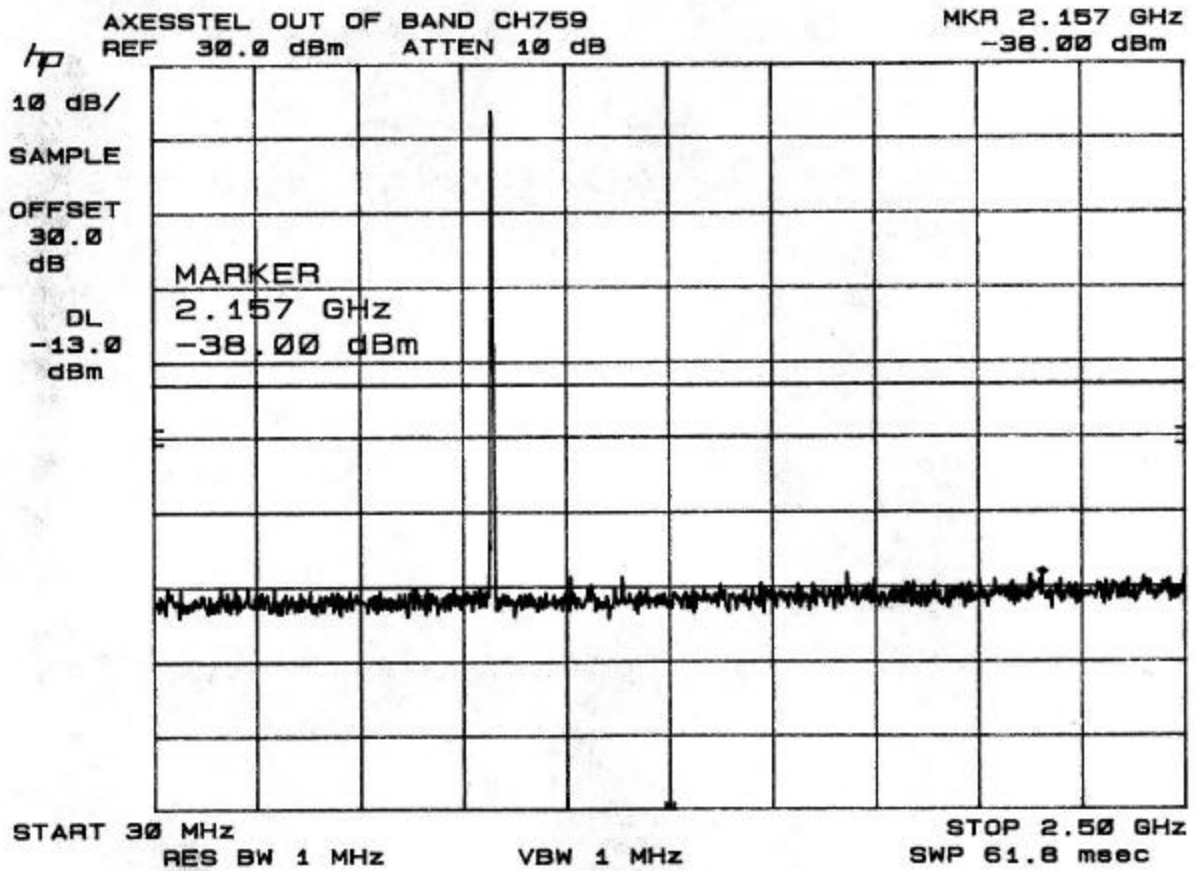
Complies. Plots are shown below.

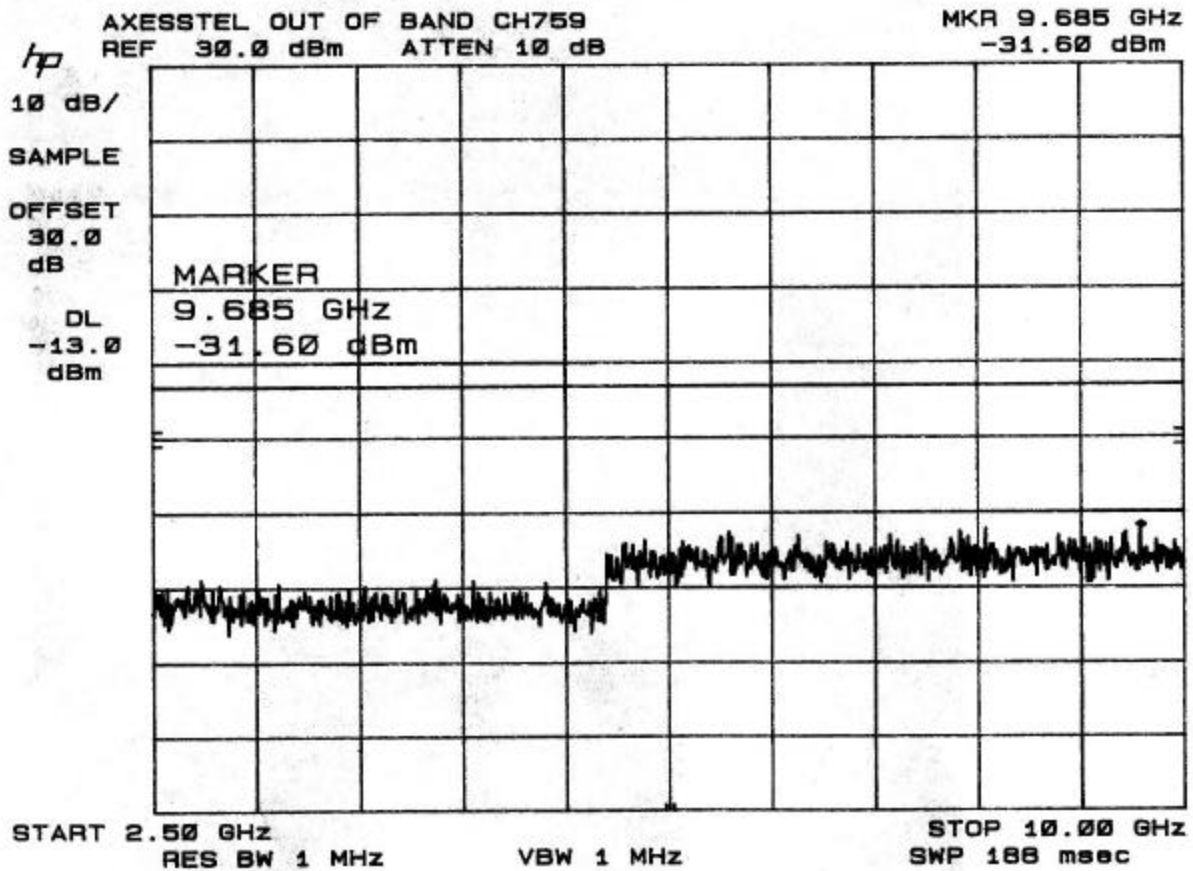


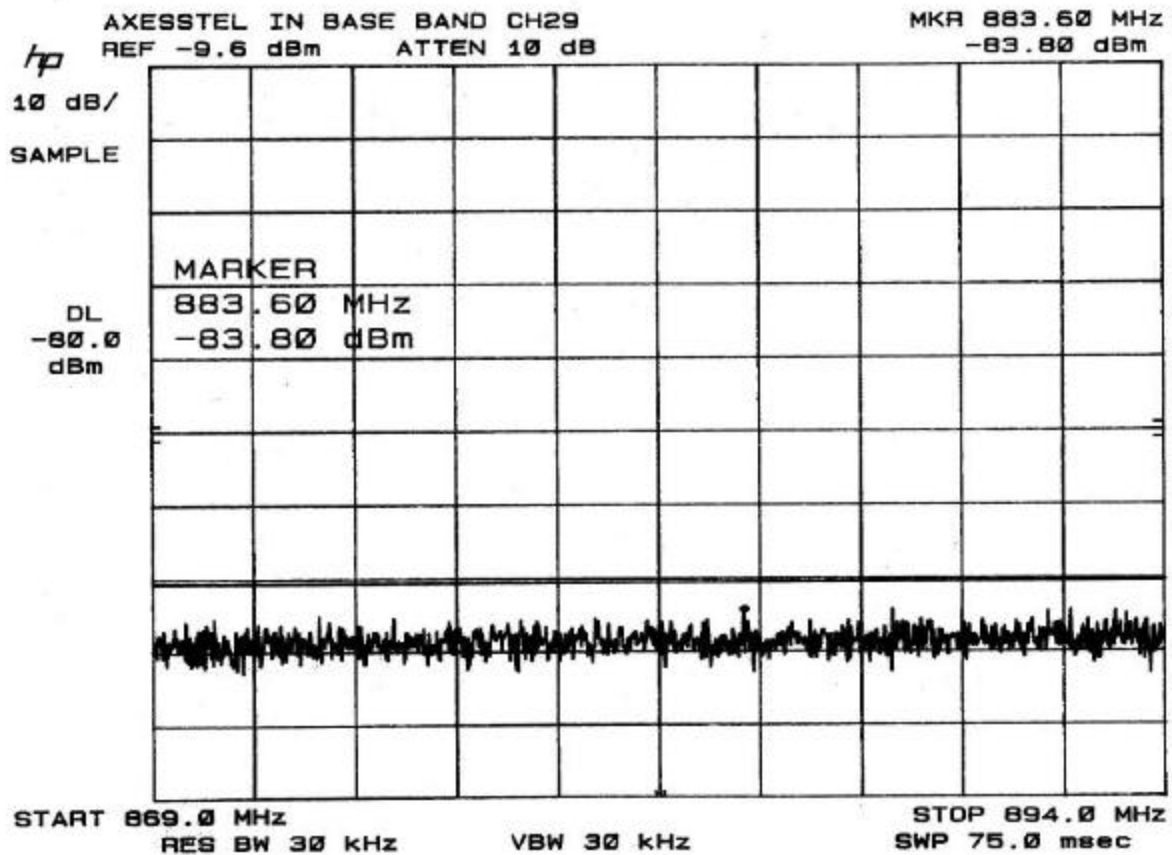


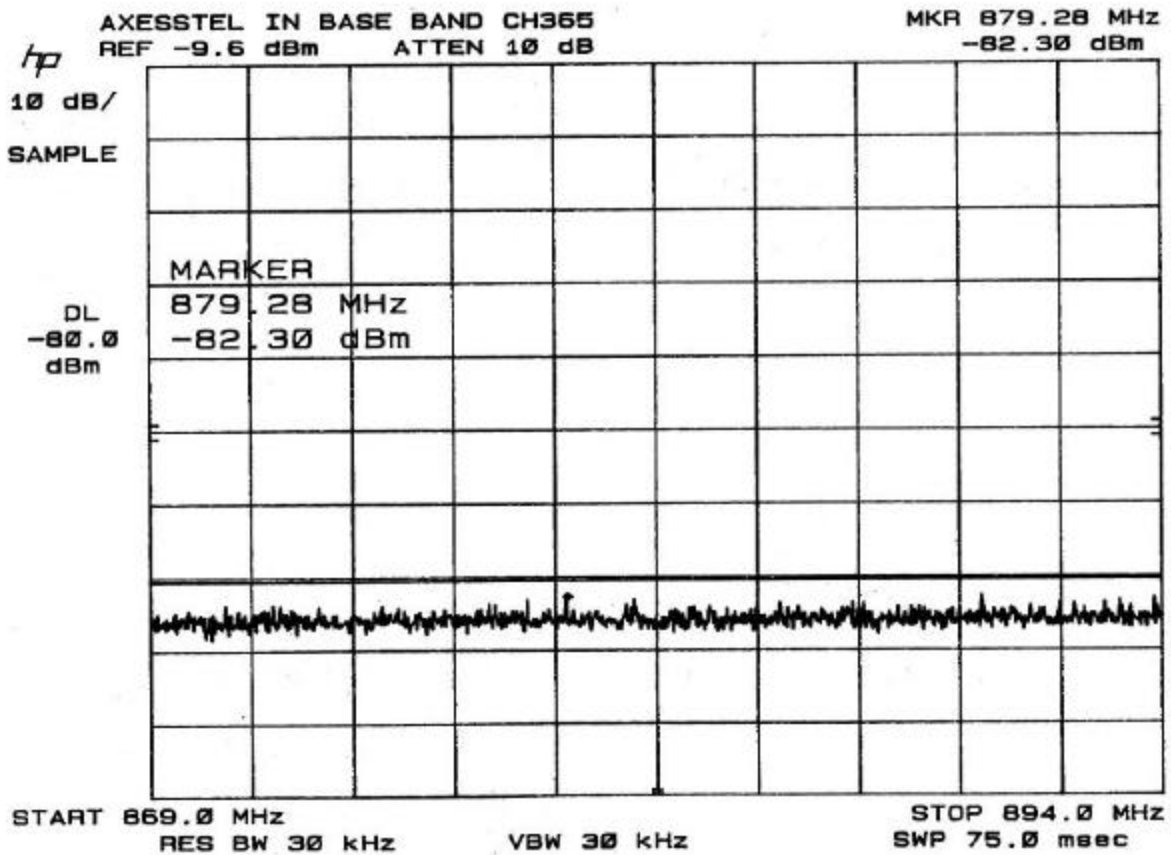


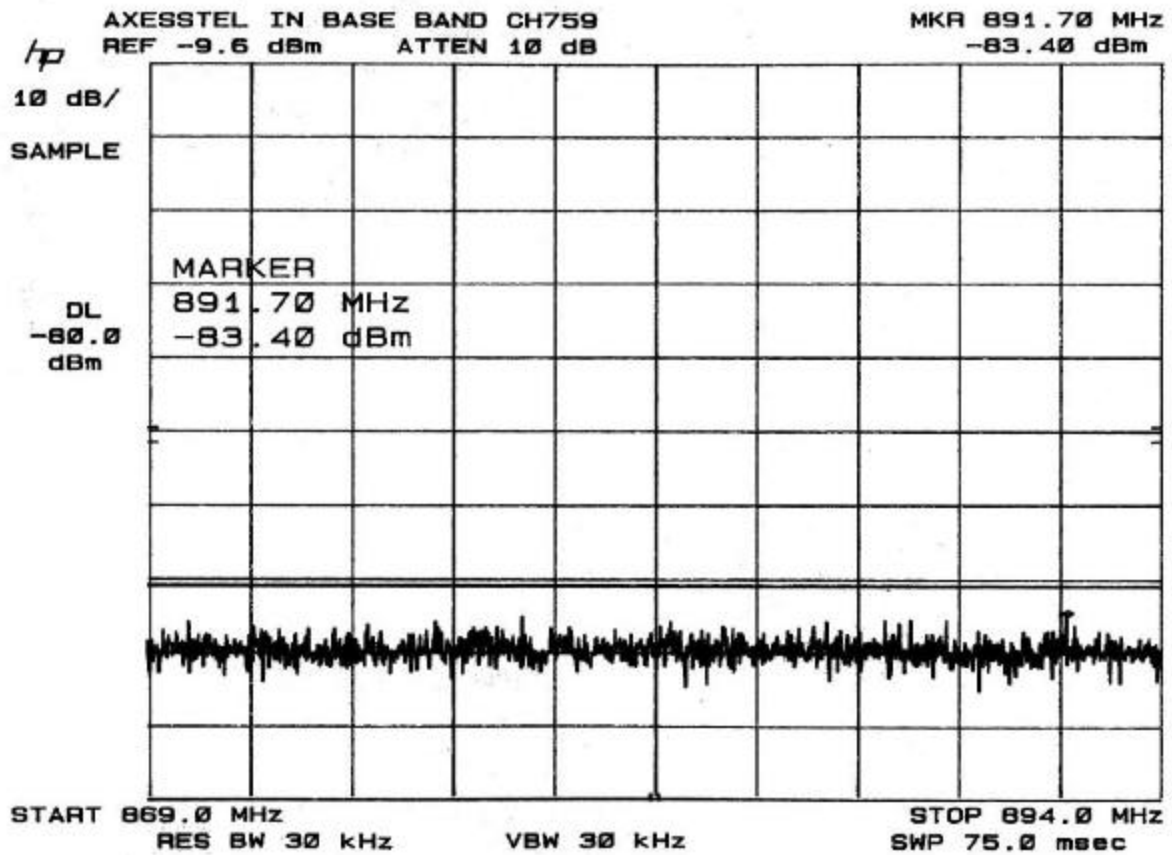


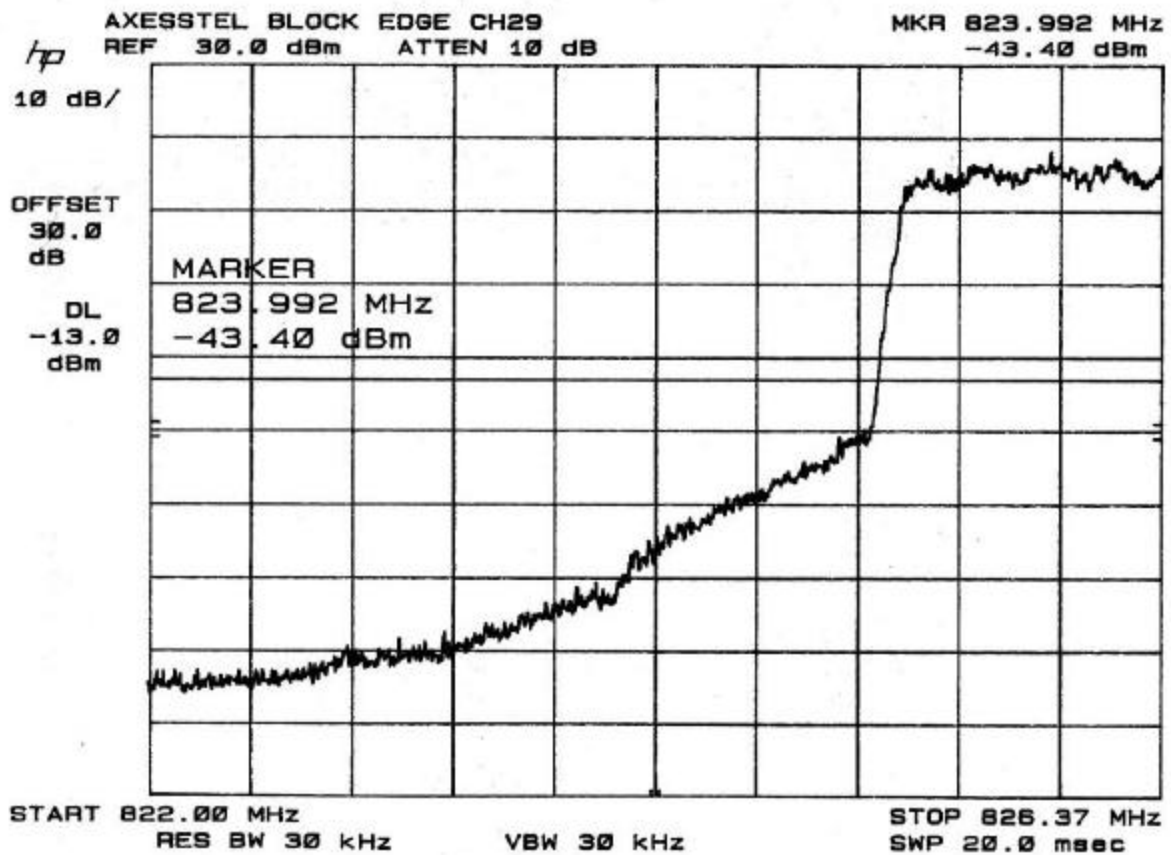


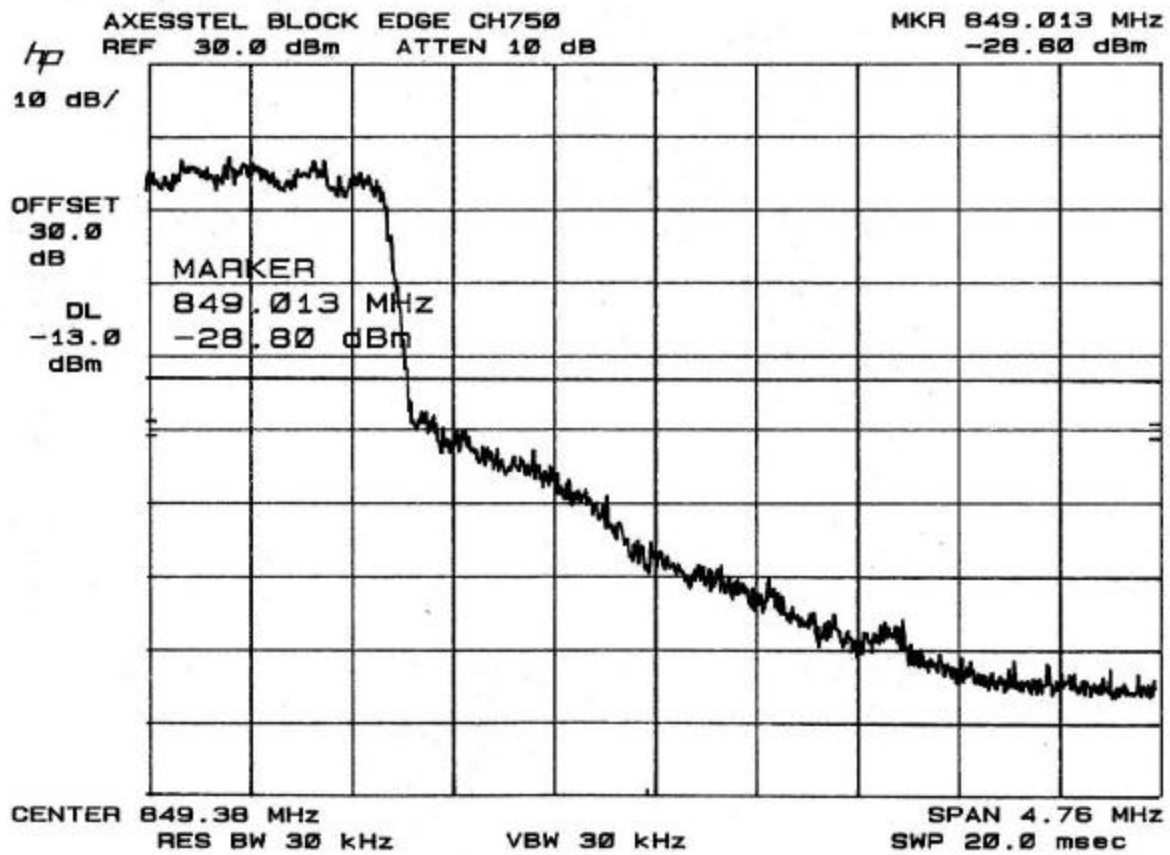








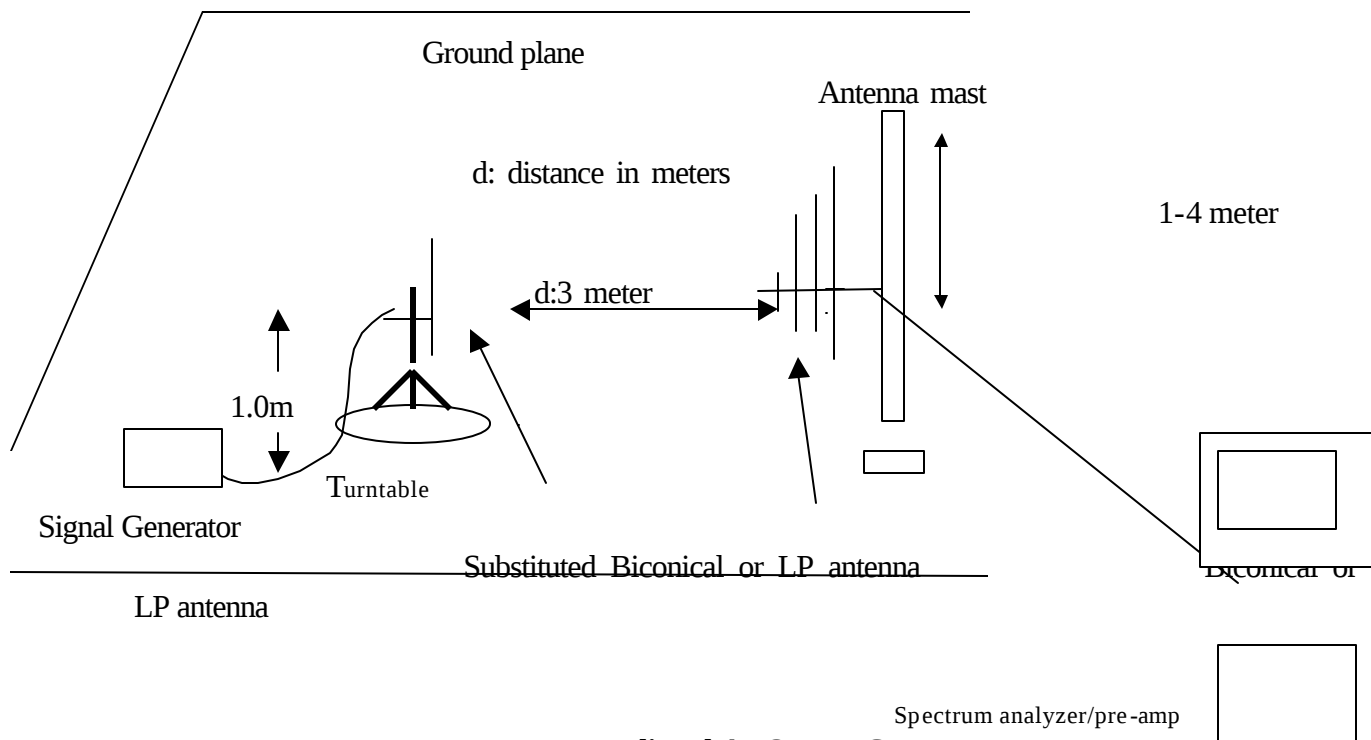




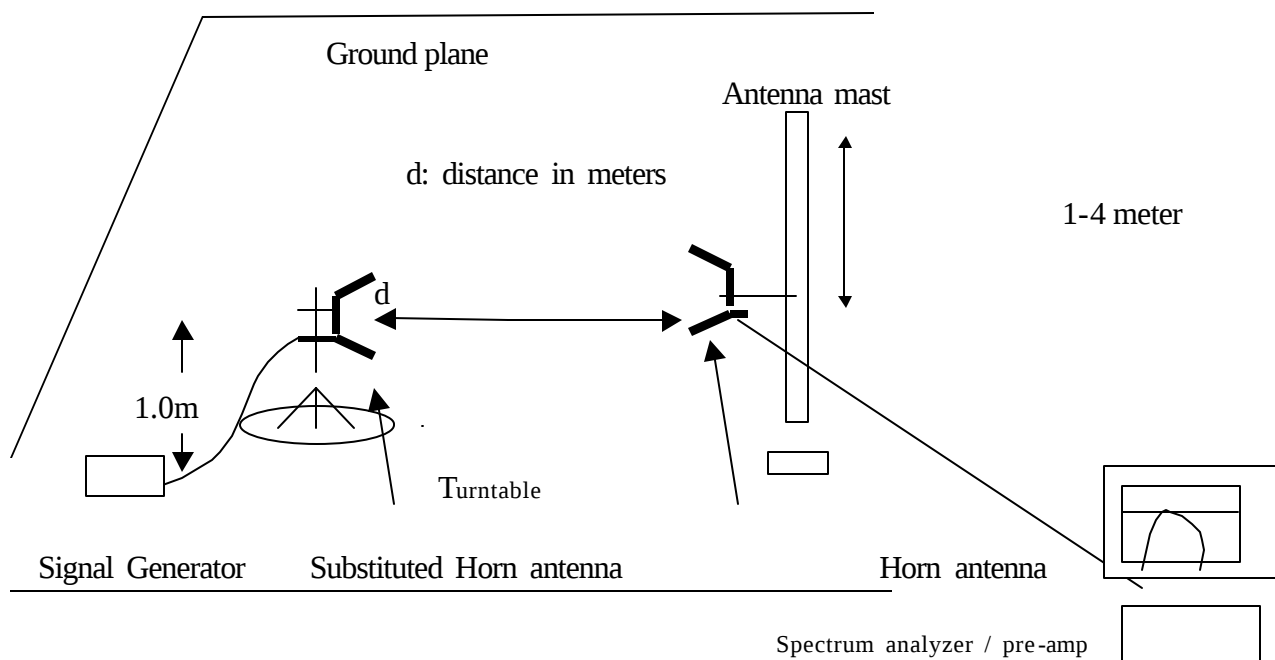
SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION SUBSTITUTION METHOD: (Radiated Emissions)

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: $\text{True reading} = \text{dBm} + \text{GdBd} - \text{CL}$

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 $43 + 10 \log (\text{mean output power, watts})$ 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 (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
825.8	26.0	0.3	0.0	25.7	38.45	-12.75
1651	-39.4	0.95	5.0	-35.35	-13	-22.35
2477	-39.3	1.1	5.7	-34.70	-13	-21.70
3302.7	-46.9	1.1	6.3	-41.70	-13	-28.70
4130	-40.8	1.4	7.1	-35.10	-13	-22.10
4955	-50.5	1.75	6.5	-45.75	-13	-32.75
5780	-51.5	1.75	7.2	-46.05	-13	-33.05
6607	-55.2	1.75	7.1	-49.85	-13	-36.85
7433	-50.0	2.0	6.8	-45.20	-13	-32.20
8256	-50.0	2.0	7.0	-45.00	-13	-32.00

CH29, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
825.8	17.4	0.3	0.0	17.1	38.45	-21.35
1651	-52.7	0.95	5.0	-48.65	-13	-35.65
2477	-51.4	1.1	5.7	-46.80	-13	-33.80
3302.7	-52.2	1.1	6.3	-47.00	-13	-34.00
4130	-42.2	1.4	7.1	-36.50	-13	-23.50
4955	-52.6	1.75	6.5	-47.85	-13	-34.85
5780	-55.2	1.75	7.2	-49.75	-13	-36.75
6607	-55.6	1.75	7.1	-50.25	-13	-37.25
7433	-49.8	2.0	6.8	-45.00	-13	-32.00
8256	-50.0	2.0	7.0	-45.00	-13	-32.00

CH29, Horizontal

RBW=1MHz

VBW=1MHz

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
836	25.5	0.3	0.0	25.2	38.45	-13.25
1672	-21.4	0.95	5.0	-17.35	-13	-4.35
2508	-18.8	1.1	5.7	-14.20	-13	-1.20
3344	-43.9	1.1	6.3	-38.70	-13	-25.70
4180	-39.8	1.4	7.1	-34.10	-13	-21.10
5016	-38.5	1.75	6.5	-33.75	-13	-20.75
5852	-35.5	1.5	7.2	-30.05	-13	-17.05
6688	-34.5	1.75	7.1	-29.15	-13	-16.15
7524	-31.2	2.0	6.8	-26.40	-13	-13.40
8360	-31.5	2.0	7.0	-26.50	-13	-13.50

CH365, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
836	18.2	0.3	0.0	17.9	38.45	20.55
1672	-48.2	0.95	5.0	-44.15	-13	-31.15
2508	-44.5	1.1	5.7	-39.90	-13	-26.90
3344	-42.8	1.1	6.3	-37.60	-13	-24.60
4180	-37.5	1.4	7.1	-31.80	-13	-18.80
5016	-38.9	1.75	6.5	-34.15	-13	-21.15
5852	-37.2	1.75	7.2	-31.75	-13	-18.75
6688	-37.8	1.75	7.1	-32.45	-13	-19.45
7524	-32.0	2.0	6.8	-27.20	-13	-14.20
8360	-37.2	2.0	7.0	-32.20	-13	-19.20

CH365, Horizontal

RBW=1MHz
VBW=1MHz

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
847.5	24.5	0.3	0.0	24.2	38.45	-14.25
1695	-25.1	0.95	5.0	--21.05	-13	-8.05
2543	-19.2	1.1	5.7	-14.60	-13	-1.6
3391	-36.7	1.1	6.3	-31.50	-13	-18.5
4238	-41.4	1.4	7.1	-35.70	-13	-22.7
5086	-41.2	1.75	6.5	-36.45	-13	-23.45
5934	-41.9	1.75	7.2	-36.45	-13	-23.45
9782	-40.1	1.75	7.1	-34.75	-13	-21.75
7630	-38.5	2.0	6.8	-33.70	-13	-20.7
8477	-39.5	2.0	7.0	-34.50	-13	-21.5

CH759, Vertical

Freq (MHz)	SG (dBm)	CL (dB)	Ant Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)
847.5	17.8	0.3	0.0	17.5	38.45	-20.95
1695	-55.2	0.95	5.0	-51.15	-13	-38.15
2543	-43.4	1.1	5.7	-38.80	-13	-25.80
3391	-41.2	1.1	6.3	-36.00	-13	-23.00
4238	-40.4	1.4	7.1	-34.70	-13	-21.70
5086	-41.6	1.75	6.5	-36.85	-13	-23.85
5934	-35.0	1.75	7.2	-29.55	-13	-16.55
9782	-30.2	1.75	7.1	-24.85	-13	-11.85
7630	-30.5	2.0	6.8	-25.70	-13	-12.70
8477	-30.2	2.0	7.0	-25.20	-13	-12.20

CH759, Horizontal

RBW=1MHz

VBW=1MHz

SECTION 2.1055: FREQUENCY STABILITY

Minimum standard:

The carrier frequency shall be maintained within a tolerance of 2.5ppm.
2.5ppm of 824MHz=2.06KHz.

Test Procedure frequency/temperature:

The EUT was setup in a temperature chamber. The EUT was setup to its maximum output power at its middle 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.

Test Procedure frequency/voltage AC:

Frequency tolerance was measured with the AC voltage to the EUT's SMPS adjusted to 85% and 115% of nominal.

Test Results:

Complies: See Spreadsheet below.

Temperature	Delta from assigned frequency
-30°C	-0.560 KHz
-20°C	-0.500 KHz
-10°C	-0.420 KHz
0°C	-0.250 KHz
10°C	0.000 KHz
20°C	0.000 KHz
30°C	0.000 KHz
40°C	0.500 KHz
50°C	0.700 KHz

Voltage	
93.5VAC	0.580 KHz
138VAC	0.760 KHz

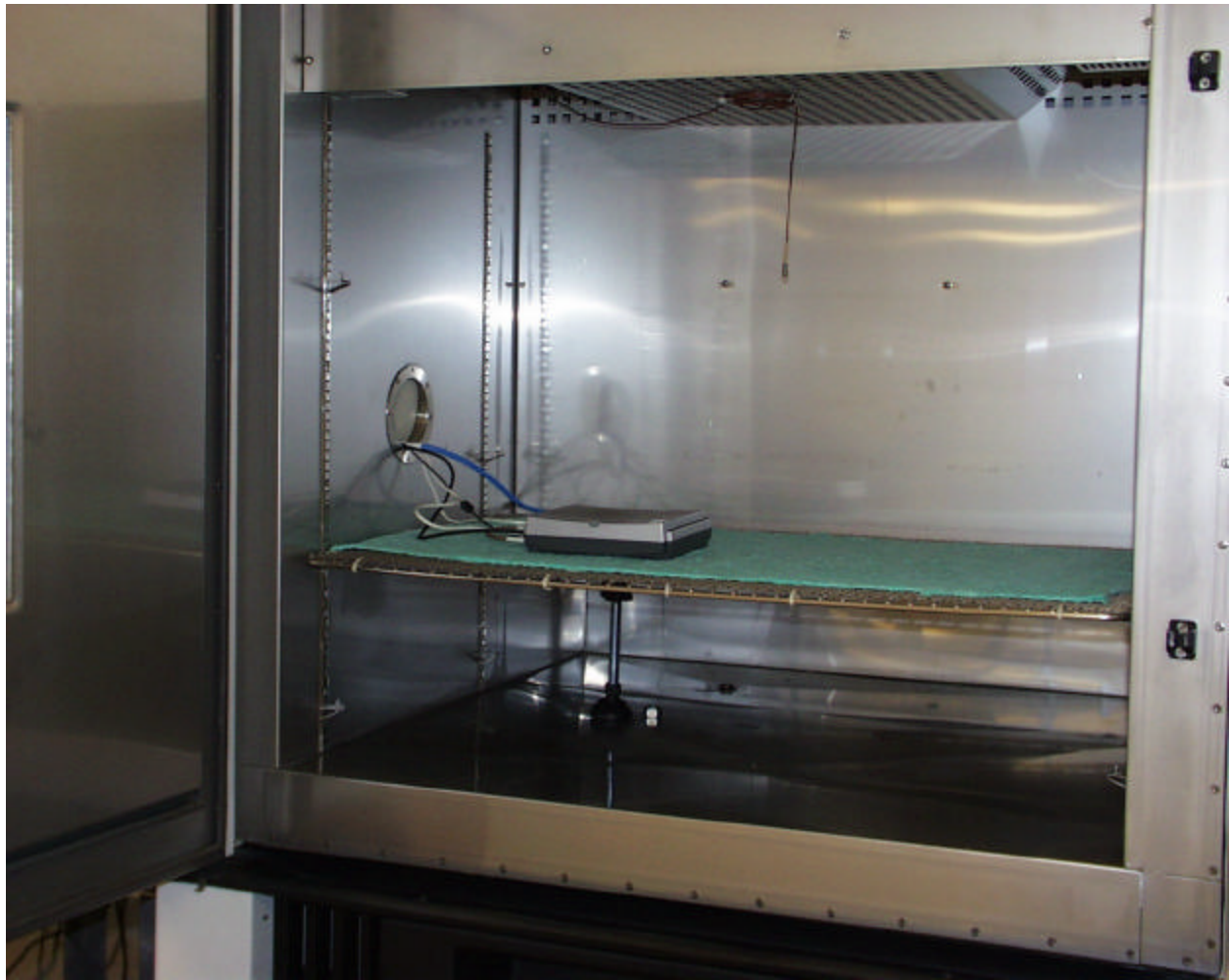
Battery End Point: See Result Below.

7.6VDC	0.000 KHz
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SETUP PHOTOS



Frequency Stability



Frequency Stability



Substitution & ERP Radiated



Spurious Radiated, Front View



Spurious Radiated, Rear View

ATTACHMENTS