FCC CFR47 PART 24 SUBPART E

CERTIFICATION REPORT

FOR

CDMA PCS WLL TERMINAL

MODEL: DTT-1900

FCC ID: PUNDTT-1900

REPORT NUMBER: 01U0934-1

ISSUE DATE: AUGUST 30, 2001

Prepared for
DOWTELECOM INC.
4TH FLOOR, WOOSONG BLDG. 361-10, YATAP-DONG,
BUNDANG-GU, SEONGNAM-SI,
GYUNGGI-DO, KOREA

Prepared by
COMPLIANCE CERTIFICATION SERVICES, INC.
d.b.a.
COMPLIANCE ENGINEERING SERVICES, INC.
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U.S.A.
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INSTALLATION & SERVICE MANUAL
BLOCK DIAGRAM, SCHEMATIC DIAGRAM & PART LIST

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: DOWTELECOM INC.
4TH Floor, Woosong Bldg. 361-10, Yatap-Dong
Bundang-Gu, Seongnam-Si,
Gyunggi-Do, Korea

Contact person: Mr. Seoung Chul Ju/Senior Engineer

Telephone number: 482-031-701-8962

2.1033(c)(2) FCC ID: PUNDTT-1900

2.1033(c)(3) Instructions/Installation Manual

Refer to **Attachment**: Installation and Service manual.

2.1033(c)(4) Type of emissions

1M25F9W

2.1033(c)(5) Frequency Range

Transmit: **1850MHz to 1910MHz**
Receive: **1930MHz to 1990MHz**

2.1033(c)(6) Range of Operation Power

< -50dBm, 0.00001WATTS.
25dBm (0.316WATTS)
See Attachment: *Technical Description* section 2.983(d)(3) *Means for variation of operating power.*

2.1033(c)(7) Maximum Power Rating

25dBm, 0.316WATTS.

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

See Attachment: *Technical Description* section 2.983(d)(5) *DC voltage and current of final amplifying device.*

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

See Attachment: *Technical Description* section 2.983(d)(9) *Tune-up procedure over the power range.*

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

Functional diagram: See Attachment: *Technical Description* section 2.983(d)(12) *Description of modulation system used.*

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

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

See Attachment: *Technical Description* section 2.983(d)(10) *Description of frequency determining and stabilizing circuitry..*

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

See Attachment: *Technical Description* section 2.983(d)(11) *Description of circuit emulated for suppression of spurious radiations.*

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

See Attachment: *Technical Description* section 2.983(d)(12) *Description of modulation system used.*

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

See Attachment: *Technical Description* section 2.983(d)(3) *Means for variation of operating power.*

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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: *Technical Description* section 2.983(d)(12) *Description of modulation system used*

2.1033(c)(14) Standard Test Condition

The EUT was operated in Test Mode during testing. See Attachment: *Technical Description* section 2.983(d)(9) *Tune-up procedure over the power range,* for a description of the Test Mode.

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TEST RESULT CERTIFICATION

COMPANY NAME: **DOWTELECOM INC.**
4TH FLOOR, WOOSONG BLDG. 361-10, YATAP-DONG
BUNDANG-GU, SEONGNAM-SI,
GYUNGGI-DO, KOREA

CONTACT PERSON: **MR. SEOUNG CHUL JU/ SENIOR ENGINEER**

TELEPHONE NO: **482-031-701-8962**

EUT DESCRIPTION: **CDMA PCS WLL TERMINAL**

MODEL NAME: **DTT-1900**

DATE TESTED: **AUGUST 24, 20001**

TYPE OF EQUIPMENT	CDMA WIRELESS LOCAL LOOP TERMINAL
AUTHORIZATION PROCEDURE	CERTIFICATION
FCC RULE PARTS	FCC Part 2, 15 & 24
MEASUREMENT PROCEDURE	FCC Part 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:

PETE KREBILL
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

Released For CCS By:

STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

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EUT DESCRIPTION

The Dowtel DTT-1900 terminal is a CDMA Wireless Local Loop (WLL) terminal. Its basic purpose is for use on a desk. It can connected to telephones to provide voice communication and or a computer to provide data communication such as fax or modem. It transmits from 1850 MHz to 1910 MHz and receives from 1930 MHz to 1990 MHz. The RF power is rated at 316 mW. The omni-directional dipole antenna has a rated gain of more than 1.5dBi.

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.

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TEST EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
Signal Generator	**HP**	**83732B**	**US3449059**	**3/21/01**	**3/21/02**
Spectrum Analyzer	**H.P.**	**8593EM**	**3710A00205**	**6/20/01**	**6/20/02**
Pre-Amp	**H.P**	**8449B**	**3008A00369**	**5/30/01**	**5/30/02**
Horn Antenna	**EMCO**	**3115**	**2238**	**6/20/01**	**6/20/02**
Horn Antenna	**EMCO**	**3115**	**9001-3245**	**6/20/01**	**6/20/02**
Horn Antenna	**ARA**	**MWH-1826/B**	**1013**	**7/26/01**	**7/26/02**

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**	**11/21/01**
Antenna, BiLog	**Chase 30 - 2000MHz**	**CBL6112**	**2049**	**12/11/01**
LISN	**Fisher Cus. Comm.**	**LISN-50/250-25-2**	**2023**	**8/5/02**
EMI Test Receiver	**Rohde & Schwarz**	**ESHS 20**	**827129/006**	**2/28/02**
Horn Antenna(1 - 18GHz)	**EMCO**	**3115**	**9001-3245**	**6/20/02**
Pre-Amplifier	**MITEQ1-26GHz**	**NSP2600-44**	**646456**	**1/3/02**
EMC Receiver (9K-26.5GHz)	**HP**	**8593EM**	**3710A00205**	**6/20/02**
Horn Antenna,(18 - 26GHz)	**Antenna Research Associate**	**MWH 1826/B**	**1013**	**7/26/02**
Signal Generator	**HP**	**8640B**	**2322A22402**	**4/10/02**

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FCC PART 15 TEST RESULTS

TESTED SYSTEMS DETAILS

MOUSE	***HP***	***M-S34***	***LZB75062022***	***DZL211029***
PRINTER	***HP***	***2225C***	***2930S52614***	***DSI6XU2225***
LAPTOP	***IMENTIC***	***94A2824***	***H4895AAA***	***DoC***
PHONE	***WINTONE***	***HA178***	***64489***	***DoC***

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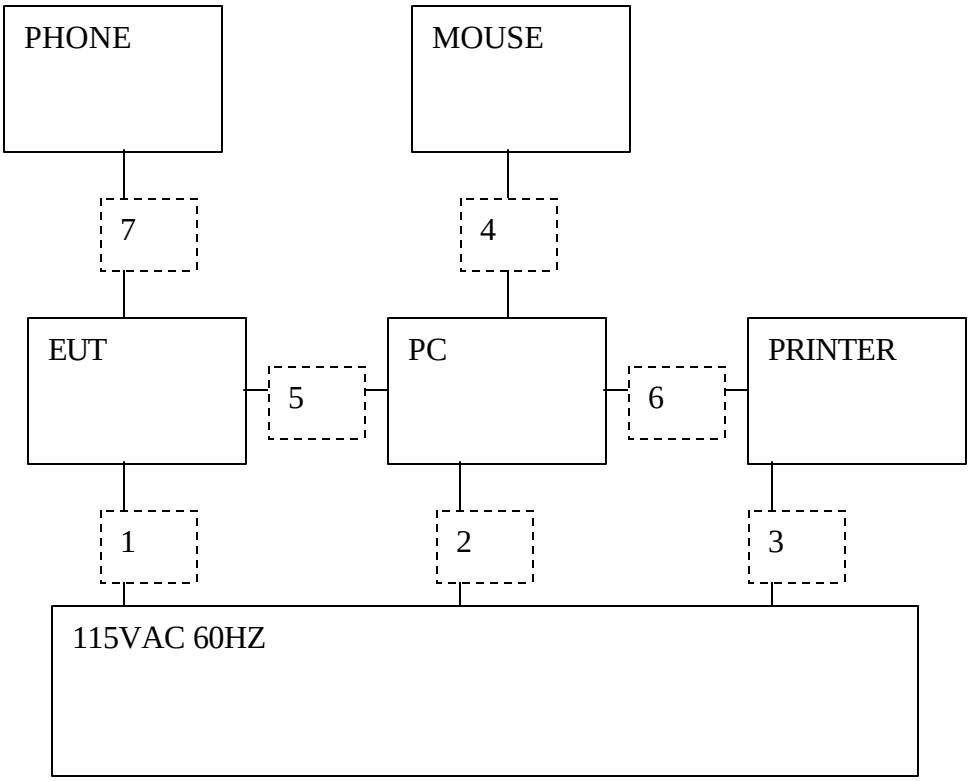
CONFIGURATION BLOCK DIAGRAM



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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	Bundled during AC LC only
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	Parallel	1	DB25	Shielded	2m	Yes	Yes	N/A
7	RJ-11	1	RJ-11	Un-shielded	1m	Yes	No	N/A

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RADIATED EMISSION

COMPLIANCE Certification Services

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 #: 01i0934-1
Report #: 010822b
Date& Time: 08/22/01 1:30 PM
Test Engr: HUE LY VANG

Company: ETL INC.
EUT Description: PCS WALL TERMINAL
Test Configuration : EUT/LAPTOP/MOUSE/PRINTER/
Type of Test: FCC CLASS B
Mode of Operation: EUT IS NORMAL OPERATIONS, ALSO DIAL AND REDIAL TO LAPTOP

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)
66.50	44.00	6.98	1.82	29.47	23.33	40.00	-16.67	3mV	180.00	1.00	P
930.00	25.20	21.64	8.45	28.35	26.94	46.00	-19.06	3mV	180.00	1.00	P
36.60	30.00	17.58	1.41	29.49	19.50	40.00	-20.50	3mV	180.00	1.00	P
830.00	25.00	20.70	7.93	28.74	24.89	46.00	-21.11	3mH	180.00	2.00	P
48.00	35.70	10.62	1.56	29.48	18.40	40.00	-21.60	3mH	180.00	2.50	P
555.00	25.00	18.41	6.16	29.36	20.21	46.00	-25.79	3mH	180.00	2.00	P
6 Worst Data											

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CONDUCTED EMISSION

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.86	36.56	--	--	0.00	48.00	--	-11.44	--	L1
6.73	40.29	--	--	0.00	48.00	--	-7.71	--	L1
20.47	37.14	--	--	0.00	48.00	--	-10.86	--	L1
0.86	39.88	--	--	0.00	48.00	--	-8.12	--	L2
1.38	41.33	--	--	0.00	48.00	--	-6.67	--	L2
6.56	42.30	--	--	0.00	48.00	--	-5.70	--	L2
6 Worst Data									

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LINE CONDUCTION PLOT

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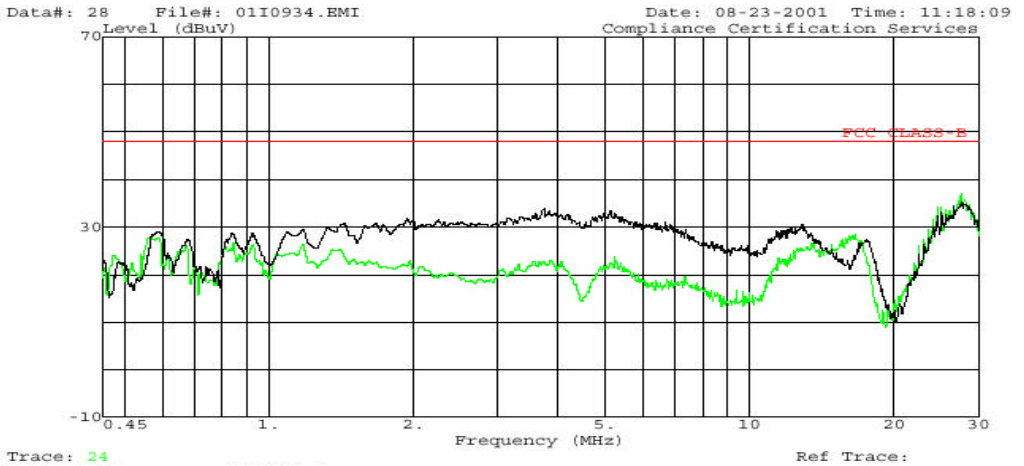

Trace: 24 Ref Trace:

Project No.	:	01i0934-1
Report No.	:	010822-wall unit
Test Engr	:	Hue Ly Vang
Company	:	ETL INC.
EUT Description	:	PCS WLL TERMINAL
Model	:	DTT1900
EUT Config.	:	EUT
Type of Test	:	FCC CLASS B
Mode of Operation:		
	:	PEAK: L1(Green), L2(Black)
	:	115Vac, 60Hz

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SETUP PHOTOS

RADIATION FRONT

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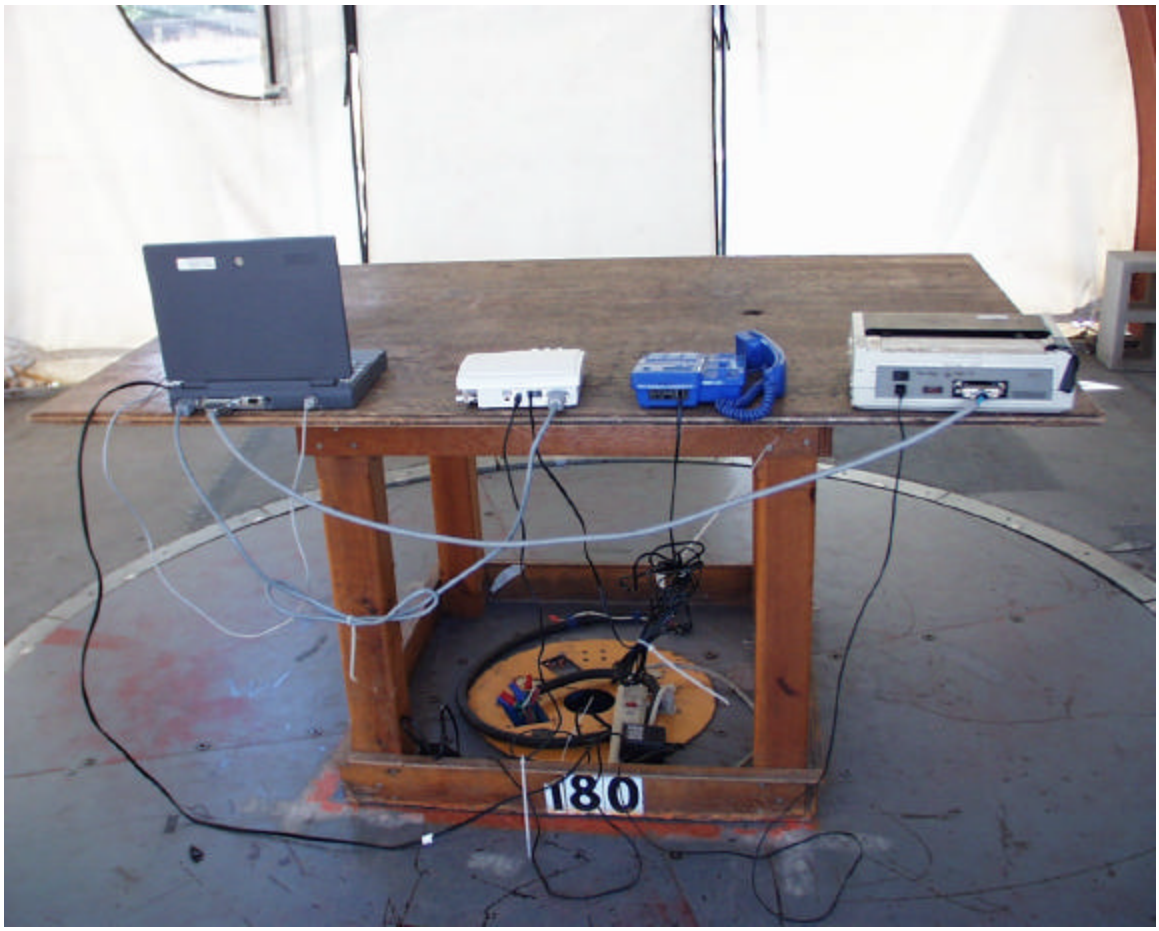

RADIATION BACK

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LINE CONDUCTION FRONT

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LINE CONDUCTION BACK

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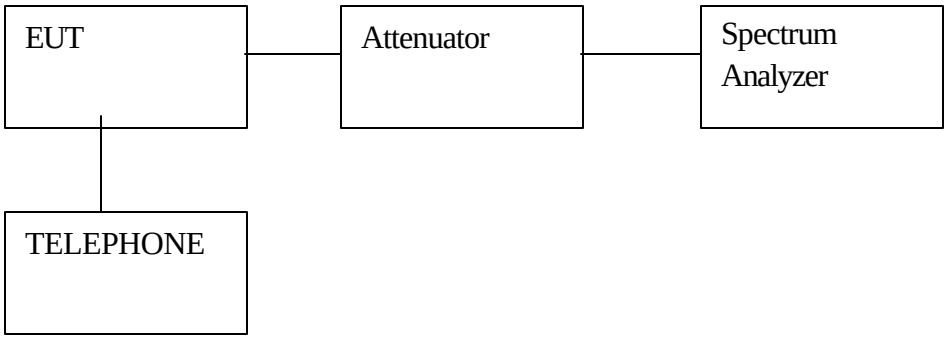
FCC PART 2 CERTIFICATION TEST RESULTS:

Test Set-up for the following conducted tests:



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SECTION 2.1046: RF POWER OUTPUT

Minimum Requirement:
24.232(B); Mobile/Portable stations are limited to 2 Watts 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 spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EIRP is then calculated by adding the EUT's antennas gain in dBi to the EUT's power in dBm. The EUT's antenna gain was rated at < 1.5dBi. 1.5dBi is used for calculating EIRP.

Test Procedure radiated:
The EUT was setup to its maximum output power at its lowest channel. The EUT's antenna was attached normally. EIRP was measured using the radiated substitution method. The measurements are repeated for the highest and a middle channel. See the description of the test method in *Field Strength of Spurious Radiations Substitution* section of this report.

Test Result:
Complies.
Calculations and plots are shown below for conducted measurements.
A spreadsheet is shown below for radiated measurements

Conducted measurements:
Channel 25: 25.09dBm + 1.5dBi = 26.59dBm EIRP or 456mW EIRP
Channel 600: 25.03dBm + 1.5dBi = 26.53dBm EIRP or 449.8mW EIRP
Channel 1175: 25.01dBm + 1.5dBi = 26.51dBm EIRP or 407.4mW EIRP

Radiated measurements:

Compliance Certification Services 8/22/01 Pete Krebill

Frequency	SA reading	Sig Gen	CL	Gain	EIRP	Limit	Margin
MHz	dBuV	dBm	dB	dBi	dBm	dBm	dB
Channel 25							
1805.125	96.86	19.6	0.3	8.8	28.1	33	-4.9
Channel 600							
1880	96.72	19.5	0.3	8.8	28	33	-5
Channel 1175							
1908.75	97.2	19.7	0.3	8.8	28.2	33	-4.8

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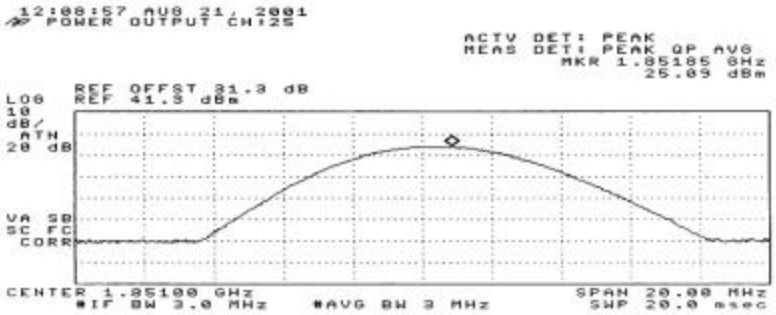

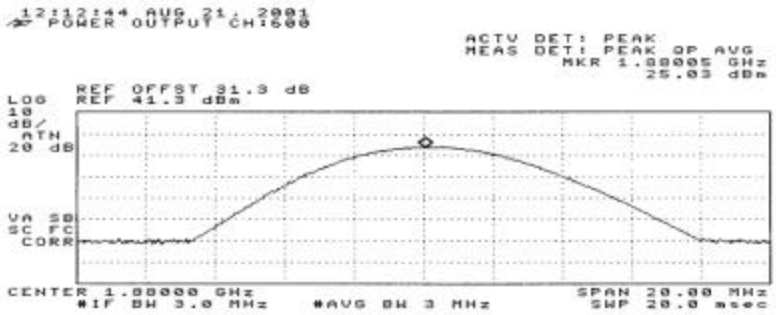

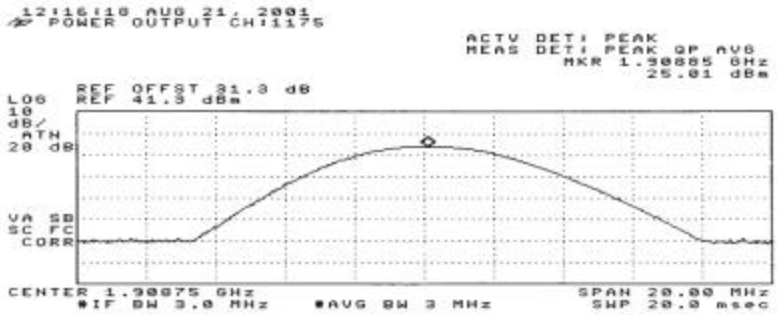

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SECTION 2.1047: MODULATION CHARACTERISTICS

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 requirements for PCS. PCS licensees may provide any mobile communications services on their assigned spectrum (FCC 24.3).

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SECTION 2.1049: OCCUPIED BANDWIDTH

Minimum requirement:
Section 2.1049(i); transmitters designed for other types of modulation-when modulated by an appropriate signal of sufficient amplitude to be representative of the type of service in which used.

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: 1.437 MHz
Channel 600: 1.437 MHz
Channel 1175: 1.430 MHz

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

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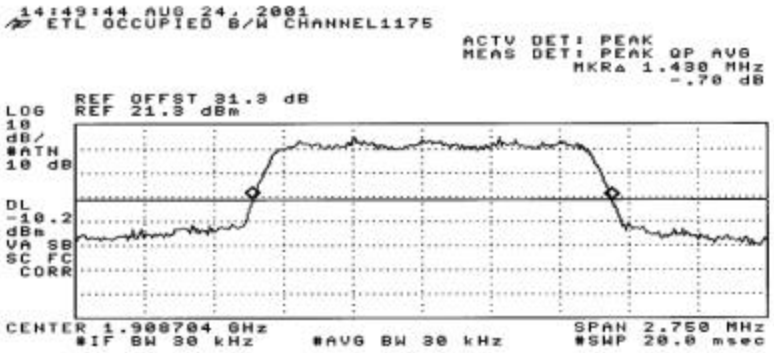

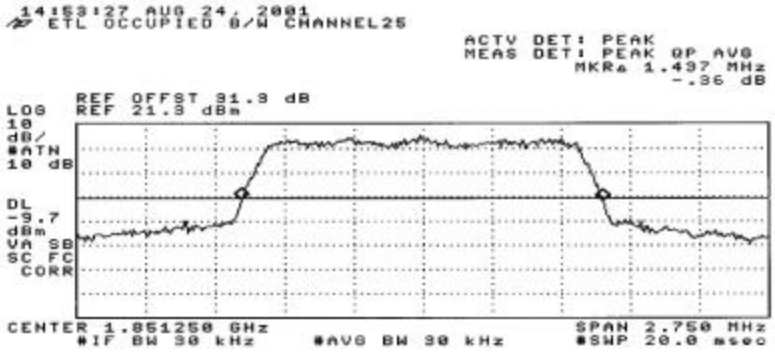

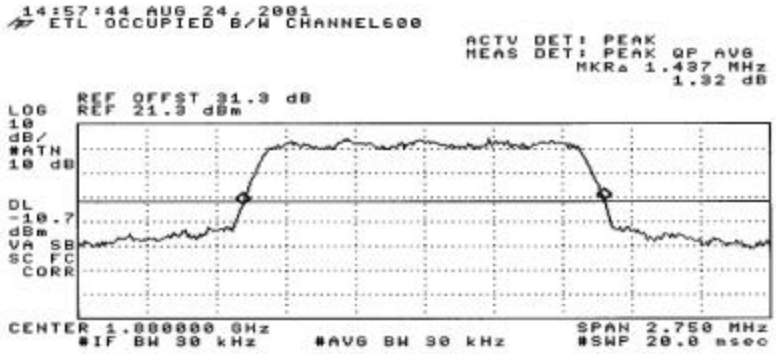

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SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL

Minimum standard:
FCC 24.238(a); On any frequency outside a licensees 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 –13dBm, calculation shown below.

43 + 10 log (0.316W) = 38dB
25dBm – 38dB = -13dBm

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 *1.43MHz =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 at its lowest channel, channel 25 (1851.25MHz). The RES BW of the analyser is set to 1% of the emission bandwidth to show compliance with the –13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the edge of the frequency block. The measurements are repeated for the EUT's highest channel, channel 1175 (1908.75). For the Out-of-Band measurements a 1 MHz RES BW 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.

Test Results:
Complies. Plots are shown below.

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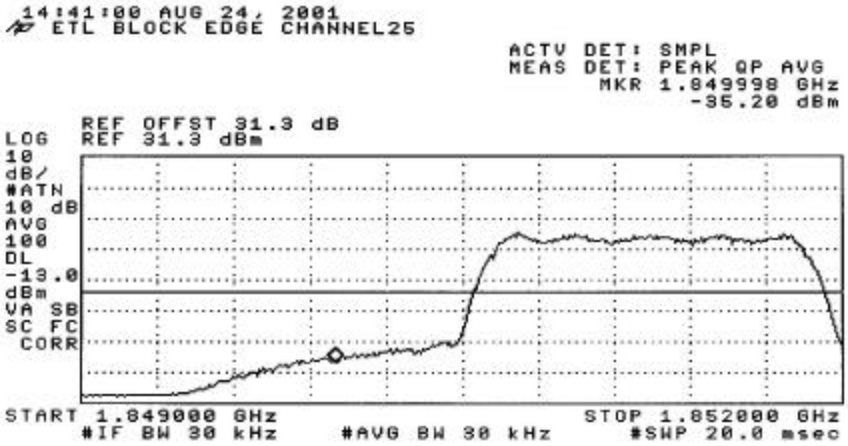

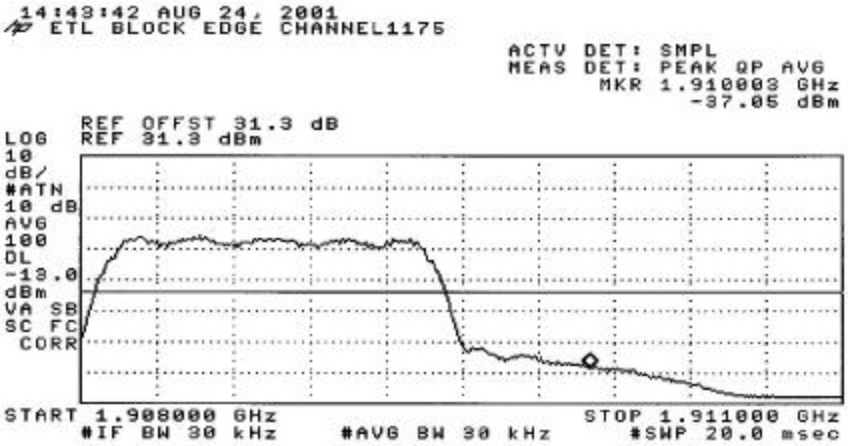

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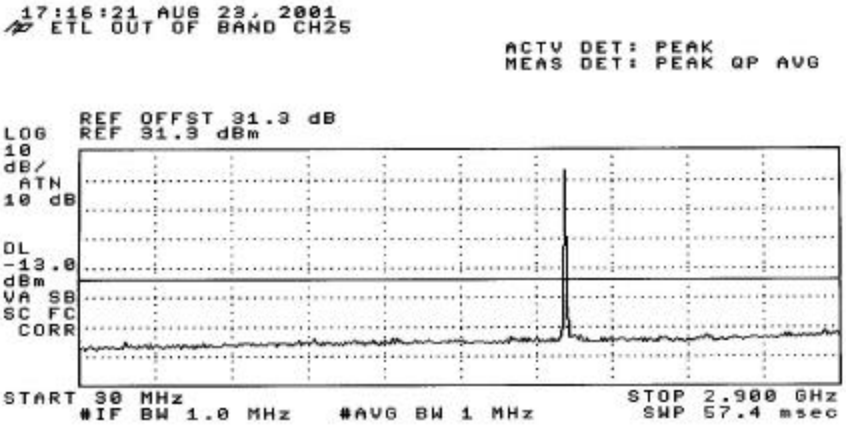

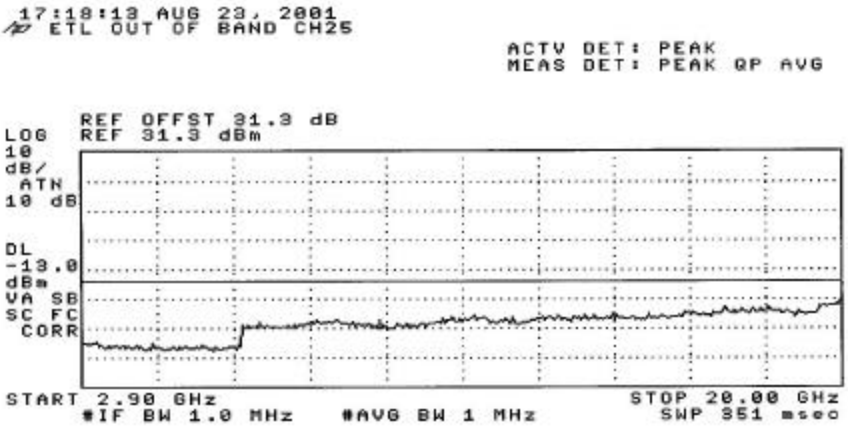

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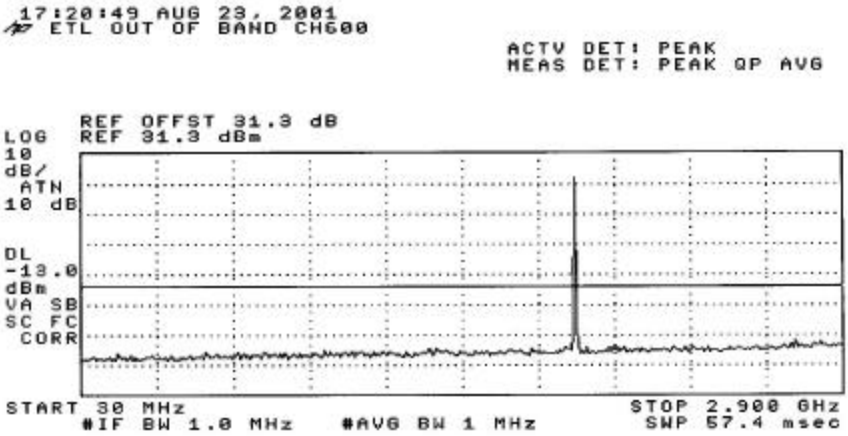

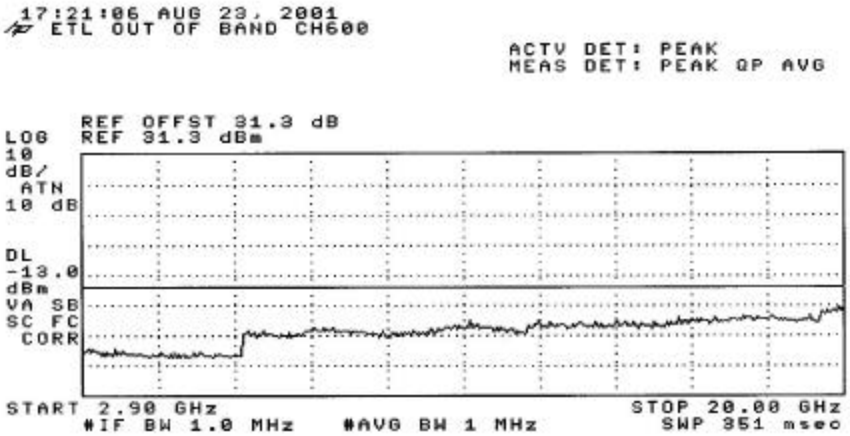

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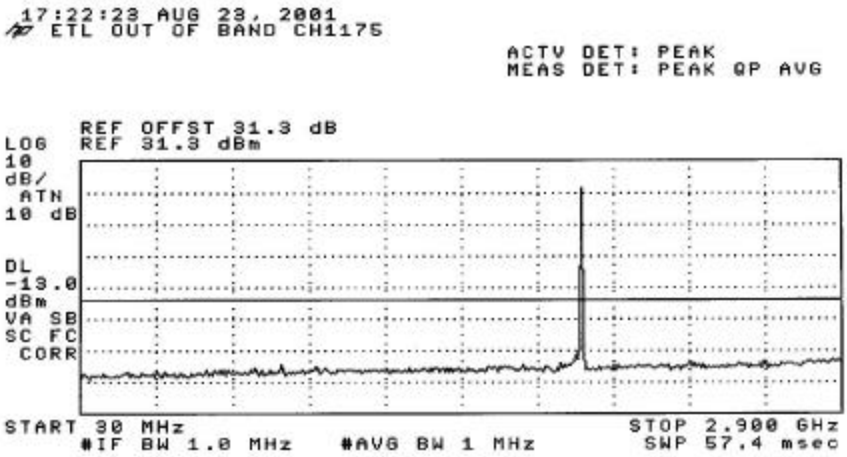

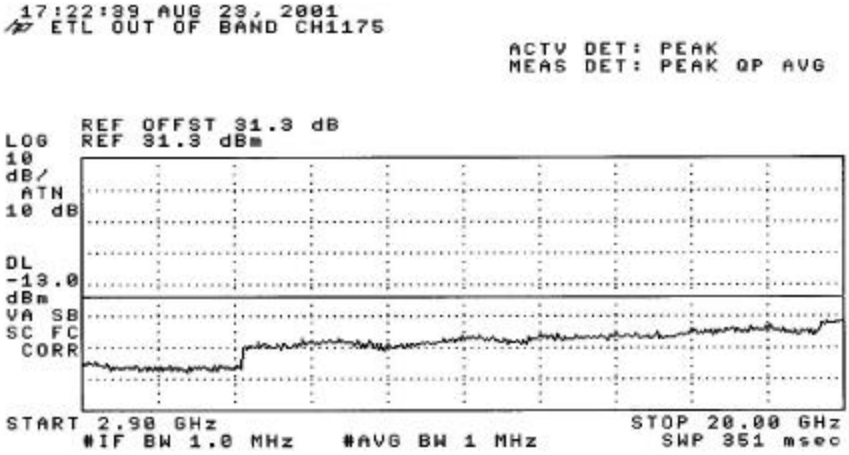

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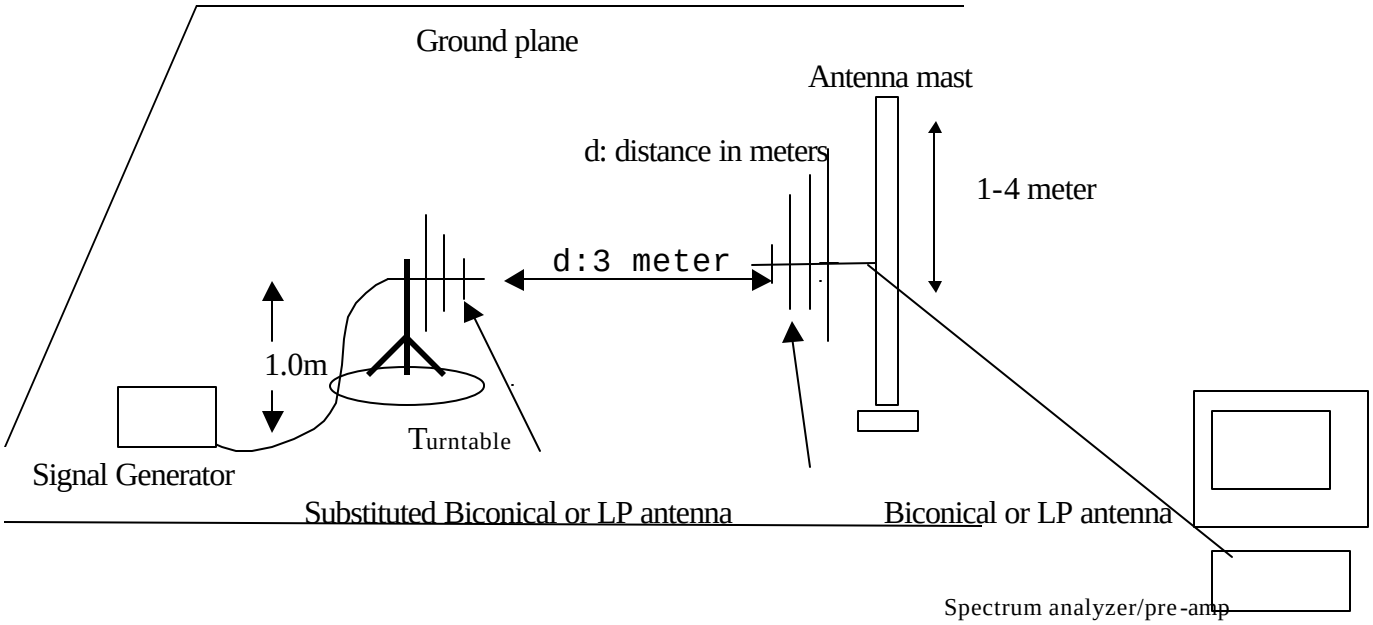
SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION.

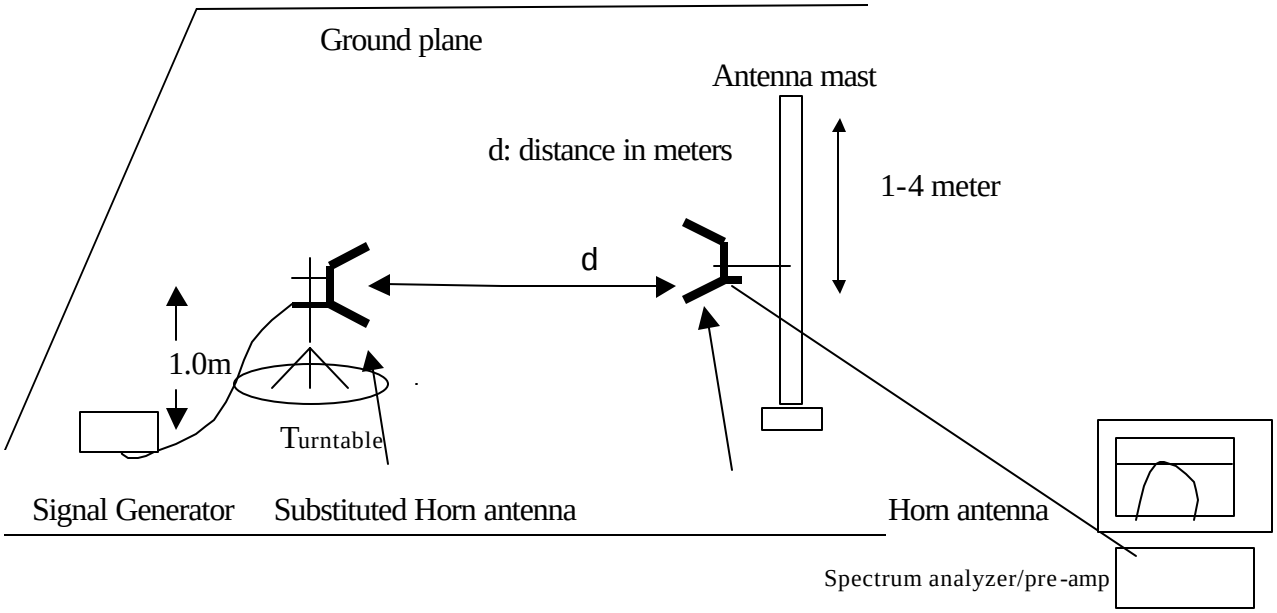
SUBSTITUTION METHOD: (Radiated Emissions)

Test Set-up:

Radiated BELOW 1GHz



Radiated ABOVE 1 GHz



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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 calculated 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.

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8/23/01
Pete Krebill

Frequency	SA reading	Sig Gen	CL	Gain	Gain	ERP	Limit	Margin
MHz	dBuV	dBm	dB	dBi	dBd	dBm	dBm	dB
Channel 25								
3702	47.76	-59.9	1.5	9	6.8	-54.6	-13	-41.6
5554	40.7	-64.8	2.3	10	7.8	-59.3	-13	-46.3
Channel 600								
3760	45.61	-60.6	1.5	9	6.8	-55.3	-13	-42.3
5640	39.25	-62.7	2.3	10	7.8	-57.2	-13	-44.2
Channel 1175								
3817	48.69	-58.4	1.5	9	6.8	-53.1	-13	-40.1
5726	42.93	-58.5	2.3	10	7.8	-53	-13	-40
Noise floor readings below:								
7405	28	-90	3	10.9	8.7	-84.3	-13	-71.3
9256	31.3	-90	6.2	11	8.8	-87.4	-13	-74.4
11107	30.42	-85.2	6.4	12.2	10	-81.6	-13	-68.6
12959	33.5	-70.2	5.8	11.8	9.6	-66.4	-13	-53.4
14800	34.8	-65.2	8	13.8	11.6	-61.6	-13	-48.6
16661	34.77	-60.2	10	12.5	10.3	-59.9	-13	-46.9
185125	34.98	-53.2	14.6	23.5	21.3	-46.5	-13	-33.5

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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. 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. The block edge emissions were measured at each temperature after the temperature stabilized. The procedure described in the *Spurious Emissions at Antenna Terminal* section for measuring block edge 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 of this report for measuring block edge emissions was used.

Test Results:
Block edge measurements were compliant with the FCC 24.238 limits for all of the conditions listed above.

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SETUP PHOTOS

ANTENNA CONDUCTED & FREQUENCY STABILITY

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EIRP RADIATED

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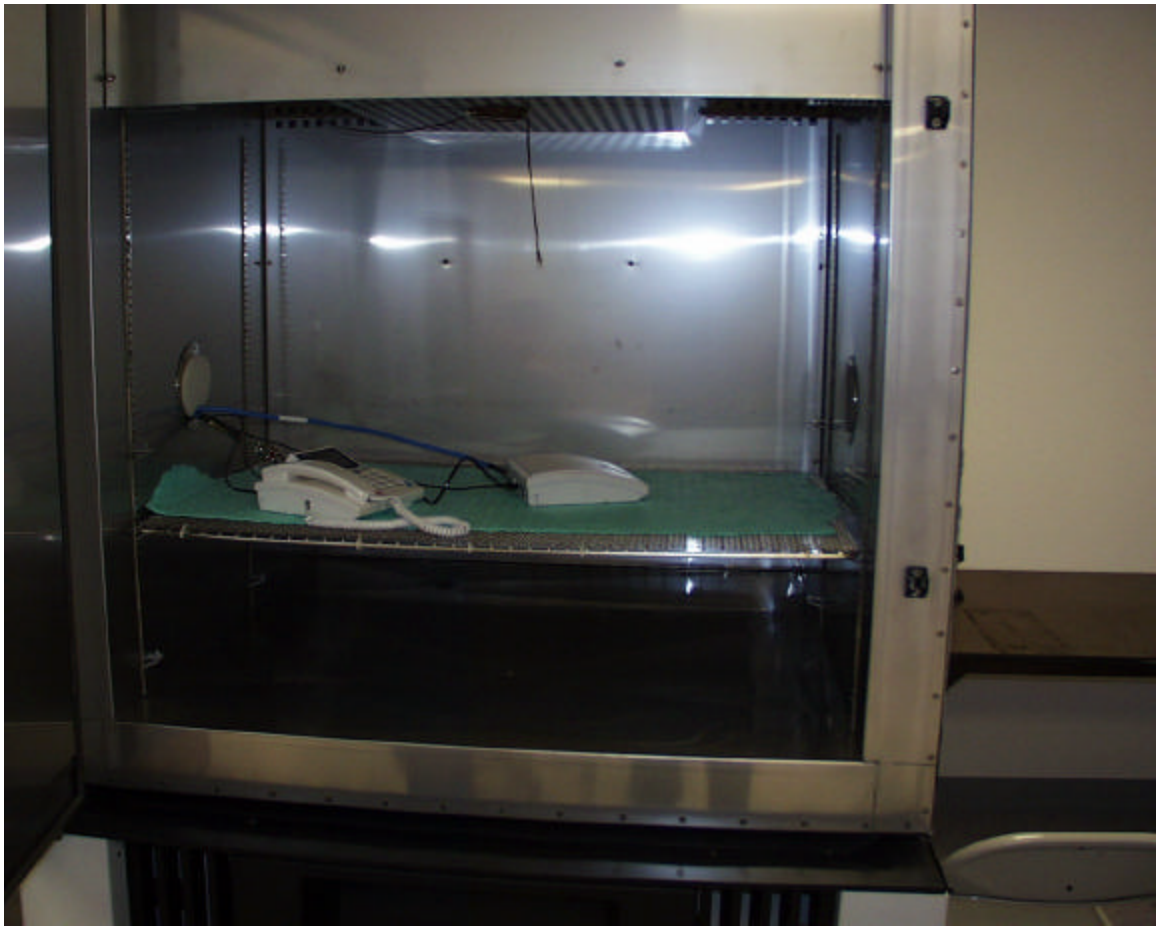

ANTENNA CONDUCTED & FREQUENCY STABILITY

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SPURIOUS RADIATED

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SUBSTITUTION

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