EMC EMISSION - TEST REPORT
UNITED STATES STANDARD 47 CFR, PART 15, SUBPART C

Test Report File No.	:	**SC106727-03F**	Date of Issue: 05 March 2002
Model / Serial No.	:	**40400-XX[1] / ENGR UNIT #1**	
Product Type	:	Spread Spectrum Radio FCC ID: HZB-US58-B60[2]	
Applicant	:	WESTERN MULTIPLEX CORPORATION	
Manufacturer	:	WESTERN MULTIPLEX CORPORATION	
License holder	:	WESTERN MULTIPLEX CORPORATION	
Address	:	1196 Borregas Avenue	
	:	Sunnyvale, CA 94089	
Test Result	:	■ **Positive[3]** ☐ **Negative**	
Test Project Number Reference(s)	:	**SC106727-03F**	
Total pages - Test Report	:	82	

NOTES: (1) 40400-25 (20 megabytes) and 40400-65 (20 to 60 megabytes)
(2) References to UNII and HZB-U58-B60 in the report should be Spread Spectrum and HZB-US58-B60.
(3) See General Remarks.

NOTE: All test equipment used by TÜV Product Service during testing is calibrated and traceable to NIST.

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

DIRECTORY - EMISSIONS
Test Report

Technical Documentation

Appendices

(*) Data supplied by Western Multiplex.

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to the following regulations:

☐ - EN 50081-1 / 1991

☐ - EN 55011 / 1998	☐ - Group 1 ☐ - Class A	☐ - Group 2 ☐ - Class B
☐ - EN 55014 / 1993	☐ - Household appliances and similar ☐ - Portable tools ☐ - Semiconductor devices	
☐ - EN 55022 / 1987	☐ - Class A	☐ - Class B
☐ - EN 55022 / 1998	☐ - Class A	☐ - Class B
☐ - VCCI	☐ - Class A ITE	☐ - Class B ITE

■ - 47 CFR Part 15, Subpart C

- ■ - 15.247(c)
- ■ - 15.207
- ■ - 15.247(b)
- ■ - 15.209(a)
- ■ - 15.109(a)
- ■ - 15.205
- ■ - 15.247(d)*
- ■ - 15.247(a)(2)*
- ■ - 15.247(e)*

☐ - AS/NZS 3548: 1995	☐ - Class A	☐ - Class B
☐ - CISPR 11 (1997)	☐ - Group 1 ☐ - Class A	☐ - Group 2 ☐ - Class B
☐ - CISPR 22 (1997)	☐ - Class A	☐ - Class B

(*) Data supplied by Western Multiplex. See Appendix D.

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Environmental Conditions In The Laboratory:

	Actual
Temperature:	: 23 °C
Relative Humidity:	: 50 %
Atmospheric Pressure:	: 100.0 kPa

Power Supply Utilized:

Power supply system : 115 V / 60 Hz / 1ϕ

Symbol Definitions:

■ - Applicable
☐ - Not Applicable

SUMMARY

SPECIFICATION	RESULT
15.247(c), Conducted Spurious	**Pass**
15.247(b) Output Power	**Pass**
15.207 Conducted Emissions	**Pass**
15.209 Radiated Spurious	**Pass**
15.109 Radiated Emissions	**Pass**
15.205 Restriced Band Emissions	**Pass**
15.247(d) Power Density	**Pass***
15.247(a)(2) 6 dB Bandwidth	**Pass***
15.247(e) Processing Gain	**Pass***

(*) Data supplied by Western Multiplex. See Appendix D for data and test results verification.

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Emissions Test Conditions: Output Power, FCC Part 15, Paragraph 15.247(b)

The *EMISSIONS* measurements were performed at the following test location:

☐ - Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
HP8900D	802	Peak Power Meter	Hewlett Packard	3607U00653	04/02

Result :
■ - Pass ☐ - Fail

Remarks: _____

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Emissions Test Conditions: Conducted Emission, FCC Part 15, Paragraph 15.207

The *EMISSIONS* measurements were performed at the following test location:

☐ - Test not applicable

■ - SR-3, Shielded Room, 12' x 20' x 8', Metal Chamber

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
9252-50-R-24-BNC	458	LISN, 50 µH /250 µH/50 Ω/ 0.25 µF	Solar Electronics Co.	941719	04/02
ESHS 30	459	EMI Test Receiver	Rohde & Schwarz	832354/004	11/01
CAT-20	602	20 dB Attenuator	Mini-Circuits	--	09/02

Result :

■ - Pass ☐ - Fail

Remarks: _____

Emissions Test Conditions: Radiated Spurious, Restricted Band, FCC Part 15, Paragraphs 15.209(a); 15.109(a); 15.205

The *EMISSIONS* measurements were performed at the following test location:

☐ - Test not applicable

■ - Roof (Small Open Area Test Site) (Calibration Due Date: 16 July 2002)
■ - Canyon #2 (3- and 10-Meter Open Area Test Site), Carroll Canyon, San Diego (Calibration Due Date: 12 July 2002)

Testing was performed at a test distance of :

■ - 3 meters

Test Equipment Used :

Model No.	Prop. No.	Description	Manufacturer	Serial No.	Cal Due Date
LPB 2520/A	739	Antenna Bilog	Antenna Research	1170	04/02
ESVS 30	427	EMI Test Receiver	Rohde & Schwarz	830350/006	11/01
8566B	823	Spectrum Analyzer	Hewlett Packard	2332A02751	07/02
HP8445B	809	Automatic Preselector	Hewlett Packard	1442A01127	11/01
AFD3-0208-40-ST	367	PreAmp, 2GHz-8 GHz	Miteq Inc	155382	--
3115	251	Antenna, Horn	Electro Mechanics Co	2595	10/02
3146	244	Antenna	Electro Mechanics Co	1063	02/02
3115	453	Double Ridge Antenna 1GHz-18 GHz	EMCO	9412-4364	10/02
AMF-5D-010180-35-10P	719	PreAmp, 2GHz-20GHz	TUV PS	549460	04/02
HP8586B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	02/02
HP11970K	652	Mixer	Hewlett Packard	3003A05400	--
12A18115300	6377	Antenna, Horn 18GHz-26 GHz	MI Technologies	21554MB	--

Result :
■ - Pass ☐ - Fail

Remarks: Restricted Bands: No signals were measurable at 3 meters. EUT moved to 1 meter distance. Special limit adjusted for 1 meter.

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Equipment Under Test (EUT) Test Operation Mode - Emissions Tests :

The equipment under test was operated under the following conditions during emissions testing:

☐ - Standby

☐ - Test Program (H - Pattern)

☐ - Test Program (Color Bar)

☐ - Test Program (Customer Specified)

☐ - Practice Operation

■ - Normal Operating Mode

☐ - _____

Configuration of the equipment under test:

☐ - See Constructional Data Form in Appendix B - Page B2

■ - See Product Information Form(s) in Appendix B - Page B2

The following peripheral devices and interface cables were connected during the testing:

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - _____ Type : _____

☐ - unshielded power cable

☐ - unshielded cables

☐ - shielded cables MPS.No.: _____

☐ - customer specific cables

☐ - _____

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

GENERAL REMARKS:

NOTES: 1) All photographs in this report are representative of setup for maximum emissions.
2) Radiated Emission in Restricted Bands - no signals were measurable at 3 meters. EUT moved to 1 meter distance. Special limit adjusted for 1 meter
3) Data for FCC Part 15, Paragraphs 15.247(d), Power Density; 15.247(a)(2), 6 dB Bandwidth; and 15.247(e) Processing Gain; and 15.247(c), Out of Band Antenna Conducted Emissions were supplied by the Western Multiplex. See Appendix D for data and test results verification.

SUMMARY:

All tests according to the regulations cited on page 3 were

■ - Performed[2,3]

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements cited on page 3.[2,3]

☐ - **Does not** fulfill the general approval requirements cited on page 3.

Statement of Measurement Uncertainty

The data and results referenced in this document are true and accurate. The measurement uncertainty is calculated to be ±2 dB for conducted emissions and ±4 dB for radiated emissions.

Equipment Received Date: 24 September 2001

Testing Start Date: 24 September 2001

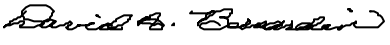
Testing End Date: 04 October 2001

- TÜV PRODUCT SERVICE, INC. -

Responsible Engineer:

Jim Owen
(EMC Chief Engineer)

Responsible Engineer:



Dave Bernardin
(EMC Engineer)

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Technical Documentation

Test Data Sheets

and

Test Setup Drawing(s)

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Output Power

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

QPSK 3/4 Modulation				
Frequency MHz	Output Power mW	Output Power dBm	EIRP Limit dBm	Max Gain dBi
Ch 5 5908.56	49.7	17.0	36	19.0
Ch 2 5768.06	49.3	16.9	36	19.1
Ch 0 5740.40	48.8	16.9	36	19.1

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Conducted Emissions

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

TUV Product Service
Powerline Conducted Emissions

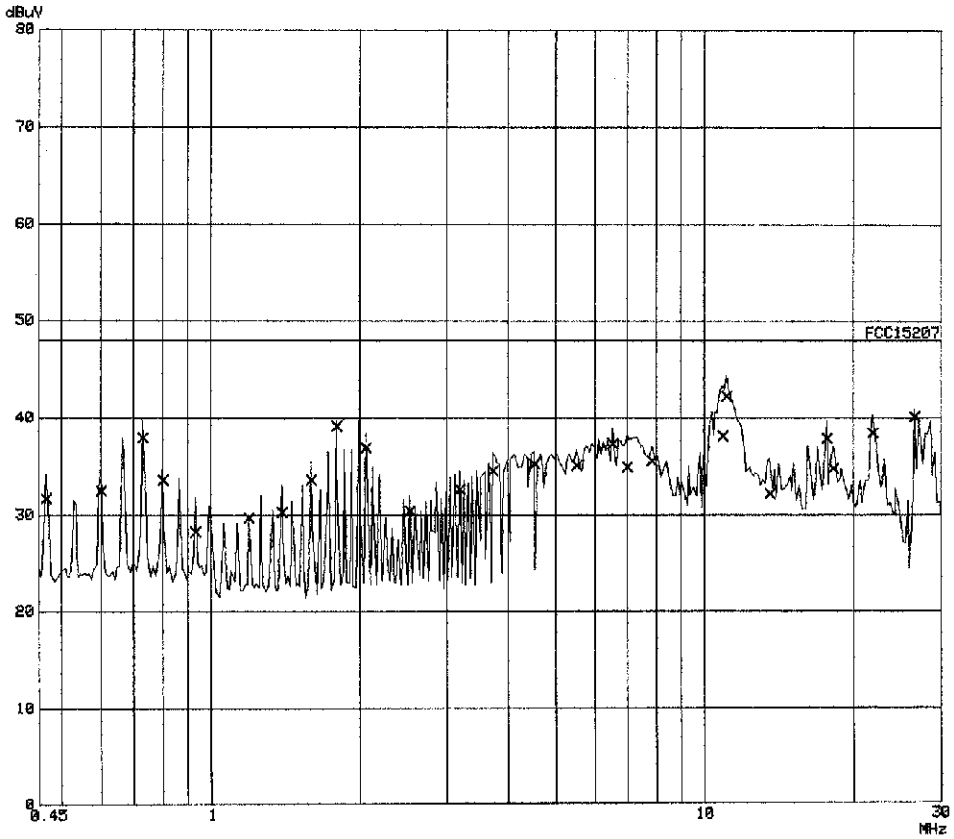
EUT: Tsunami Multipoint Base Station
Manuf: Western multiplex
Op Cond: 110 Vac to -48Vdc
Operator: Dave Bernardin
Test Spec: FCC Part 15 B
Comment: 110V ac 60 Hz Line 1Channel 6a QPSK-3/4
SC106727
Date: 24. Sep 01 10:14

Scan Settings (2 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	1M	5k	10k	PK	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	9k	30M	20dBLISN

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 35dB



TÜV PRODUCT SERVICE

TUV Product Service
Powerline Conducted Emissions

EUT: Tsunami Multipoint Base Station
Manuf: Western multiplex
Op Cond: 110 Vac to -48Vdc
Operator: Dave Bernardin
Test Spec: FCC Part 15 B
Comment: 110V ac 60 Hz Line 1Channel 6a QPSK-3/4
SC106727
Date: 24. Sep 01 10:14

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.46500	31.7	48.0
0.60000	32.5	48.0
0.73000	38.0	48.0
0.80000	33.6	48.0
0.93000	28.2	48.0
1.19500	29.7	48.0
1.39500	30.3	48.0
1.59500	33.6	48.0
1.79500	39.2	48.0
2.06000	36.9	48.0
2.53000	30.4	48.0
3.19500	32.6	48.0
3.72500	34.5	48.0
4.52500	35.3	48.0
5.52000	35.1	48.0
6.52000	37.3	48.0
6.99000	35.0	48.0
7.85000	35.6	48.0
10.90500	38.2	48.0
11.11000	42.2	48.0
13.57000	32.1	48.0
17.69500	37.9	48.0
18.24500	34.8	48.0
21.91000	38.5	48.0
26.61000	40.1	48.0

* limit exceeded

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

TUV Product Service
Powerline Conducted Emissions

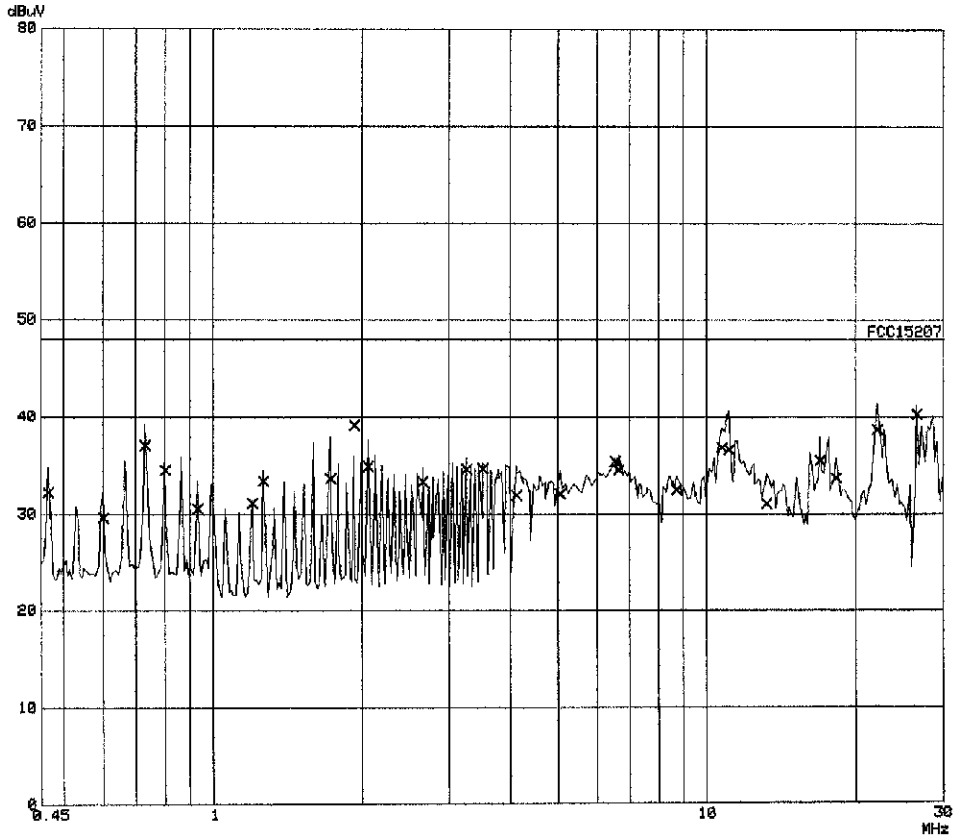
EUT: Tsunami Multipoint Base Station
Manuf: Western multiplex
Op Cond: 110 Vac to -48Vdc
Operator: Dave Bernardin
Test Spec: FCC Part 15 B
Comment: 110V ac 60 Hz Line 2Channel 6a QPSK-3/4
SC106727
Date: 24. Sep 01 10:21

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
450k	1M	5k	10k	PK	100ms	AUTO	LN OFF	60dB
1M	30M	5k	10k	PK	2ms	AUTO	LN OFF	60dB

Transducer No.	Start	Stop	Name
1	9k	30M	20dBLISN

Final Measurement: x QP
Meas Time: 1 s
Subranges: 25
Acc Margin: 35dB



TÜV PRODUCT SERVICE

TUV Product Service
Powerline Conducted Emissions

EUT: Tsunami Multipoint Base Station
Manuf: Western multiplex
Op Cond: 110 Vac to -48Vdc
Operator: Dave Bernardin
Test Spec: FCC Part 15 B
Comment: 110V ac 60 Hz Line 2Channel 6a QPSK-3/4
SC106727
Date: 24. Sep 01 10:21

Final Measurement Results:

Frequency MHz	QP Level dBuV	QP Limit dBuV
0.46500	32.2	48.0
0.60000	29.6	48.0
0.73000	37.1	48.0
0.80000	34.6	48.0
0.93000	30.5	48.0
1.20000	31.2	48.0
1.26500	33.5	48.0
1.72500	33.7	48.0
1.93000	39.2	48.0
2.06000	34.9	48.0
2.66000	33.3	48.0
3.26000	34.6	48.0
3.52500	34.7	48.0
4.12000	31.9	48.0
5.05500	32.1	48.0
6.52000	35.4	48.0
6.65000	34.6	48.0
8.71500	32.5	48.0
10.77500	36.9	48.0
11.10500	36.6	48.0
13.24000	31.0	48.0
16.96000	35.5	48.0
18.30500	33.7	48.0
22.15000	38.7	48.0
26.61000	40.3	48.0

* limit exceeded

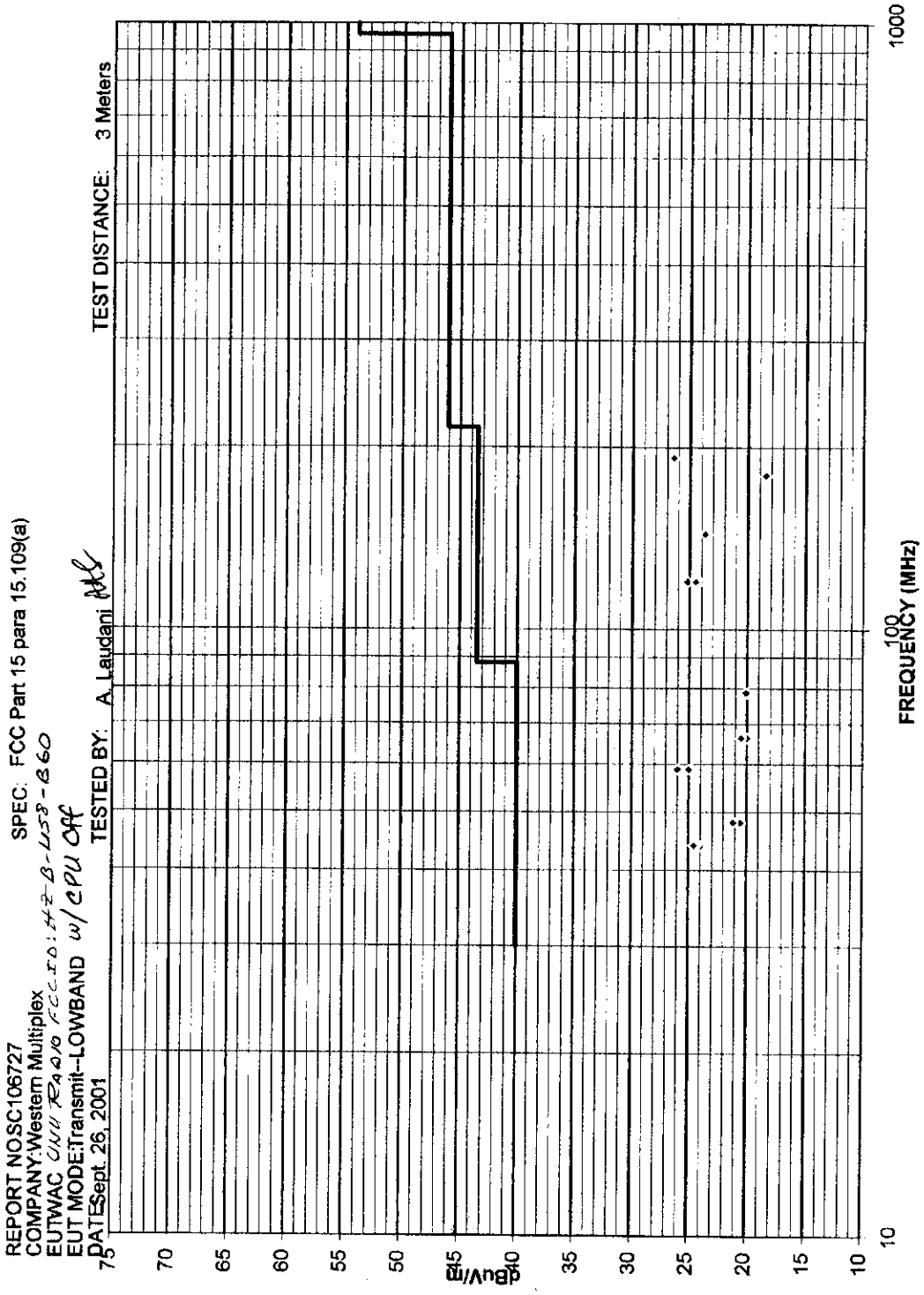
TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

Radiated Spurious and Restricted Bands

NOTE: 1) Reference to UNII should be Spread Spectrum and reference to HZB-U58-B60 should be HZB-US58-B60.

2) The modulation type for this filling from the following data records is QPSK ¾

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364


REPORT NO:SC106727
COMPANY:Western Multiplex
EUT/AC CNW RA400 FCC ID: HZB-US58-B60
EUT MODE:Transmit-LOWBAND w/ cPU Off
DATE:Sept. 26, 2001
SPEC: FCC Part 15 para 15.109(a)
TESTED BY: A. Laudani
TEST DISTANCE: 3 Meters
dBuV/m
FREQUENCY (MHz)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
1000
100
10

REPORT No: SC106727 SPEC: FCC Part 15 para 15.109(a)

CUSTOMER: Western Multiplex TEST DIST: 3 Meters

E.U.T: WAC UNII Radio FCC ID: HZB-US58-B60 TEST SITE: 2

EUT MODE: Transmit–LOWBAND w/ CPU OFF BICONICAL: 739

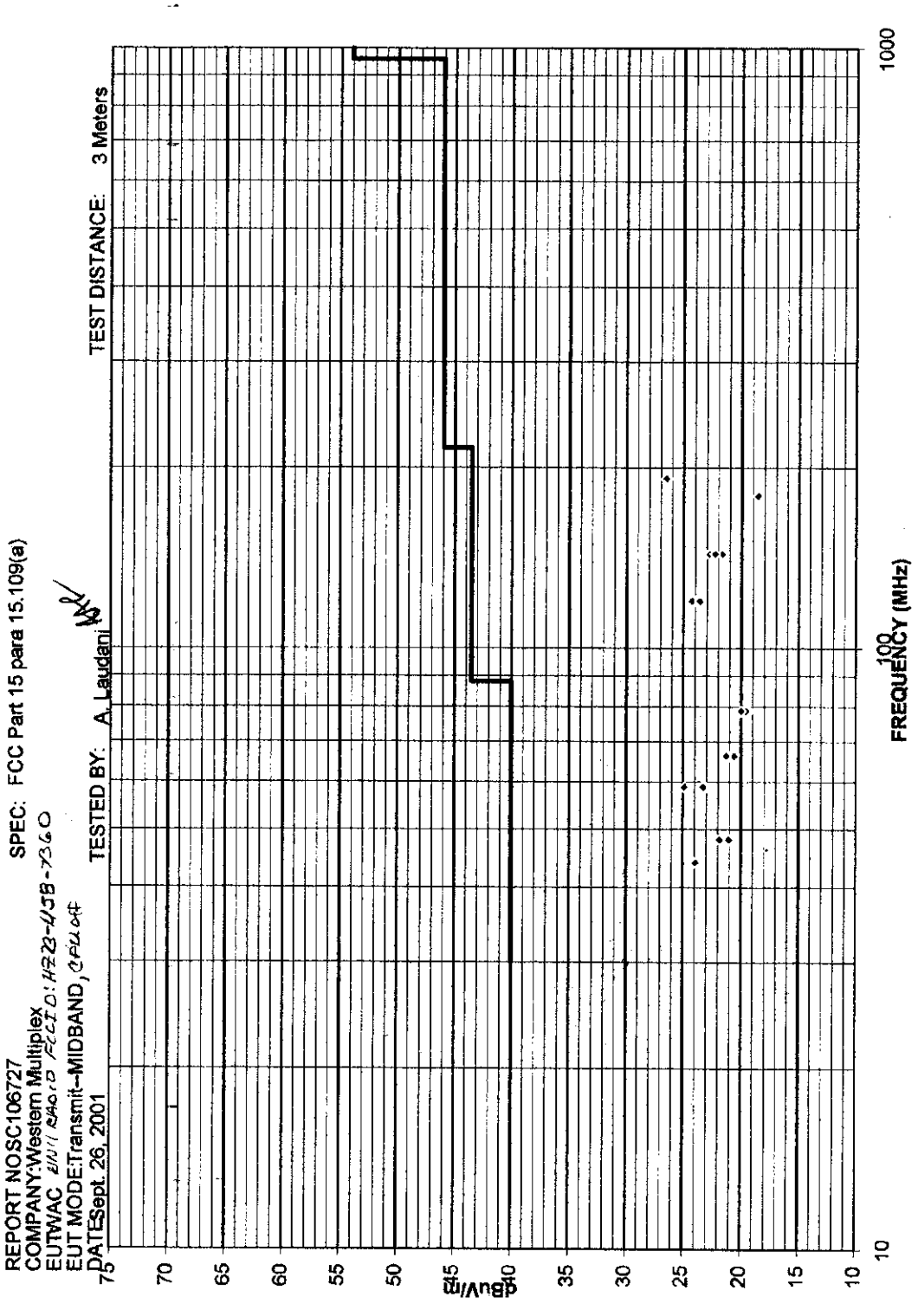
DATE: Sept. 26, 200 TESTED BY: A. Lauciani LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 427

Temperature: 28 Relative Humidity: 44

EUT MARGIN -14.0 dB at 58.83 MHz ver. 1.8

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
43.90	5.7	4.6	18.3	24.0	40	-16.0	0	1	8QAM -6A
48.00	3.8	1.6	17.5	21.3	40	-18.7	0	1	8QAM -6A
58.83	12.1	2.5	13.9	26.0	40	-14.0	60	1	8QAM -6A
66.21	9.8	2.4	10.5	20.3	40	-19.7	60	1	8QAM -6A
78.71	11	4.3	9.1	20.1	40	-19.9	60	1	8QAM -6A
120.00	9.4	3.2	14.8	24.2	43.5	-19.3	60	1	8QAM -6A
144.00	11.8	1.2	11.9	23.7	43.5	-19.8	0	1	8QAM -6A
180.00	6.3	0	12.2	18.5	43.5	-25.0	0	1	8QAM -6A
192.00	13.4	7.2	13.0	26.4	43.5	-17.1	300	1	8QAM -6A
43.99	6.1	3.5	18.3	24.4	40	-15.6	0	1	16QAM -6A
48.00	3.1	2.5	17.5	20.6	40	-19.4	0	1	16QAM -6A
58.83	10.9	2.3	13.9	24.8	40	-15.2	60	1	16QAM -6A
66.21	9.5	2.8	10.5	20.0	40	-20.0	60	1	16QAM -6A
78.71	10.9	4	9.1	20.0	40	-20.0	60	1	16QAM -6A
120.00	10.4	3.2	14.8	25.2	43.5	-18.3	60	1	16QAM -6A
144.00	11.6	0.9	11.9	23.5	43.5	-20.0	60	1	16QAM -6A
43.99	6.3	3.5	18.3	24.6	40	-15.4	0	1	QPSK3/4 -6A
48.00	3.7	1.7	17.5	21.2	40	-18.8	0	1	QPSK3/4 -6A
58.83	11.1	3.4	13.9	25.0	40	-15.0	60	1	QPSK3/4 -6A
66.21	10	2.3	10.5	20.5	40	-19.5	60	1	QPSK3/4 -6A
78.71	11	3.4	9.1	20.1	40	-19.9	60	1	QPSK3/4 -6A
120.00	9.7	3.6	14.8	24.5	43.5	-19.0	60	1	QPSK3/4 -6A
144.00	11.8	1	11.9	23.7	43.5	-19.8	60	1	QPSK3/4 -6A


REPORT NOSC106727
COMPANY:Western Multiplex
EUT/MAC
EUT MODE:Transmit-MIDBAND,
DATE:Sept. 26, 2001
SPEC: FCC Part 15 para 15.109(a)
TESTED BY: A. Laudani
TEST DISTANCE: 3 Meters
dBuV/m
FREQUENCY (MHz)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
100
1000

REPORT No: SC106727 SPEC: FCC Part 15 para 15.109(a)

CUSTOMER: Western Multiplex TEST DIST: 3 Meters

E U T: WAC UNII Radio FCC ID: HZB-US58-B60 TEST SITE: 2

EUT MODE: Transmit–MIDBAND, CPM QPSK BICONICAL: 739

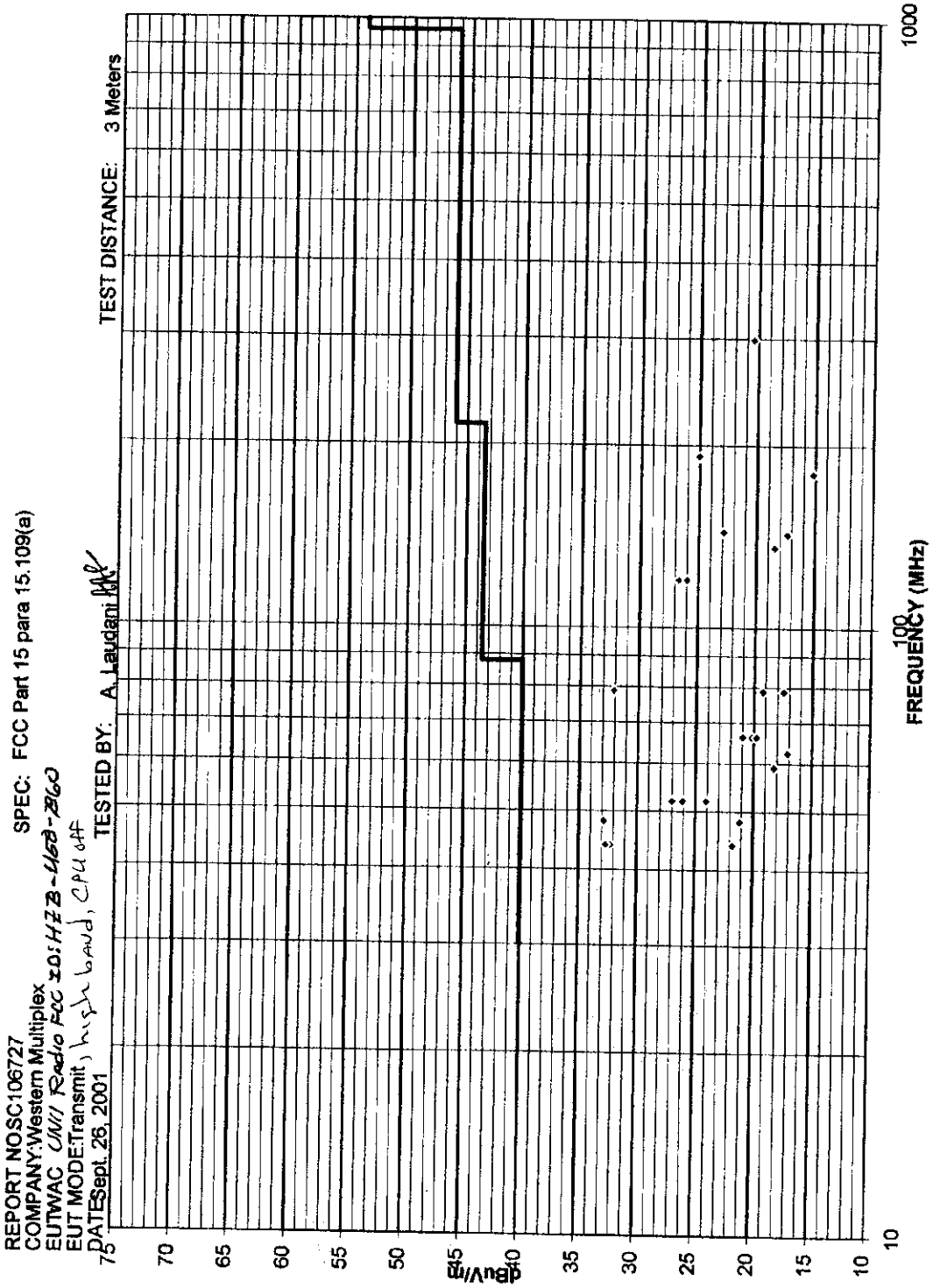
DATE: Sept. 26, 200 TESTED BY: A. Laudani LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 427

Temperature: 28 Relative Humidity: 44

EUT MARGIN -15.1 dB at 58.83 MHz ver 1.8

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
43.90	6	3.4	18.3	24.3	40	-15.7	0	1	8QAM -6C
48.00	3.5	2	17.5	21.0	40	-19.0	0	1	8QAM -6C
58.83	11	0	13.9	24.9	40	-15.1	60	1	8QAM -6C
66.21	10.4	2.4	10.5	20.9	40	-19.1	60	1	8QAM -6C
78.71	10.3	3.5	9.1	19.4	40	-20.6	60	1	8QAM -6C
120.00	9.1	3.1	14.8	23.9	43.5	-19.6	60	1	8QAM -6C
144.00	9.8	1	11.9	21.7	43.5	-21.8	0	1	8QAM -6C
180.00	6.4	0	12.2	18.6	43.5	-24.9	0	1	8QAM -6C
192.00	9	13.5	13.0	26.5	43.5	-17.0	0	1	8QAM -6C
43.99	5.8	3.2	18.3	24.1	40	-15.9	0	1	16QAM -6C
48.00	4.4	3	17.5	21.9	40	-18.1	0	1	16QAM -6C
58.83	9.2	2.2	13.9	23.1	40	-16.9	60	1	16QAM -6C
66.21	10.1	2.6	10.5	20.6	40	-19.4	60	1	16QAM -6C
78.71	10.5	3.9	9.1	19.6	40	-20.4	60	1	16QAM -6C
120.00	9.5	3.2	14.8	24.3	43.5	-19.2	60	1	16QAM -6C
144.00	10.9	1.2	11.9	22.8	43.5	-20.7	60	1	16QAM -6C
43.99	5.7	3.7	18.3	24.0	40	-16.0	0	1	QPSK3/4 -6C
48.00	3.6	3	17.5	21.1	40	-18.9	0	1	QPSK3/4 -6C
58.83	9.4	3	13.9	23.3	40	-16.7	60	1	QPSK3/4 -6C
66.21	10.8	2.5	10.5	21.3	40	-18.7	60	1	QPSK3/4 -6C
78.71	10.9	4.4	9.1	20.0	40	-20.0	60	1	QPSK3/4 -6C
120.00	8.8	3.1	14.8	23.6	43.5	-19.9	60	1	QPSK3/4 -6C
144.00	10.4	1.4	11.9	22.3	43.5	-21.2	60	1	QPSK3/4 -6C


REPORT NO:SC106727
COMPANY:Western Multiplex
EUT:WAC CMU Radio FCC ID: HZB-US58-B60
EUT MODE:Transmit, high band, CPU 04F
DATE:Sept. 26, 2001
SPEC: FCC Part 15 para 15.109(a)
TESTED BY: A. Laudani
TEST DISTANCE: 3 Meters
dBuV/m
FREQUENCY (MHz)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
10
100
1000

REPORT No: SC106727 SPEC: FCC Part 15 para 15.109(a)

CUSTOMER: Western Multiplex TEST DIST: 3 Meters

EUT: WAC UNII Radio FCC ID: HZB-US58-B60 TEST SITE: 2

EUT MODE: Transmit High band, CH Low BICONICAL: 739

DATE: Sept. 26, 200 TESTED BY: A. Laudani LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth. RCVR: 427

Temperature: 28 Relative Humidity: 44

EUT MARGIN -7.1 dB at 48 MHz ver 1.8

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
43.90	14	5	18.3	32.3	40	-7.7	0	1	16QAM -6F
48.00	15.4	4.9	17.5	32.9	40	-7.1	0	1	16QAM -6F
52.00	10.5	0.3	16.5	27.0	40	-13.0	0	1	16QAM -6F
59.10	4.5	-0.1	13.8	18.3	40	-21.7	90	1	16QAM -6F
62.40	5	2	12.1	17.1	40	-22.9	90	1	16QAM -6F
66.21	8	10.5	10.5	21.0	40	-19.0	60	1	16QAM -6F
78.71	22.3	23	9.1	32.1	40	-7.9	60	1	16QAM -6F
120.00	11	3.3	14.8	25.8	43.5	-17.7	60	1	16QAM -6F
136.00	5.6	-0.1	12.9	18.5	43.5	-25.0	180	1	16QAM -6F
143.00	5.4	-1	12.0	17.4	43.5	-26.1	110	1	16QAM -6F
144.00	11	-1	11.9	22.9	43.5	-20.6	280	1	16QAM -6F
180.00	3	2	12.2	15.2	43.5	-28.3	190	1	16QAM -6F
192.00	12	10.8	13.0	25.0	43.5	-18.5	270	1	16QAM -6F
299.00	3.1	-0.2	17.4	20.5	46	-25.5	130	1	16QAM -6F
43.90	14.4	5	18.3	32.7	40	-7.3	0	1	8QAM -6F
48.00	3.7	3	17.5	21.2	40	-18.8	0	1	8QAM -6F
78.71	8.4	5	9.1	17.5	40	-22.5	60	1	8QAM -6F
52.00	7.6	0	16.5	24.1	40	-15.9	60	1	8QAM -6F
120.00	11.9	3	14.8	26.7	43.5	-16.8	60	1	8QAM -6F
66.21	9.7	2	10.5	20.2	40	-19.8	60	1	8QAM -6F
43.90	3.5	-2	18.3	21.8	40	-18.2	0	1	QPSK3/4 -6F
48.00	3.7	1.4	17.5	21.2	40	-18.8	0	1	QPSK3/4 -6F
52.00	9.6	1.1	16.5	26.1	40	-13.9	60	1	QPSK3/4 -6F
66.21	9.3	2	10.5	19.8	40	-20.2	60	1	QPSK3/4 -6F
78.71	10.2	3.6	9.1	19.3	40	-20.7	60	1	QPSK3/4 -6F
120.00	11.2	3	14.8	26.0	43.5	-17.5	60	1	QPSK3/4 -6F

REPORT No: SC106727 SPEC: FCC Part 15 para 15.109(a)

CUSTOMER: Western Multiplex TEST DIST: 3 Meters

E.U.T: WAC TEST SITE: 2

EUT MODE: NORMAL: transmit/receive BICONICAL: 739

DATE: Sept. 26, 200 TESTED BY: A. Laudani LOG PERIODIC: 739

NOTES: Quasi-Peak with 120 KHz measurement bandwidth RCVR: 427

Temperature: 28 Relative Humidity: 44 ver 1.8

FREQUENCY (MHz)	VERTICAL measured (dBuv)	HORIZONTAL measured (dBuV)	CORRECTION FACTOR (dB/m)	MAXIMUM CORRECTED (dBuV/m)	SPECIFIED LIMIT (dBuV/m)	EUT MARGIN (dB)	EUT ROTATION (degrees)	ANTENNA HEIGHT (meters)	NOTE
	L.O. leakage								L.O. LEAKAGE
452.60	-0.1	-0.5	21.7	21.6	46	-24.4	0-360	1	8QAM -6A CHANNEL 0
452.60	-0.1	-0.5	21.7	21.6	46	-24.4		1	8QAM -6C CHANNEL 2
452.60	-0.1	-0.5	21.7	21.6	46	-24.4		1	8QAM -6F CHANNEL 5
452.60	-0.5	-0.3	21.7	21.4	46	-24.6		1	16QAM -6A CHANNEL 0
452.60	-0.3	-0.6	21.7	21.4	46	-24.6		1	16QAM -6C CHANNEL 2
452.60	-0.1	-0.3	21.7	21.6	46	-24.4		1	16QAM -6F CHANNEL 5
452.60	-0.1	-0.8	21.7	21.8	46	-24.4		1	QPSK3/4 -6A CHANNEL 0
452.60	-0.4	-0.3	21.7	21.4	46	-24.6		1	QPSK3/4 -6C CHANNEL 2
452.60	-0.2	-0.4	21.7	21.5	46	-24.5	0-360	1	QPSK3/4 -6F CHANNEL 5

REPORT No: SC106727 TESTER: Dave Bernardin SPEC: FCC 15.209(a)

CUSTOMER: Western Multiplex TEST DIST: 3 Meters

E U T: UNII Radio FCCID: HZB-U58-B60 TEST SITE: Roof

EUT MODE: Normal Receive/Transmit BICONICAL: N/A

DATE: Sept. 27, 2001 LOG: N/A

NOTES: Duty Cycle= 100% OTHER: 453

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain + Preselector Loss

v.bela1a

FREQ (MHz)	VERT (dBuv) pk	VERT (dBuv) av	HORIZ (dBuv) pk	HORIZ (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
														LO 2 Leakage
5267.0417	27.9	17.3	29.3	19.4	21.4	**50.7**	**40.8**	74	54	-23.3	-13.2	0	1.2	8QAM Channel 0, 6A
5267.0417	30	19.5	29.9	19.5	21.4	**51.4**	**40.9**	75	54	-23.6	-13.1	0	1.2	16QAM Channel 0, 6A
5267.0417	29.2	19.45	28.7	19.5	21.4	**50.6**	**40.9**	74	54	-23.4	-13.1	0	1.2	QPSK3/4 Channel 0, 6A
5294.7083	28.05	19.5	28.1	17.9	21.5	**49.6**	**41.0**	74	54	-24.4	-13	0	1.1	8QAM Channel 2, 6C
5294.7083	31	19.45	26.9	17.8	21.5	**52.5**	**41.0**	74	54	-21.5	-13	0	1.1	16QAM Channel 2, 6C
5294.7083	28.5	19.15	28.1	17.9	21.5	**50.0**	**40.7**	74	54	-24	-13.3	0	1.1	QPSK3/4 Channel 2, 6C
5336.2083	28.6	20	29.7	19.9	21.6	**51.3**	**41.6**	74	54	-22.7	-12.4	0	1	8QAM Channel 5, 6F
5336.2083	28.6	20	27.6	19.9	21.6	**50.2**	**41.6**	74	54	-23.8	-12.4	0	1	16QAM Channel 5, 6F
5336.2083	28.8	20.2	29.1	19.9	21.6	**50.7**	**41.8**	74	54	-23.3	-12.2	0	1	QPSK3/4 Channel 5, 6F

REPORT No: SC106727 TESTER: Dave Bernardin SPEC: FCC 15.209(a) / 15.205

CUSTOMER: Wesern Multiplex TEST DIST: 3 Meters

E U T: UNII Radio FCCID: HZB-U58-B60 TEST SITE: Roof

EUT MODE: Normal Receive/Transmit BICONICAL: N/A

DATE: Oct. 04,2001 LOG: N/A

NOTES: Duty Cycle= 100% OTHER: 0

above 1GHz: RBW & VBW 1 MHz for Pk; RBW 1MHz and VBW 10Hz for AVG

below 1GHz: RBW & VBW 100 kHz for Pk; RBW 100kHz and VBW 10Hz for AVG

CF = Antenna Factor + Cable Loss - Preamplifier Gain

v.beta1a

FREQ (MHz)	VERT (dBuv) pk	VERT (dBuv) av	HORIZ (dBuv) pk	HORIZ (dBuv) av	CF (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes	
11480.8	43.3	31.2	42.1	31.1	15.6	**58.9**	**46.8**	74	54	-15.1	-7.21	0	1.5	8QAM Ch 0, 6A	CH 0 8 QAM
11536.14	42.3	31.2	43.4	31.2	15.5	**58.9**	**46.7**	74	54	-15.1	-7.26	0	1.2	16QAM Ch 0, 6A	CH 2
11612.14	42.8	30.7	43.1	30.6	15.4	**58.5**	**46.1**	74	54	-15.5	-7.88	0	1	QPSK 3/4 Ch 0, 6A	CH 5
11480.8	44.1	31.2	42.5	31.1	15.6	**59.7**	**46.8**	74	54	-14.3	-7.21	0	1.5	8QAM Ch 2, 6C	CH 0 16QAM
11536.14	42.4	31.1	42.6	31.2	15.5	**58.1**	**46.7**	74	54	-15.9	-7.26	0	1.2	16QAM Ch 2, 6C	CH 2
11612.14	42.6	30.7	43	30.6	15.4	**58.4**	**46.1**	74	54	-15.6	-7.88	0	1	QPSK 3/4 Ch 2, 6C	CH 5
11480.8	40.8	31.1	41.5	31.1	15.6	**57.1**	**46.7**	74	54	-16.9	-7.31	0	1.5	8QAM Ch 5, 6F	CH 0 QPSK
11536.14	42.3	31.2	42.3	31.1	15.5	**57.8**	**46.7**	74	54	-16.2	-7.26	0	1.2	16QAM Ch 5, 6F	CH 2
11612.14	42.1	30.6	42.3	30.7	15.4	**57.7**	**46.1**	74	54	-16.3	-7.88	0	1	QPSK 3/4 Ch 5, 6F	CH 5

Test Report #: SC106727 **Test Area:** SR5 **Date:** 4-Oct-01

Test Method FCC15.205(b) Restricted bands of operaton

EUT Model #: UNII Radio **EUT POWER:** 115 Vac/60 Hz

Temperature 23 C
Air Pressure: 100.1 kPa
Relative Humidity: 48 %

EUT Description FCC ID: HZB-U58-B60

NOTES: Mode: Receive/Transmit Normal Mode
No signals were measurable at 3 meters. The EUT was moved to one meter distance.
SPEC LIMIT was adjusted for one meter.

FREQ (MHz)	VERTICAL (dBuv) pk	VERTICAL (dBuv) av	HORIZONTAL (dBuv) pk	HORIZONTAL (dBuv) av	CORRECTION FACTOR (dB/m)	MAX LEVEL (dBuV/m) pk	MAX LEVEL (dBuV/m) av	SPEC LIMIT (dBuV/m) pk	SPEC LIMIT (dBuV/m) av	MARGIN (dB) pk	MARGIN (dB) av	EUT Rotation	Antenna Height	Notes
22961	31.5	19.8	31.5	19.8	32.92	**64.42**	**52.72**	84	64	-19.58	-11.28	0	1	8QAM CH 0, 6A
22961	32.4	19.9	32.4	19.9	32.92	**65.32**	**52.82**	84	64	-18.68	-11.18	0	1	16QAM CH 0, 6A
22961	31.5	19.8	31.5	19.8	32.92	**64.42**	**52.72**	84	64	-19.58	-11.28	0	1	QPSK 3/4 CH 0, 6A
23072	29.6	19.4	29.6	19.4	32.92	**62.52**	**52.32**	84	64	-21.48	-11.68	0	1	8QAM CH 2, 6C
23072	29.7	19.4	29.7	19.4	32.92	**62.62**	**52.32**	84	64	-21.38	-11.68	0	1	16QAM CH 2, 6C
23072	30.5	19.5	30.5	19.5	32.92	**63.42**	**52.42**	84	64	-20.58	-11.58	0	1	QPSK 3/4 CH 2, 6C
23244	29.6	19.4	29.6	19.4	32.96	**62.56**	**52.36**	84	64	-21.44	-11.64	0	1	8QAM CH 5, 6F
23244	29.4	19.4	29.4	19.4	32.96	**62.36**	**52.36**	84	64	-21.64	-11.64	0	1	16QAM CH 5, 6F
23255	29.8	19.5	29.8	19.5	32.96	**62.76**	**52.46**	84	64	-21.24	-11.54	0	1	QPSK 3/4 CH 5, 6F

Test Equipment Used:

Model Number	Prop. #	Description	Manufacturer	Serial No.	Cal. Date
hp8586B	407	Spectrum Analyzer	Hewlett Packard	2311A02209	2/15/02
hp11975A	719	Amplifier	Hewlett Packard	2517A00639	not req'r.
hp11970K	652	Mixer	Hewlett Packard	3003A05400	not req'r.
12A18 115300	0006377	Horn Antenna 18-26 GHz	MI Technologies	21554MB	not req'r.

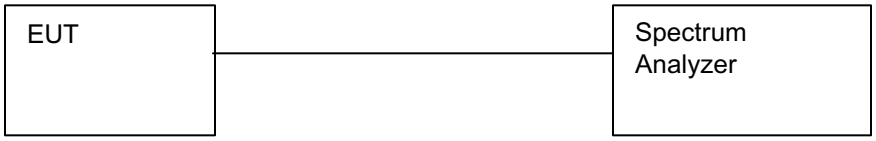
Tested Dave Bernardin

Signature

Reviewed by: Alan Laudani

Signature

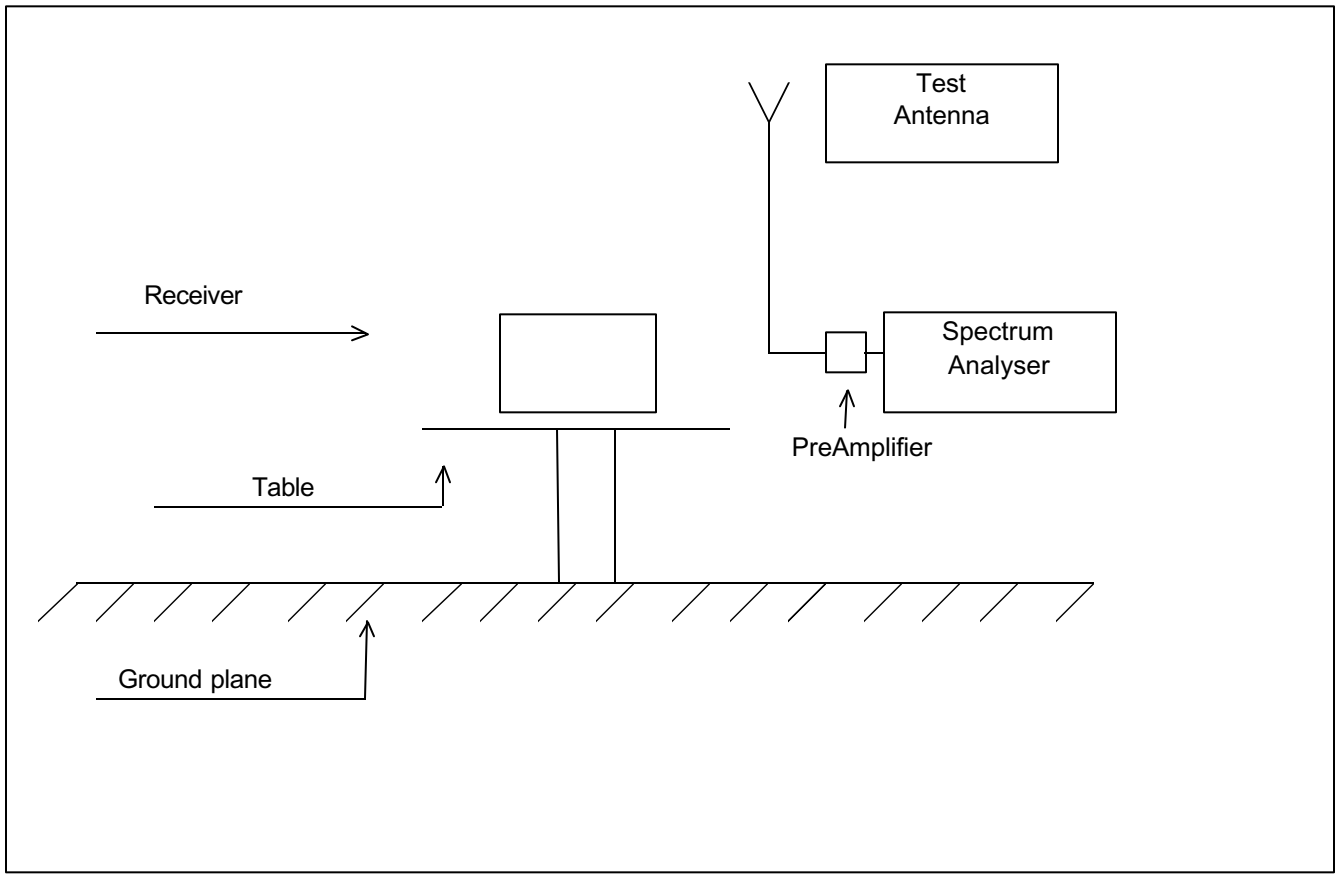
Conducted Spurious Test Setup



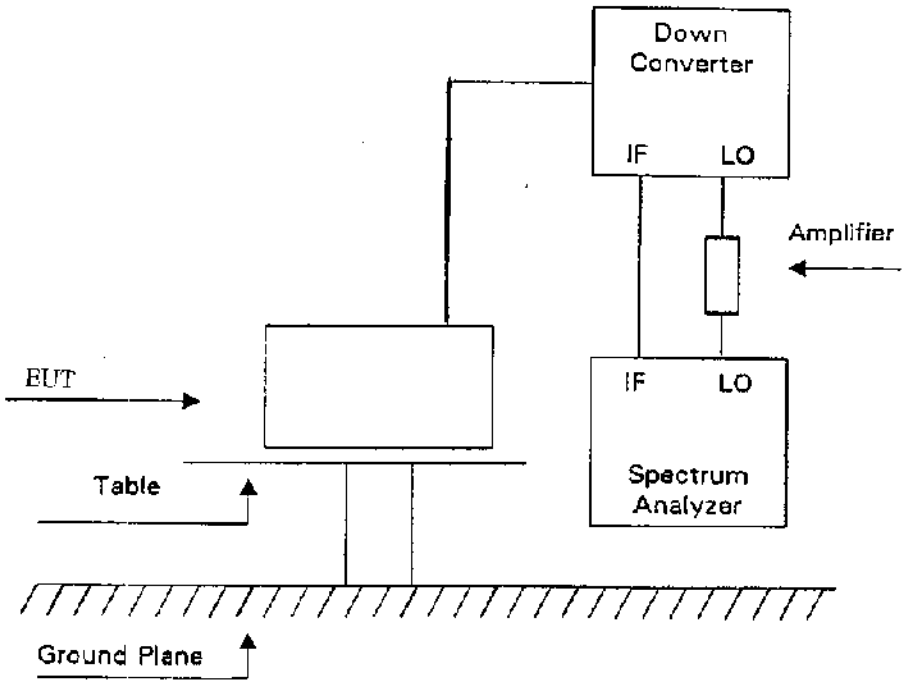
Output Power Test Setup

TÜV PRODUCT SERVICE 10040 Mesa Rim Road San Diego, CA 92121-2912 Phone 858 546 3999 FAX 858 546 0364

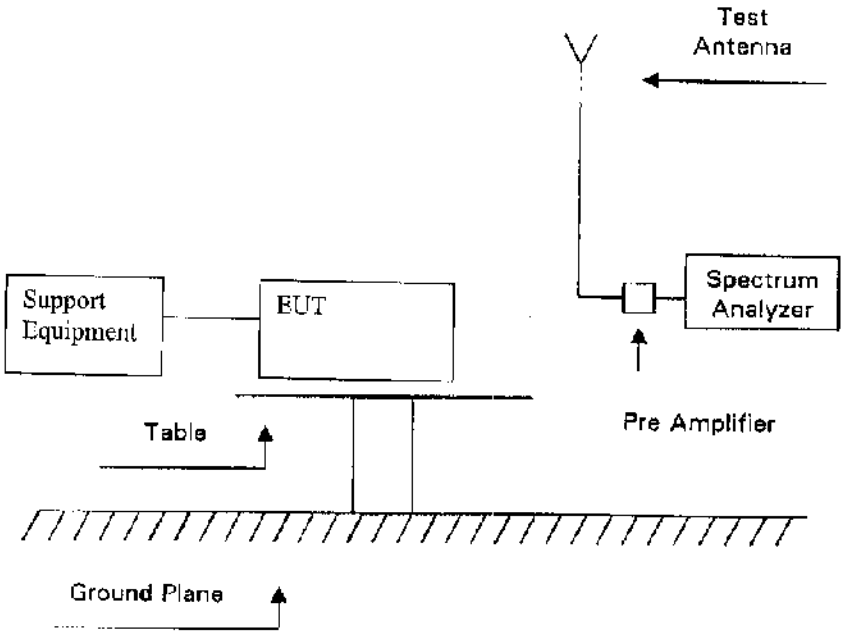
Radiated Spurious Emissions



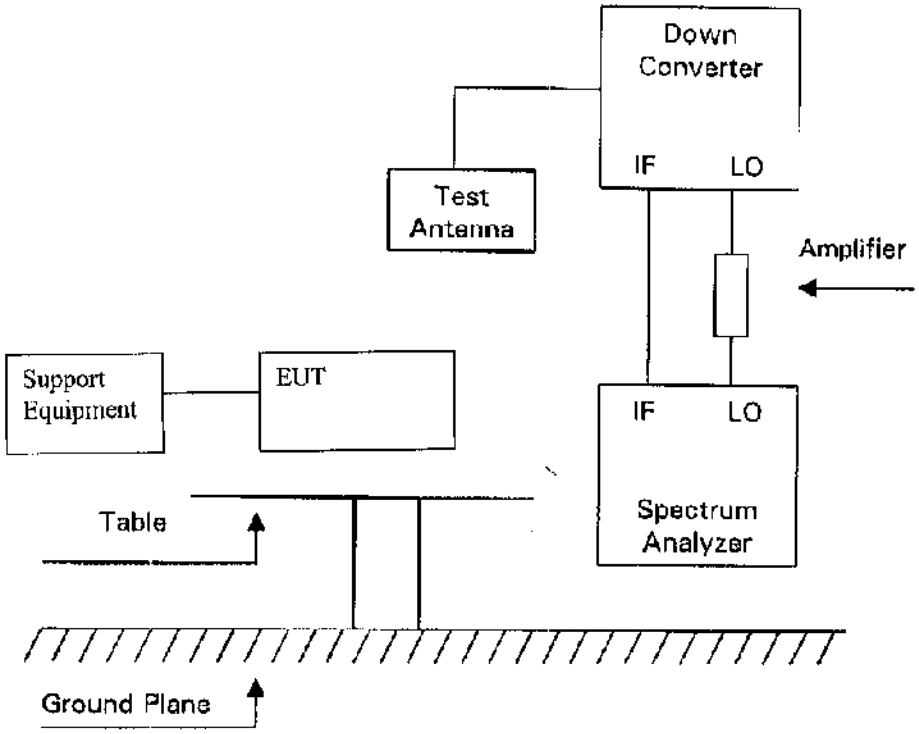
Test Setup for Out of Band Antenna Conducted Emission



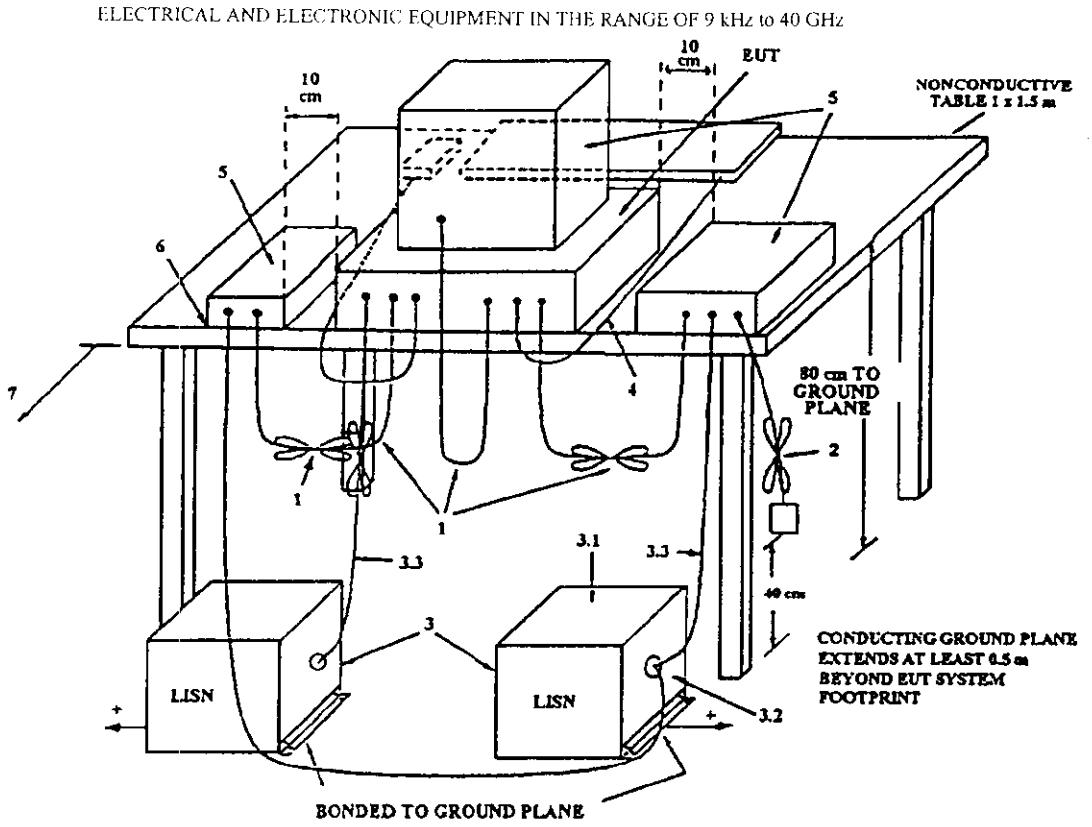
Test Setup for Radiated Emission in Restricted Bands and Radiated Emission from Receiver L.O.



Test Setup for Radiated Emission in Restricted Bands



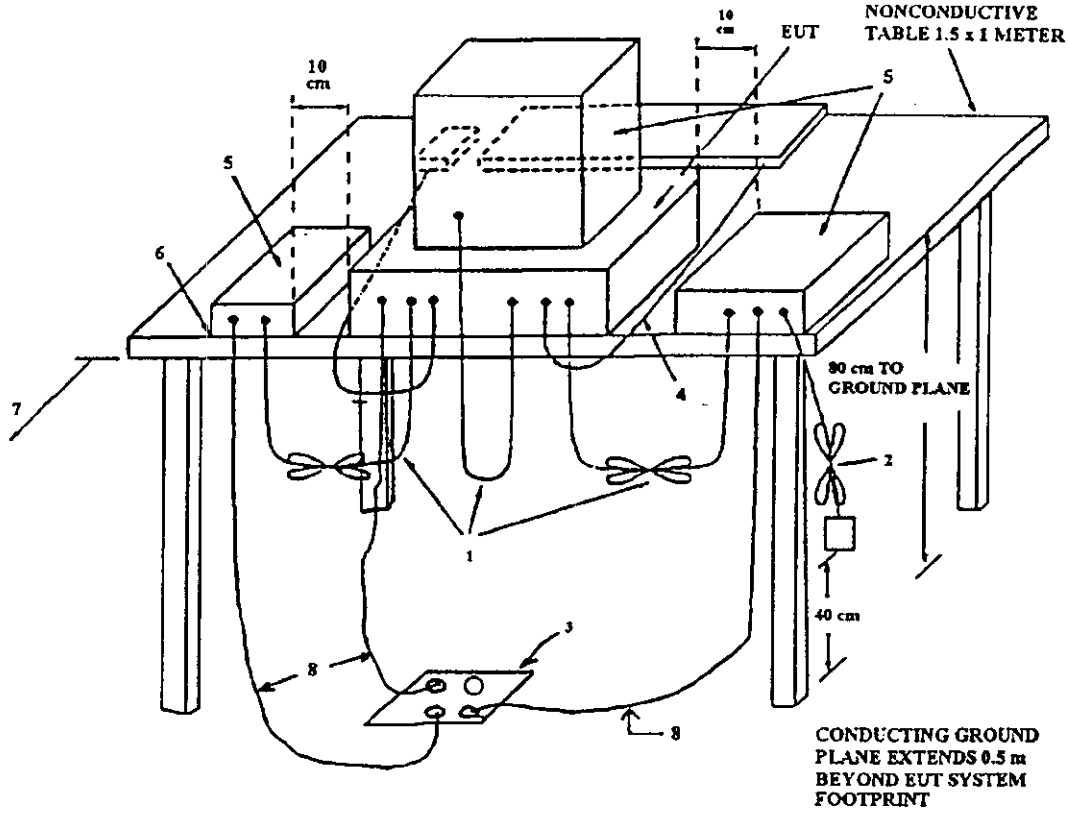
Conducted Emissions Test Setup, 0.15 to 30 MHz



LEGEND:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.
2. I/O cables that are connected to a peripheral shall be bundled in center. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
3. EUT connected to one LISN. Unused LISN connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, ground plane.
   - 3.1 All other equipment powered from second LISN.
   - 3.2 Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
   - 3.3 LISN at least 80 cm from nearest part of EUT chassis.
4. Cables of hand-operated devices, such as keyboards, mouses, etc., have to be placed as close as possible to the controller.
5. Non-EUT components being tested.
6. Rear of EUT, including peripherals, shall be all aligned and flush with rear of tabletop.
7. Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the floor ground plane.

Radiated Emissions Test Setup, 30 to 1000 MHz



LEGEND:

1. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 to 40 cm long, hanging approximately in the middle between ground plane and table.
2. I/O cables that are connected to a peripheral shall be bundled in center. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.
3. If LISNs are kept in the test setup for radiated emissions, it is preferred that they be installed under the ground plane with the receptacle flush with the ground plane.
4. Cables of hand-operated devices, such as keyboards, mouses, etc., have to be placed as close as possible to the controller.
5. Non-EUT components of EUT system being tested.
6. The rear of all components of the system under test shall be located flush with the rear of the table.
7. No vertical conducting wall used.
8. Power cords drape to the floor and are routed over to receptacle.