

TEST RESULT SUMMARY

FCC PART 15 SUBPART C Section 15.245

MANUFACTURER'S NAME	New Japan Radio Co., Ltd.
NAME OF EQUIPMENT	X-Band Doppler Module (MIC Type)
MODEL NUMBER	NJR4175
MANUFACTURER'S ADDRESS	1-1 Fukuoka 2-Chome, Kamifukuoka-City Saitama Prefecture Japan, 356-8510
TEST REPORT NUMBER	NC107539
TEST DATE	21 November 2001

According to testing performed at TÜV Product Service Inc, the above-mentioned unit is in compliance with the electromagnetic compatibility requirements defined in FCC Part 15 Subpart C, Section 15.245.

It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

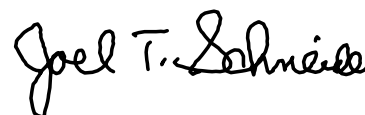
TÜV Product Service Inc, as an independent testing laboratory, declares that the equipment tested as specified above conforms to the requirements of FCC Part 15 Subpart C, Section 15.245.

Date: 10 December 2001

Location: Taylors Falls MN
USA



G. S. Jakubowski
Test Engineer



J. T. Schneider
Chief Engineer

EMC EMISSION - TEST REPORT

Test Report File No. : **NC107539** Date of issue: 10 December 2001

Model / Serial No. : **NJR4175 / 44**

Product Type : X-Band Doppler Module (MIC Type)

Applicant : New Japan Radio Co., Ltd.

Manufacturer : New Japan Radio Co., Ltd.

License holder : New Japan Radio Co., Ltd.

Address : 1-1 Fukuoka 2-Chome, Kamifukuoka-City
 : Saitama Prefecture Japan, 356-8510

Test Result : **Positive** **Negative**

Test Project Number : **NC107539**
 Reference(s)

Total pages including Appendices : 20

TÜV Product Service Inc is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO/IEC Guide 25 and EN 45001.

TÜV Product Service Inc reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. TÜV Product Service Inc shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV Product Service Inc issued reports.

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EMISSIONS TEST REGULATIONS :

The emissions tests were performed according to following regulations:

- | | | |
|--|---|------------------------------------|
| <input type="checkbox"/> - EN 50081-1 / 1991 | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| <input type="checkbox"/> - EN 55011 / 1991 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55013 / 1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1987 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55014 / A2:1990 | <input type="checkbox"/> - Household appliances and similar | |
| <input type="checkbox"/> - EN 55014 / 1993 | <input type="checkbox"/> - Portable tools | |
| | <input type="checkbox"/> - Semiconductor devices | |
| <input type="checkbox"/> - EN 55015 / 1987 | | |
| <input type="checkbox"/> - EN 55015 / A1:1990 | | |
| <input type="checkbox"/> - EN 55015 / 1993 | | |
| <input type="checkbox"/> - EN 55022 / 1987 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - EN 55022 / 1994 | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - BS | | |
| <input type="checkbox"/> - VCCI | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input checked="" type="checkbox"/> - FCC Part 15 Subpart C Section 15.245 | | |
| <input type="checkbox"/> - AS 3548 (1992) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 11 (1990) | <input type="checkbox"/> - Group 1 | <input type="checkbox"/> - Group 2 |
| | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |
| <input type="checkbox"/> - CISPR 22 (1993) | <input type="checkbox"/> - Class A | <input type="checkbox"/> - Class B |

Environmental conditions in the lab:

	<u>Actual</u>
Temperature:	: 22 °C
Relative Humidity	: 19 %
Atmospheric pressure	: 98.0 kPa
Power supply system	: 5 VDC

Sign Explanations:

- not applicable
- applicable



Emissions Test Conditions: CONDUCTED EMISSIONS (Interference Voltage)

The *CONDUCTED EMISSIONS (INTERFERENCE VOLTAGE)* measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

Emissions Test Conditions: RADIATED EMISSIONS (Magnetic Field)

The *RADIATED EMISSIONS (MAGNETIC FIELD)* measurements were performed at the following test location:

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

at a test distance of :

- 3 meters
- 30 meters

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *RADIATED EMISSIONS (ELECTRIC FIELD)* measurements, in the frequency range of 30 MHz-1000 MHz, were tested in a horizontal and vertical polarization at the following test location :

- Test not applicable

- - Wild River Lab Large Test Site (Open Area Test Site) – NSA measurements made 7-01, due 7-02
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)

at a test distance of :

- - 3 meters
- 10 meters
- 30 meters

Test equipment used :

	TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
■ -	3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	9-24-02
■ -	3926	11867A	Hewlett-Packard	Limiter	02442	3-21-02
■ -	2688	8566B	Hewlett-Packard	Spectrum Analyzer (Unit D)	2221A01596	12-04-01
■ -	2676	85662A	Hewlett-Packard	Analyzer Display (Unit D)	2152A03640	12-04-01
■ -	2682	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit D)	2811A01127	12-05-01
■ -	2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	9-12-02

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Emissions Test Conditions: INTERFERENCE POWER

The *INTERFERENCE POWER* measurements were performed by using the absorbing clamp on the mains and interface cables in the frequency range 30 MHz - 300 MHz at the following test location :

■ - Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room
- New Brighton Lab Shielded Room

Emissions Test Conditions: RADIATED EMISSIONS (Electric Field)

The *EQUIVALENT RADIATED EMISSIONS* measurements in the frequency range 1 GHz - 53 GHz were performed in a horizontal and vertical polarization at the following test location :

- Test not applicable

- Wild River Lab Large Test Site (Open Area Test Site)
- Wild River Lab Small Test Site (Open Area Test Site)
- Oakwood Lab (Open Area Test Site)
- Wild River Lab Screen Room

at a test distance of:

- 1 meters
- 3 meters
- 10 meters

Test equipment used :

TUV ID	Model Number	Manufacturer	Description	Serial Number	Cal Due
<input checked="" type="checkbox"/> - 3202	EM-6917B	Electro-Metrics	Biconicalog Periodic	102	9-24-02
<input checked="" type="checkbox"/> - 2688	8566B	Hewlett-Packard	Spectrum Analyzer (Unit D)	2221A01596	12-04-01
<input checked="" type="checkbox"/> - 2676	85662A	Hewlett-Packard	Analyzer Display (Unit D)	2152A03640	12-04-01
<input checked="" type="checkbox"/> - 2682	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit D)	2811A01127	12-05-01
<input checked="" type="checkbox"/> - 2665	ZHL-1042J	Mini-Circuits	Preamplifier	32296	9-12-02
<input checked="" type="checkbox"/> - 2075	3115	Electro-Mechanics (EMCO)	Ridge Guide Ant. 1-18 GHz	9001-3275	10-20-02
<input checked="" type="checkbox"/> - 2478	AWT-18037	Avantek	Preamplifier 8-18 GHz	1001-9226	3-21-02
<input checked="" type="checkbox"/> - 2477	AFT-8434	Avantek	Preamplifier 4-8 GHz	2613A92801	3-21-02
<input checked="" type="checkbox"/> - 2127	11975A	Hewlett Packard	Amplifier 2- 8 GHz	2738A01200	5-16-02
<input checked="" type="checkbox"/> - 2661	11970A	Hewlett-Packard	Harm Mixer – 26.5-40 GHz	2332A01861	1-17-03
<input checked="" type="checkbox"/> - 2662	11970K	Hewlett-Packard	Harm Mixer – 18-26.5 GHz	2332A01170	1-17-03
<input checked="" type="checkbox"/> - 2919	11970U	Hewlett-Packard	Harm Mixer – 40-60 GHz	3003A01395	1-17-03
<input checked="" type="checkbox"/> - 2788	3116	Electro-Mechanics (EMCO)	Ridge Guide Ant 18-40 GHz	2005	1-18-02
<input checked="" type="checkbox"/> - 2918	19-7025		Horn Antenna – 40-60 GHz		N/A

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST) and is calibrated annually.

Equipment Under Test (EUT) Test Operation Mode - Emission tests :

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

- Standby
- Test program (H - Pattern)
- Test program (color bar)
- Test program (customer specific)
- Practice operation
- Normal Operating Mode
- _____

Configuration of the device under test:

- See Constructional Data Form in Appendix B - Pages B2
- See Product Information Form in Appendix B - beginning on Page B3

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

- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- _____ Type : _____
- unshielded power cable
- unshielded cables
- shielded cables MPS.No.: _____
- customer specific cables
- _____
- _____

Emission Test Results:

Conducted emissions 10/150 kHz - 30 MHz

The requirements are - MET - NOT MET

Minimum margin of compliance _____ dB at _____ kHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

Radiated emissions (magnetic field) 10 kHz - 30 MHz

The requirements are - MET - NOT MET

Minimum margin of compliance _____ dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

Radiated emissions (electric field) 30 MHz - 1000 MHz

The requirements are - MET - NOT MET

Minimum margin of compliance _____ >10 dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

Interference Power at the mains and interface cables 30 MHz - 300 MHz

The requirements are - MET - NOT MET

Minimum margin of compliance _____ dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

Equivalent Radiated emissions 1 GHz - 53 GHz

The requirements are - MET - NOT MET

Minimum margin of compliance for fundamental _____ 14 dB at _____ 10.525 GHz

Minimum margin of compliance for harmonics/spurious _____ 1 dB at _____ 31.575 GHz

Remarks: The level at 10.525 GHz is 114.7 dBuV/m (543.2 mV/m) at a distance of 3 meters. The limit is 128 dBuV/m (2500mV/m). The highest level harmonic was measured at 31.575 GHz to be 87 dBuV/m (22.4 mV/m) compared to a limit of 88 dBuV/m (25 mV/m). The peak values do not exceed the average values by more than 20 dB.

DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

The documentation we have received from the manufacturer states that the transmitter is designed for use only within a building or to open building doors. The transmitter was tested from 30 MHz to 53 GHz, no spurious emissions were detected other than those listed in the data sheets. This entire frequency range was examined, including the restricted bands of operation listed in 15.205.

SUMMARY:

The requirements according to the technical regulations are

- met
- **not** met.

The device under test does

- fulfill the general approval requirements mentioned on page 3.
- **not** fulfill the general approval requirements mentioned on page 3.

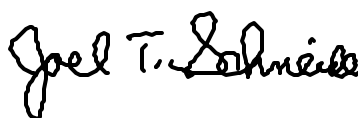
Testing Start Date: 21 November 2001

Testing End Date: 21 November 2001

- TÜV PRODUCT SERVICE INC -



Tested By:
G. S. Jakubowski



J. T. Schneider
Chief Engineer

Test-setup photo(s):
Conducted emission 10/150 kHz - 30 MHz

Not Applicable



Test-setup photo(s):
Radiated emission 30 MHz - 53000 MHz



Appendix A

Test Data Sheets
and
Test Setup Drawing(s)

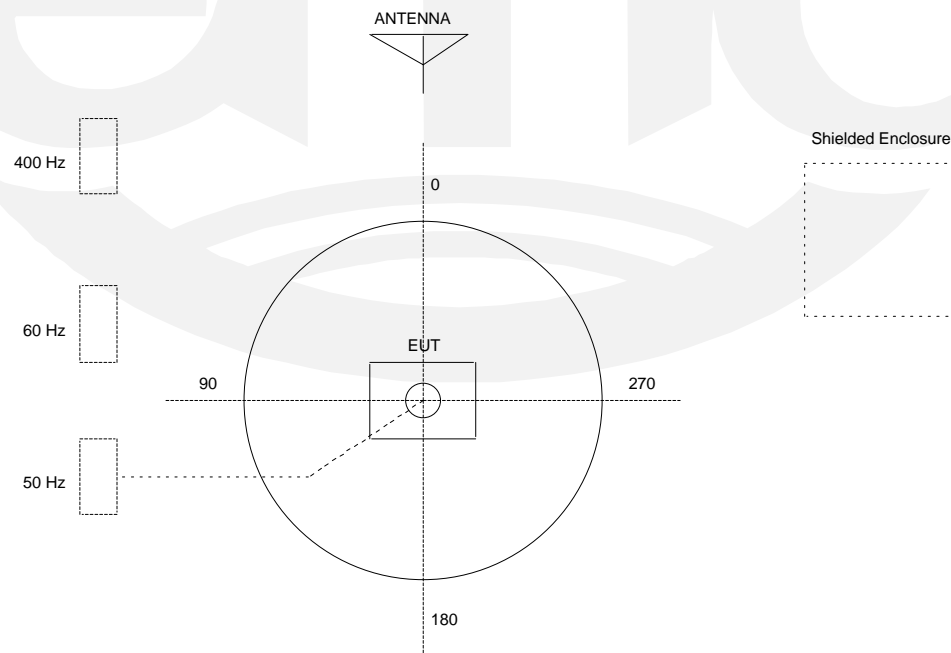


TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB Large Test Site

Notes:

1. Items shown in dotted lines are located on the floor below the test area. It is 5 meters vertically from the ground floor to the test area.
2. 50 Hz, 60 Hz, and 400 Hz are power panels for alternating current.
3. The antenna may be positioned horizontally 3, 10 or 30 meters from the center of the turntable.
4. The circle is a 6.7 meter diameter turntable.
5. A ground plane is in the plane of this sheet.
6. The test sample is shown in the azimuthal position representing zero degrees.



Radiated Electromagnetic Emissions



Test Report #: 7539 Run 1 Test Area: LTS 3m
 Test Method: N/A Test Date: 21-Nov-2001
 EUT Model #: NJR4175 EUT Power: 5VDC
 EUT Serial #: No. 44 Temperature: 22 °C
 Manufacturer: New Japan Radio Relative Humidity: 19 %
 EUT Description: 10.5GHz Doppler Module Air Pressure: 98 kPa
 Notes: _____ Page: 1 of 2

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL dBuV/m	POL / HGT / AZ (m) (DEG)	FINAL mV/m	FCC 15.245 LIMIT - mV/m
0 degrees azimuth = EUT back (opposite antenna array)						
Position 1						
EUT standing upright, antenna arrays above & below circuitry						
Maximized						
10525.5	63.5 Av	11.9 / 39.3 / 0.0	114.7	V / 1.2 / 193.0	543.2	2500
Position 2						
EUT upright, arrays left & right of circuitry						
Max'd						
10525.5	61.0 Av	11.9 / 39.3 / 0.0	112.2	H / 1.5 / 177.0	N/A	N/A
Position 3						
EUT on its back						
Max'd						
10525.4	54.2 Av	11.9 / 39.3 / 0.0	105.4	V / 2.1 / 91.0	N/A	N/A
Position 1						
Max'd						
10525.4	62.8 Av	11.9 / 39.3 / 0.0	114.0	V / 1.2 / 172.0	N/A	N/A
10525.4	63.2 Pk	11.9 / 39.3 / 0.0	114.5	V / 1.2 / 172.0	N/A	N/A
No significant emissions detected 30 MHz to 5 GHz						

Tested by: G Jakubowski

Printed

Signature

Reviewed by: TKS

Printed

Signature

Radiated Electromagnetic Emissions



Test Report #: 7539 Run 1 Test Area: LTS 3m
 Test Method: N/A Test Date: 21-Nov-2001
 EUT Model #: NJR4175 EUT Power: 5VDC
 EUT Serial #: No. 44 Temperature: 22 °C
 Manufacturer: New Japan Radio Relative Humidity: 19 %
 EUT Description: 10.5GHz Doppler Module Air Pressure: 98 kPa
 Notes: _____ Page: 2 of 2

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL dBuV/m	POL / HGT / AZ (m) (DEG)	FINAL mV/m	FCC 15.245 LIMIT - mV/m
No significant spurious emissions detected 30 MHz to 53 GHz						
Harmonic measurements						
21050	40.0 Av	0.0 / 44.3 / 0.0	84.3	MAXIMIZED	16.4	25
21050	42.5 Pk	0.0 / 44.3 / 0.0	86.8	MAXIMIZED	N/A	N/A
31575	39.3 Av	0.0 / 47.7 / 0.0	87.0	MAXIMIZED	22.3	25
31575	41.3 Pk	0.0 / 47.7 / 0.0	89.0	MAXIMIZED	N/A	N/A
42100	35.5 Pk	0.0 / 38.5 / 0.0	74.0	MAXIMIZED	5.0	25
52625	35.5 Pk	0.0 / 39.5 / 0.0	75.0	MAXIMIZED	5.6	25
End scan						

Tested by: G Jakubowski

Printed

Signature

Reviewed by: TKS

Printed

Signature

Appendix B

Constructional Data Form

and/or

Product Information Form



Product information provided for the Model NJR4170 and NJR4175

X-Band Doppler Module (MIC Type)

MODEL NO. NJR4175

Description: This specification covers the general requirements for microwave doppler module. This module is designed for motion sensing applications. This module consists of DRO (Dielectric Resonator Oscillator), balanced Schottky Barrier Diode mixer and Micro-strip Patch Antennas.

Specifications:

Electrical Characteristics (at 25 degrees C, + 5VDC)

Operating Voltage	5.0 +/-0.2 VDC
Operating Current	30 mA typ.
Center Frequency	10.525 GHz +/-5 MHz
Output Power	8 mW E.I.R.P. typ.
Return Loss Sensitivity	-90 dBc
Second Harmonic Emission	<25 mV/m (at 3 m)
Antenna Beamwidth (-3 dB)	E-Plane 36 deg. / H-Plane 72 deg.

Pulse Mode Operation

Pulse Width	5 microsec.
Duty Cycle	0.01

Absolute Maximum Ratings

DC Input Voltage	+8 VDC
Operating Temperature Range	-30 to +70 degrees C
Storage Temperature Range	-40 to +80 degrees C

No other electronics other than the Doppler circuit.

Appendix C

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

Measurement Uncertainty

The test system for conducted emissions is defined as the LISN, tuned receiver or spectrum analyzer, and coaxial cable. The test system for radiated emissions is defined as the antenna, the pre-amplifier, the spectrum analyzer and the coaxial cable. These test systems have a measurement uncertainty of ± 4.5 dB. The equipment comprising the test systems are calibrated on an annual basis.

Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

CONDUCTED EMISSIONS

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit. Conducted and radiated emission testing is performed according to the procedures in ANSI C.63.4-1992.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

RADIATED EMISSIONS

The final level, expressed in dB μ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB μ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

Example:

FREQ (MHz)	LEVEL (dB μ V)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dB μ V/m)	POL/HGT/AZ (m) (deg)	DELTA1 FCC
60.80	42.5Qp	+ 1.2 + 10.9 - 25.5 =	29.1	V 1.0 0.0	-10.9

DETAILS OF TEST PROCEDURES

General Standard Information

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

Conducted Emissions

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

Radiated Emissions

Radiated emissions from the EUT are measured in the frequency range of 30 to 53000 MHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak/average detection. The average detection is accomplished by reducing the video bandwidth of the spectrum analyzer to 10 Hz. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 10 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees. The EUT is positioned in 3 orthogonal positions in order to determine worst case.