

TEST RESULT SUMMARY

FCC PART 15 SUBPART B Class B Limit

MANUFACTURER'S NAME	Kondo Kagaku Company LTD
NAME OF EQUIPMENT	FM Receiver
MODEL NUMBER	KR-301F
MANUFACTURER'S ADDRESS	17-7 Higashi-Nippon 4 chome Arakawa-ku Tokyo Japan
TEST REPORT NUMBER	NC203630
TEST DATE	24 July 2002

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.

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.

Date: 29 July 2002



R. M. Johnson
Test Technician



T. K. Swanson
Test Technician

Location: Taylors Falls MN
USA

Not Transferable

EMC EMISSION - TEST REPORT

Test Report File No. : **NC203630** Date of issue: 29 July 2002Model / Serial No. : KR-301F /Product Type : FM ReceiverApplicant : Kondo Kagaku Company LTDManufacturer : Kondo Kagaku Company LTDLicense holder : Kondo Kagaku Company LTDAddress : 17-7 Higashi-Nippon 4 chome: Arakawa-ku Tokyo JapanTest Result : **Positive** **Negative**Test Project Number : NC203630
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.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval. This report shall not be used by the client to claim product endorsement by NVLAP or any agency of the US government.

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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 | <input type="checkbox"/> - Class A | <input checked="" type="checkbox"/> - Class B |
| <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:	: 20 °C
Relative Humidity	: 68 %
Atmospheric pressure	: 98.0 kPa
Power supply system	: 6 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)
- Wild River Lab Small Test Site (Open Area Test Site) – NSA measurements made 7-02, due 7-03
- 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
■ -	2830	ZHL-1042J	Mini-Circuits	Preamplifier	H081396-16	3-15-03
■ -	3203	EM-6917B	Electro-Metrics	Biconicalog Periodic	106	2-14-03
■	2686	8568B	Hewlett-Packard	Spectrum Analyzer (Unit B)	2049A01305	1-30-03
■	2674	85662A	Hewlett-Packard	Analyzer Display (Unit B)	2050A02007	1-30-03
■	2680	85650A	Hewlett-Packard	Quasi-Peak Adapter (Unit B)	2043A00343	1-30-03

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 - 18 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



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
- customer specific cables

MPS.No.: _____

- _____
- _____

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 _____ 7 dB at _____ 37.61 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 - 18 GHz

The requirements are - MET - NOT MET

Minimum margin of compliance _____ dB at _____ MHz

Maximum margin of non-compliance _____ dB at _____ MHz

Remarks: _____

DEVIATIONS FROM STANDARD:

None

GENERAL REMARKS:

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: 24 July 2002

Testing End Date: 24 July 2002

- TÜV PRODUCT SERVICE INC -



Tested By:
R. M. Johnson



T. K. Swanson
Test Technician

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

Not Applicable



Test-setup photo(s):
Radiated emission 30 MHz - 1000 MHz

See the Test Setup Exhibit included in the submittal package



Appendix A

Test Data Sheets
and
Test Setup Drawing(s)



TEST SETUP FOR EMISSIONS TESTING

WILD RIVER LAB
Small Test Site (STS)

See the Test Setup Exhibit included in the submittal package



Radiated Electromagnetic Emissions



Test Report #:	3630 Run 02	Test Area:	STS 3M		
Test Method:	FCC Part 15	Test Date:	24-Jul-2002		
EUT Model #:	mn:R-122802 pn:KR-301F 75MHz	EUT Power:	6 VDC		
EUT Serial #:				Temperature:	20 °C
Manufacturer:	Kondo Kagaku Co., LTD.			Relative Humidity:	68 %
EUT Description:	Receiver			Air Pressure:	98 kPa
Notes:				Page:	1 of 3

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
37.61	40.9 Qp	1.2 / 17.8 / 27.9	32.0	V / 1.0 / 0.0	-8.0	N/A
75.22	35.5 Qp	1.6 / 8.1 / 27.7	17.4	V / 1.0 / 0.0	-22.6	N/A
112.84	30.9 Qp	2.0 / 9.5 / 27.8	14.5	V / 1.0 / 0.0	-29.0	N/A
150.46	28.1 Qp	2.3 / 9.7 / 27.7	12.3	V / 1.0 / 0.0	-31.2	N/A
188.08	27.3 Qp	2.6 / 10.0 / 27.8	12.1	V / 1.0 / 0.0	-31.4	N/A
225.70	26.0 Qp	2.9 / 10.8 / 27.9	11.8	V / 1.0 / 0.0	-34.2	N/A
263.31	25.9 Qp	3.1 / 12.6 / 27.9	13.8	V / 1.0 / 0.0	-32.2	N/A
300.93	26.2 Qp	3.3 / 13.4 / 28.1	14.8	V / 1.0 / 0.0	-31.2	N/A
338.55	26.3 Qp	3.6 / 14.4 / 28.0	16.3	V / 1.0 / 0.0	-29.7	N/A
376.17	25.9 Qp	3.8 / 15.3 / 28.0	17.0	V / 1.0 / 0.0	-29.0	N/A
413.79	25.7 Qp	4.0 / 15.8 / 28.0	17.4	V / 1.0 / 0.0	-28.6	N/A
451.41	26.2 Qp	4.2 / 16.4 / 28.0	18.7	V / 1.0 / 0.0	-27.3	N/A
75.22	36.6 Qp	1.6 / 8.1 / 27.7	18.6	V / 1.0 / 180.0	-21.4	N/A
MAXIMIZED.						
37.61	41.5 Qp	1.2 / 17.8 / 27.9	32.6	V / 1.2 / 270.0	-7.4	N/A
MAXED ANTENNA AND ROTATED EUT 360 DEGREES.						
NO NEW OR HIGHER EMISSIONS FOUND WITH HORIZONTAL POLARIZATION AT ALL AZIMUTHS.						
END OF SCAN 30 - 1000MHZ.						

Tested by:	RMJ		
	Printed		Signature
Reviewed by:	TKS		
	Printed		Signature

Radiated Electromagnetic Emissions



Test Report #:	3630 Run 02	Test Area:	STS 3M		
Test Method:	FCC Part 15	Test Date:	24-Jul-2002		
EUT Model #:	mn:R-122802 pn:KR-301F 75MHz	EUT Power:	6 VDC		
EUT Serial #:				Temperature:	20 °C
Manufacturer:	Kondo Kagaku Co., LTD.			Relative Humidity:	68 %
EUT Description:	Receiver			Air Pressure:	98 kPa
Notes:				Page:	2 of 3

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
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***** MEASUREMENT SUMMARY *****						
37.61	41.5 Qp	1.2 / 17.8 / 27.9	32.6	V / 1.2 / 270.0	-7.4	N/A
75.22	36.6 Qp	1.6 / 8.1 / 27.7	18.6	V / 1.0 / 180.0	-21.4	N/A
451.41	26.2 Qp	4.2 / 16.4 / 28.0	18.7	V / 1.0 / 0.0	-27.3	N/A
413.79	25.7 Qp	4.0 / 15.8 / 28.0	17.4	V / 1.0 / 0.0	-28.6	N/A
112.84	30.9 Qp	2.0 / 9.5 / 27.8	14.5	V / 1.0 / 0.0	-29.0	N/A
376.17	25.9 Qp	3.8 / 15.3 / 28.0	17.0	V / 1.0 / 0.0	-29.0	N/A
338.55	26.3 Qp	3.6 / 14.4 / 28.0	16.3	V / 1.0 / 0.0	-29.7	N/A
150.46	28.1 Qp	2.3 / 9.7 / 27.7	12.3	V / 1.0 / 0.0	-31.2	N/A
300.93	26.2 Qp	3.3 / 13.4 / 28.1	14.8	V / 1.0 / 0.0	-31.2	N/A
188.08	27.3 Qp	2.6 / 10.0 / 27.8	12.1	V / 1.0 / 0.0	-31.4	N/A
263.31	25.9 Qp	3.1 / 12.6 / 27.9	13.8	V / 1.0 / 0.0	-32.2	N/A
225.70	26.0 Qp	2.9 / 10.8 / 27.9	11.8	V / 1.0 / 0.0	-34.2	N/A

Tested by: RMJ

Printed

Signature

Reviewed by: TKS

Printed

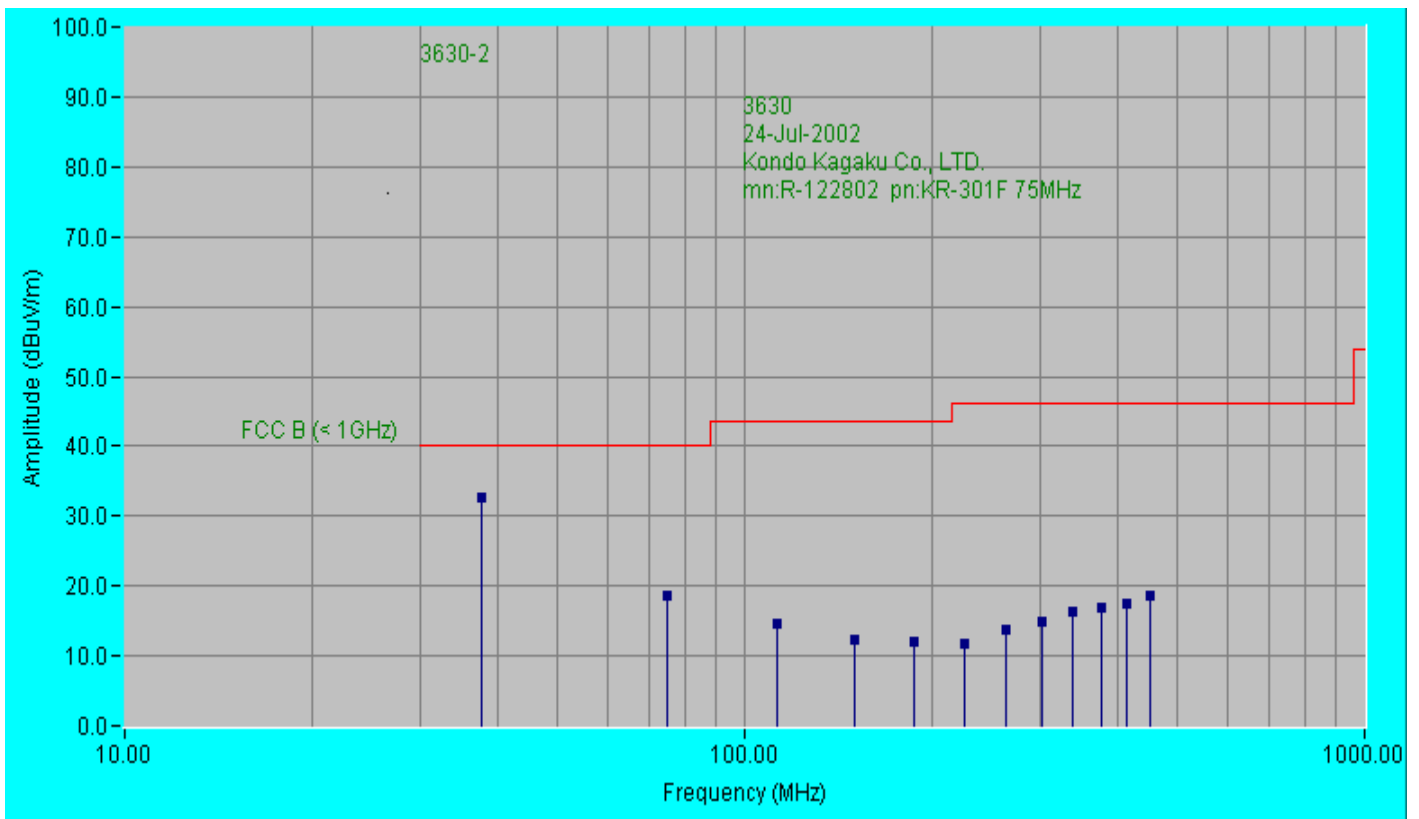
Signature

Radiated Electromagnetic Emissions



Test Report #:	3630 Run 02	Test Area:	STS 3M	Temperature:	20 °C
Test Method:	FCC Part 15	Test Date:	24-Jul-2002	Relative Humidity:	68 %
EUT Model #:	mn:R-122802 pn:KR-301F 75MHz	EUT Power:	6 VDC	Air Pressure:	98 kPa
EUT Serial #:				Page:	3 of 3
Manufacturer:	Kondo Kagaku Co., LTD.				
EUT Description:	Receiver				
Notes:					

FREQ (MHz)	LEVEL (dBuV)	CABLE / ANT / PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/m)	POL / HGT / AZ (m) (DEG)	DELTA1 FCC B (< 1GHz)	DELTA2 N/A
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Tested by: RMJ

Printed

Signature

Reviewed by: TKS

Printed

Signature

Appendix B

Constructional Data Form

And/or

Product Information Form



Not Provided

Appendix C

MEASUREMENT PROTOCOL FOR FCC

GENERAL INFORMATION

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-1992 procedures and using the CISPR 22 Limits.

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 it's 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 dBµV, 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 dBµV and µV, 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 dBµV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBµV), adding the antenna correction factor and cable loss factor (Factor dB) to it, then subtracting the preamp gain. 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 A.

Example:

FREQ (MHz)	LEVEL (dBuV)	CABLE/ANT/PREAMP (dB) (dB/m) (dB)	FINAL (dBuV/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 1000 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 detection. 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.