Band Edge measurement for radiated emission in Ristricted Band(Radiated)

Turbo Mode (Channel 3) Peak data

Band Edge measurement for radiated emission in Ristricted Band(Radiated)

Turbo Mode (Channel 3) , Average data

6.7 RF Exposure Measurement [Section 15.407(f)(4) & 1.1307(b)]

Refer to SAR Test Report

6.8 Frequency Stability [Section 15.407(g)]

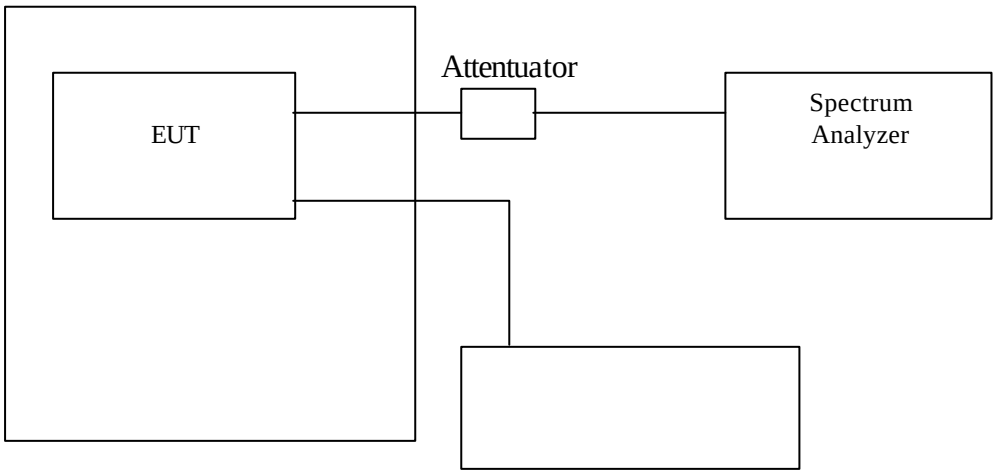
6.8.1 Limits of Frequency Stability Measurement

The frequency tolerance of the carrier sing shall be maintained within +/- 0.02% Of the operating frequency over the operation temperature range of EUT (0^0C - 35^0C) , and variation in the primary supply voltage from 85% to 115% of the rated supply voltage (115V AC) at 20^0C.

6.8.2 Test Procedure

1. The EUT was placed in the Temperature/Humidity Chamber and powered by a Voltage/Frequency Power converter.
2. Connect the RF output of EUT to Spectrum. Turn on the EUT.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. Allow sufficient time (approximately 30 min) for the chamber temperature to stabilize. Turn the EUT on and measure the operating frequency after 2, 5, 10 minites.
5. Set the Voltage/Frequency Power Converter to 85% and 115% of supply voltage, then repeat step 2, 3, 4 respectively.
6. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to the lowest temperature.
7. Repeat step 2 , 3, 4, 5 with the temperature of chamber set to 20^0C

6.8.3 Test Setup



6.8.4 Test Data

Operating Frequency: 5180MHz		Limit: +/- 0.02%					
Temp. (^{0}C)	Power Supply (V AC)	2 minutes		5 minutes		10 minutes	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
35	132	5179.9762	-0.000459	5179.9769	-0.000446	5179.9767	-0.000450
	115	5179.9764	-0.000456	5179.9766	-0.000452	5179.9765	-0.000454
	97	5179.9764	-0.000456	5179.9769	-0.000446	5179.9764	-0.000456
0	132	5179.9857	-0.000276	5179.9863	-0.000264	5179.9859	-0.000272
	115	5179.9853	-0.000284	5179.9858	-0.000274	5179.9856	-0.000278
	97	5179.9854	-0.000282	5179.9859	-0.000272	5179.9855	-0.000280
20	132	5180.0085	0.000164	5180.0091	0.000176	5180.0099	0.000191
	115	5180.0081	0.000156	5180.0088	0.000170	5180.0095	0.000183
	97	5180.0079	0.000153	5180.0075	0.000145	5180.0088	0.000170

Operating Frequency: 5320 MHz		Limit: +/- 0.02%					
Temp. (^{0}C)	Power Supply (V AC)	2 minutes		5 minutes		10 minutes	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
35	132	5319.9759	-0.000453	5319.9766	-0.000440	5319.9762	-0.000447
	115	5319.9753	-0.000464	5319.9762	-0.000447	5319.9759	-0.000453
	97	5319.9755	-0.000461	5319.9763	-0.000445	5319.9761	-0.000449
0	132	5319.9825	-0.000329	5319.9829	-0.000321	5319.9827	-0.000325
	115	5319.9829	-0.000321	5319.9831	-0.000318	5319.9826	-0.000327
	97	5319.9823	-0.000333	5319.9827	-0.000325	5319.9823	-0.000333
20	132	5320.0095	0.000179	5320.0101	0.000190	5320.0109	0.000205
	115	5320.0091	0.000171	5320.0098	0.000184	5320.0102	0.000192
	97	5320.0089	0.000167	5320.0096	0.000180	5320.0103	0.000194

7. Appendix

7.1 Appendix A: Measurement Procedure for Powerline Conducted Emissions

The EUT is set up in accordance with the suggested configuration given in ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996. The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the Figure 1 of the ANSI C63.4-2001 or CISPR16. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum according to ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

7.2 Appendix B: Test Procedure for Radiated Emissions

Preliminary Measurements in the Anechoic Chamber

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

Measurements on the Open Site or 10m EMC Chamber

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of the 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum according to ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

7.3 Appendix C: Test Equipment

7.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	12/04/2002	12/04/2004
Conduction	50 Ohms Load Conduction 02	EMCO	N/A	ISL-50ohms conduction 02	11/21/2002	11/21/2003
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	06/03/2002	06/03/2003
Conduction	EMI Receiver 02	HP	85460A	3448A00183	08/21/2002	08/21/2003
Conduction	ISN T4	Schaffner	ISN T400	16593	08/20/2002	08/20/2004
Conduction	ISN T4 02	FCC	F-CMISN-CAT5	02003	12/17/2002	12/17/2003
Conduction	CISPR22 Voltage Probe	FCC	F-CVP-1	68	12/18/2002	12/18/2003
Conduction	Current Probe	Schaffner	SMZ 11	18030	01/09/2003	01/09/2004
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	05/07/2002	05/07/2003
Conduction	LISN 04	EMCO	3810/2	9604-1429	12/17/2002	12/16/2003
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	12/04/2002	12/04/2004
Radiation	Spectrum Analyzer 06	Advantest	R3162	91700295	09/25/2002	09/24/2003
Radiation	EMI Receiver 04	AFJ	ER 55CR	55390143233	10/28/2002	10/27/2003
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/04/2002	06/04/2003
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	10/03/2002	10/03/2003
Radiation	Microwave Cable Chmb 02 3M	HUBER+SUHNER AG.	Sucoflex 103	42731/3 & 42729/3	03/21/2002	03/21/2003
Radiation	Temperature/ Humility Chamber	K. Son Ins. Tech.	THS-B4H^{+}-100	2287	03/01/2003	03/01/2004
Radiation	Voltage/Frequency Power converter	EXTECH Electronics	CFC-105W	780274	08/25/2003	08/25/2004
Rad. Above 1Ghz	Spectrum Analyzer 07	Advantest	R3182	110600649	10/17/2002	10/17/2003
Rad. Above 1Ghz	Horn Antenna 02	Com-Power	AH-118	10088	02/06/2003	02/05/2004
Rad. Above 1Ghz	Horn Antenna 04	Com-Power	AH-826	081-001	12/10/2002	12/09/2003
Rad. above 1Ghz	Horn Antenna 05	Com-Power	AH-640	100A	09/13/2001	09/13/2003
Rad. above 1Ghz	Microwave Cable Chmb 05	HUBER+SUHNER AG.	Sucoflex 103	42726/3 & 42727/3	09/11/2002	09/11/2003

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Rad. Above 1Ghz	Preamplifier 02	MITEQ	AFS44-00102650-40-10P-44	728229	05/07/2002	05/07/2003
Rad. Above 1Ghz	Preamplifier 09	MITEQ	AFS44-00102650-40-10P-44	858687	02/28/2003	02/28/2004
Rad. Above 1Ghz	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	02/28/2002	02/28/2004
Rad. Above 1Ghz	Signal Generator 03	Anritsu	MG3642A	6200162550	02/10/2003	02/09/2004
Rad. Above 1Ghz	Signal Generator 04	Anritsu	MG3692A	020311	02/06/2002	02/06/2004
Rad. Above 1Ghz	Peak Power Analyzer	HP	8990A	3621A01269	12/09/2002	12/09/2003
Rad. Above 1Ghz	Power Sensor Radar	HP	84815A	3318A01828	11/12/2001	11/12/2003

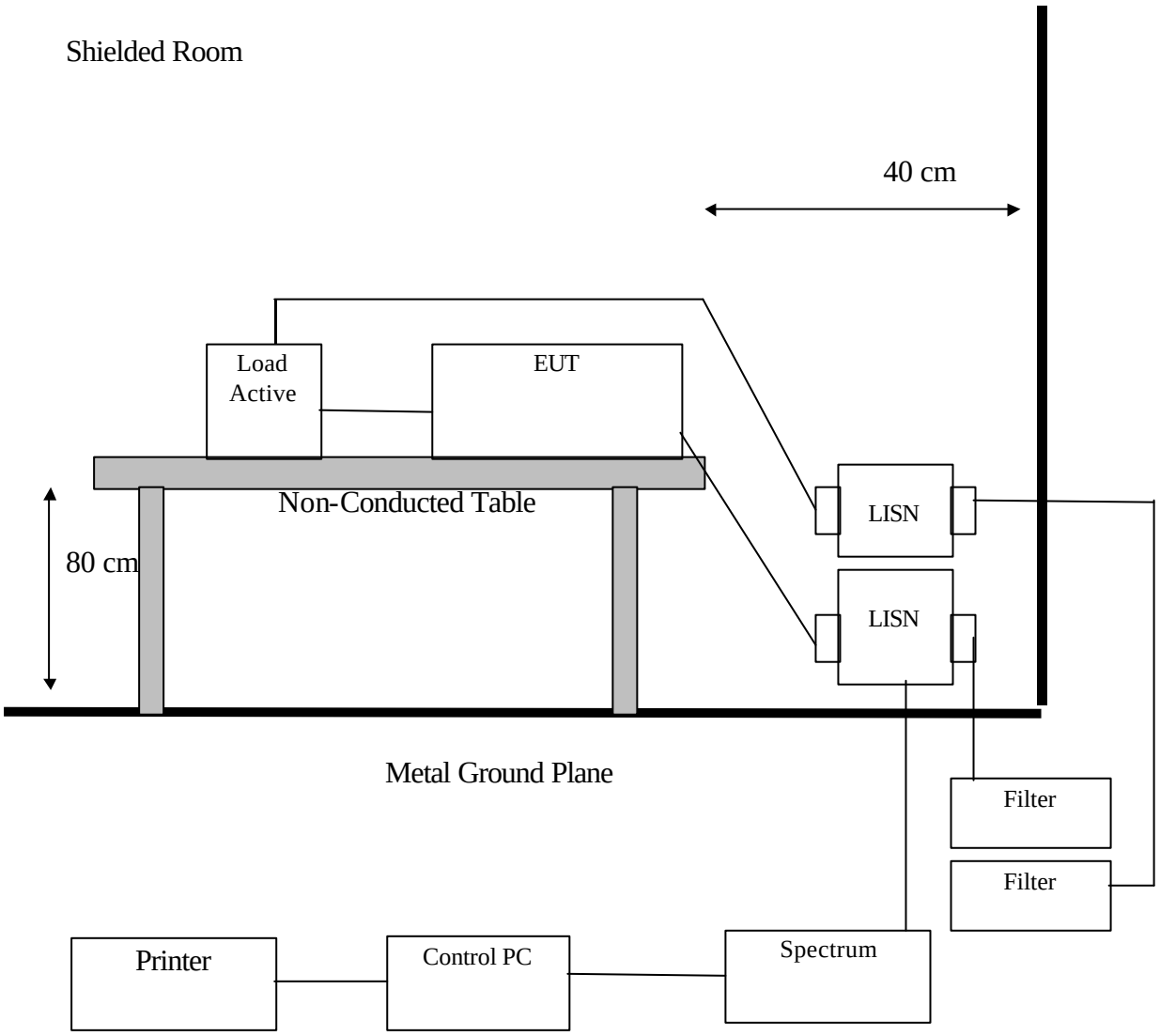
Note: Calibration traceable to NIST or national or international standards.

7.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

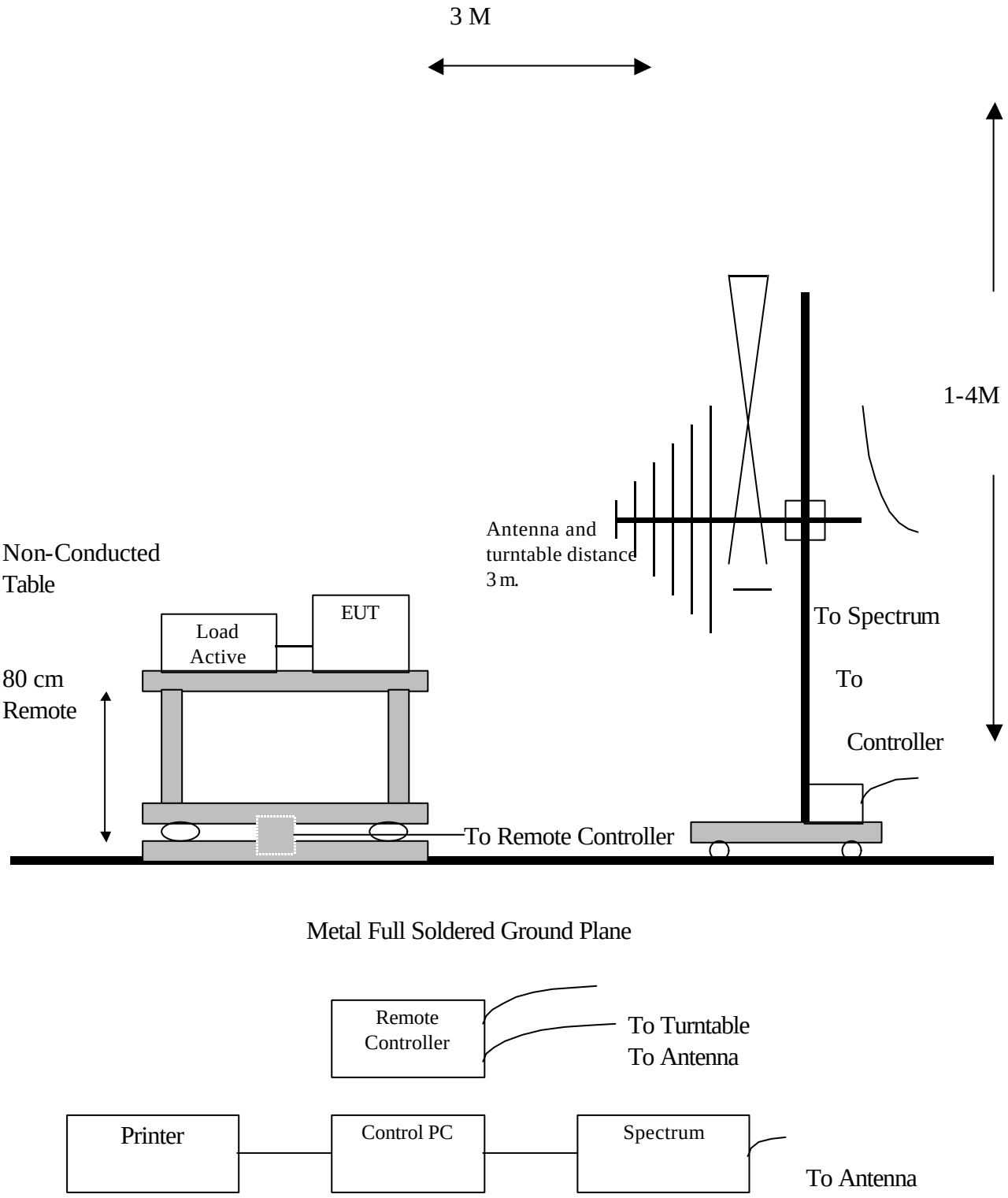
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

7.4 Appendix D: Layout of EUT and Support Equipment

7.4.1 General Conducted Test Configuration



7.4.2 General Radiation Test Configuration



7.5 Appendix E: Description of Support Equipment

7.5.1 Description of Support Equipment

Support Unit 1.

Description:	Acer USB Keyboard
Model Number:	6511-UV
Serial Number:	N/A
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	N/A (comply with FCC DOC)

Support Unit 2.

Description:	HP Printer (for parallel interface port)
Model Number:	C2642A
Serial Number:	TH84T1N3J3
Power Supply Type:	AC Adaptor (HP Model: C2175A)
Power Cord:	Non-shielded, Detachable
Data Cable:	Shielded, Detachable, With Metal Hood
FCC ID:	B94C2642X

Support Unit 3.

Description:	Acer USB Speaker
Model Number:	90.38H12.001
Serial Number:	401677
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	(Comply with FCC DOC)

Support Unit 4.

Description:	SONY radio cassette player
Model Number:	WM-FX50
Serial Number:	N/A
Power Supply Type:	N/A
Power Cord:	N/A

Support Unit 5.

Description:	Logitech USB Mouse
Model Number:	M-u48a
Serial Number:	LZE02050204
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	JNZ211360

Support Unit 6.

Description:	Acer Monitor
Model:	G781
Serial Number:	9990071012144004457T7AA31T
Power Cord:	Non-shielded, Detachable
FCC ID:	(Comply with FCC Standards)

7.5.2 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

A. Read and write to the disk drives.
B. Send H pattern to the parallel port device (Printer).
C. Send audio signal to the speaker.
D. Receive audio signal from walkman.
E. Send H pattern to the video port device (Monitor).
F. Repeat the above steps.

	Filename	Issued Date
Monitor	HH.bat	8/20/1991
Printer1	Wordpad.exe	11/11/1999

7.5.3 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to AC Power Cord Inlet (3-pin)	1.8M	Nonshielded, Detachable	Plastic Head
Monitor Data Cable	Monitor to PC VGA port	1.6M	Shielded, Un-detachable	Metal Head
USB Mouse Data Cable	USB Mouse to PC USB port	1.8M	Shielded, Un-detachable	Metal Head
Audio-in Data Cable	Walkman to PC Line In Port	1.5M	Non-shielded, Detachable	Plastic Head
USB Speaker Data Cable	USB Speaker to PC USB port	1.5M	Shielded, Un-detachable	Metal Head
USB Speaker Data Cable	USB Speaker to PC Line out port	1.5M	Non-shielded, Un-detachable	Plastic Head
Printer Data Cable	Printer to PC Parallel port	1.5M	Shielded, Detachable	Metal Head
USB Keyboard Data Cable	USB Keyboard to PC USB port	1.8M	Shielded, Undetachable	Metal Head

7.6 Appendix F: Accuracy of Measurement

Test Site: Conduction 02

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.104	k=1	0.052
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.330	k=1	0.165
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	LISN Factor Calibration	Normal	k=2	1.200	k=1	0.600
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	0.850
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**1.701**		

Measurement Uncertainty Calculations:

Uc (y) = square root (u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2)
U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

Test Site: Chamber 02-3M

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.067	k=1	0.034
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.103	k=1	0.052
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	Antenna Factor Calibration	Normal	k=2	1.700	k=1	0.850
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	1.029
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**2.059**		

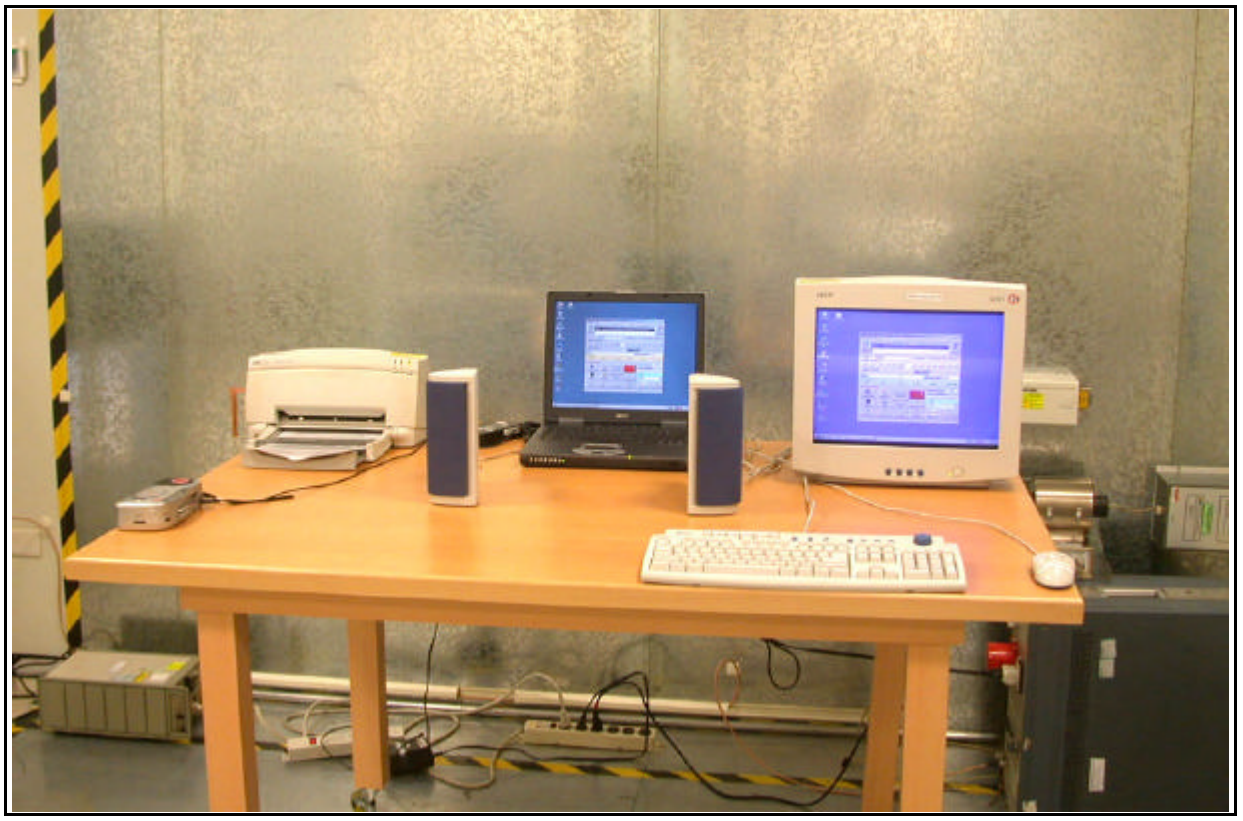
Measurement Uncertainty Calculations:

Uc (y) = square root (u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2)
U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

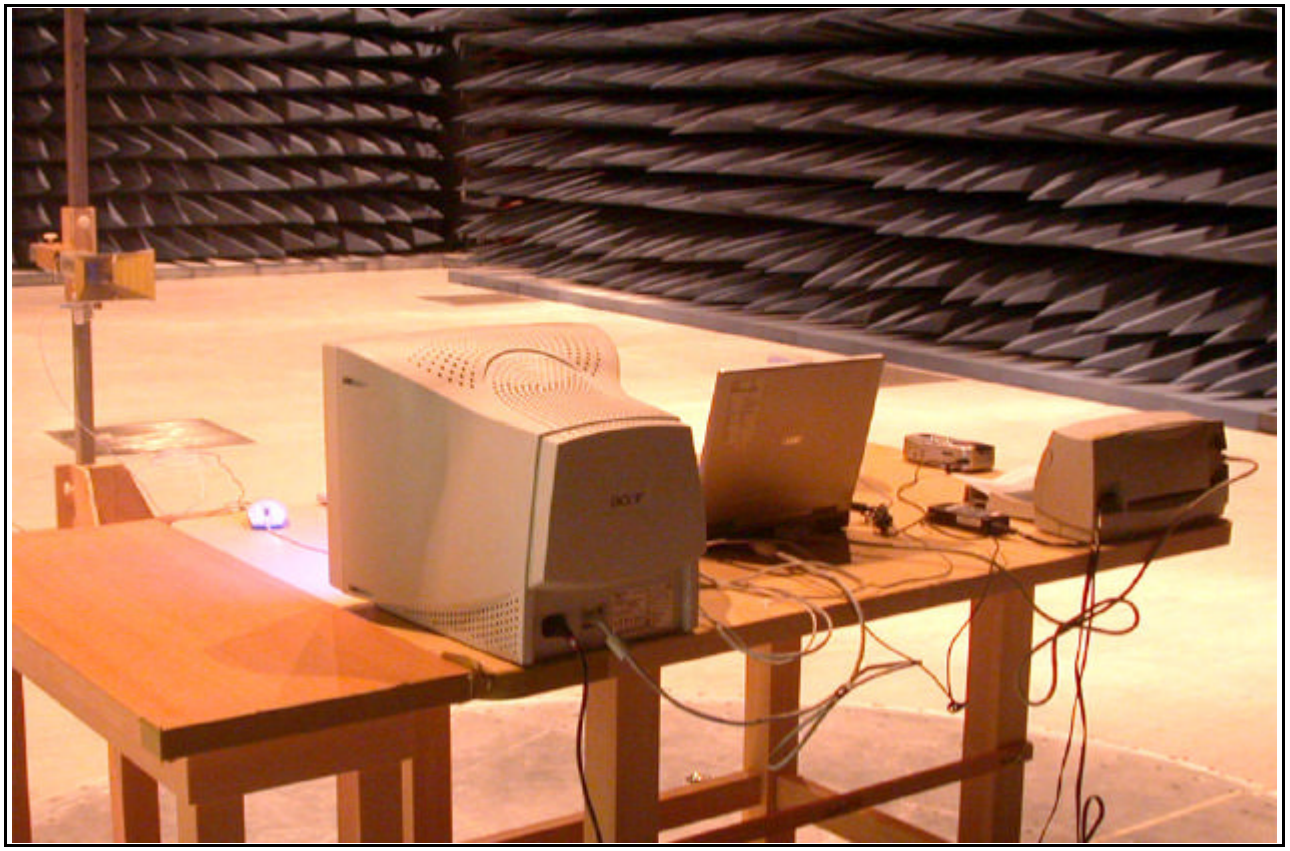
7.7 Appendix G: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT



The Front View of Highest Radiated Set-up For EUT

The Back View of Highest Radiated Set-up For EUT



7.8 Appendix H: Antenna Spec.

Please refer to the attached file.