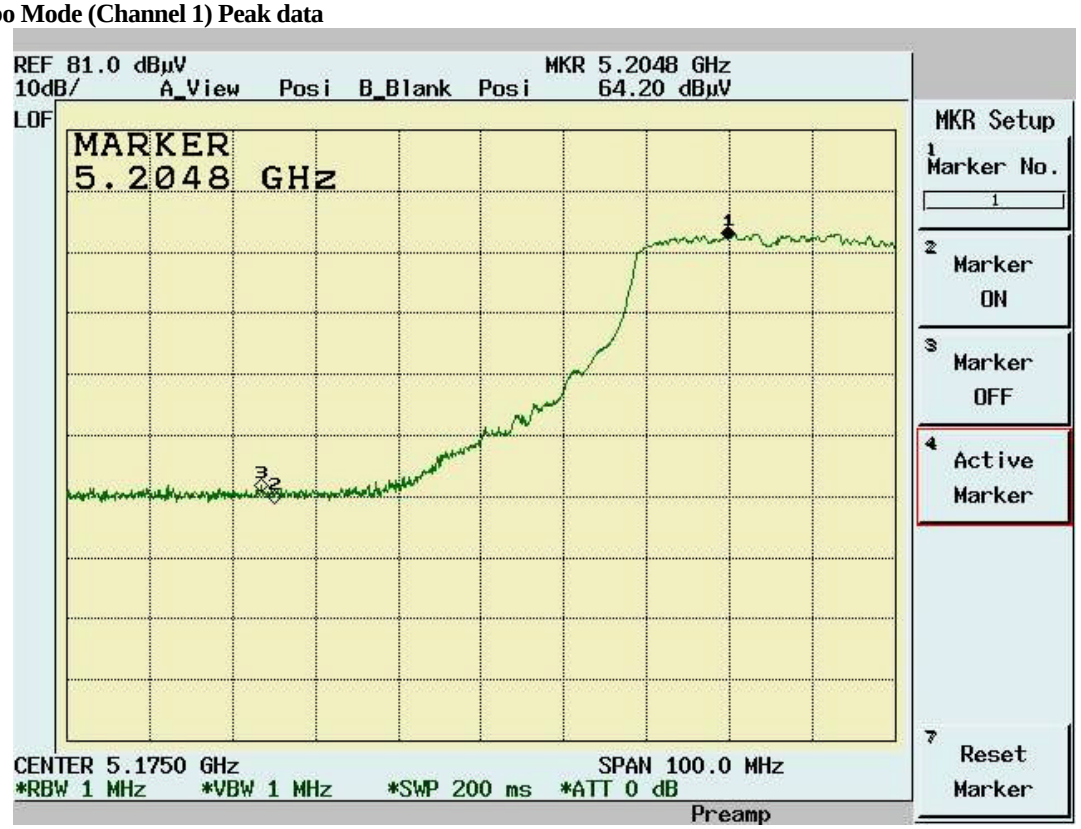
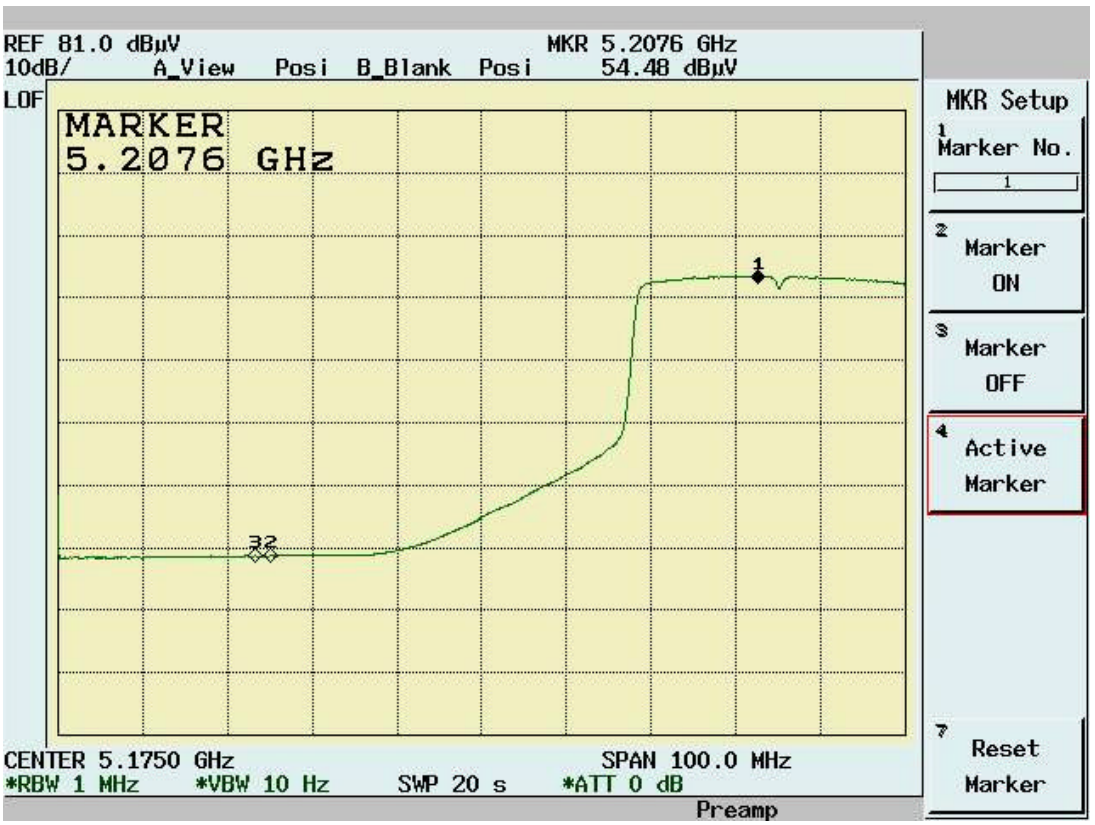
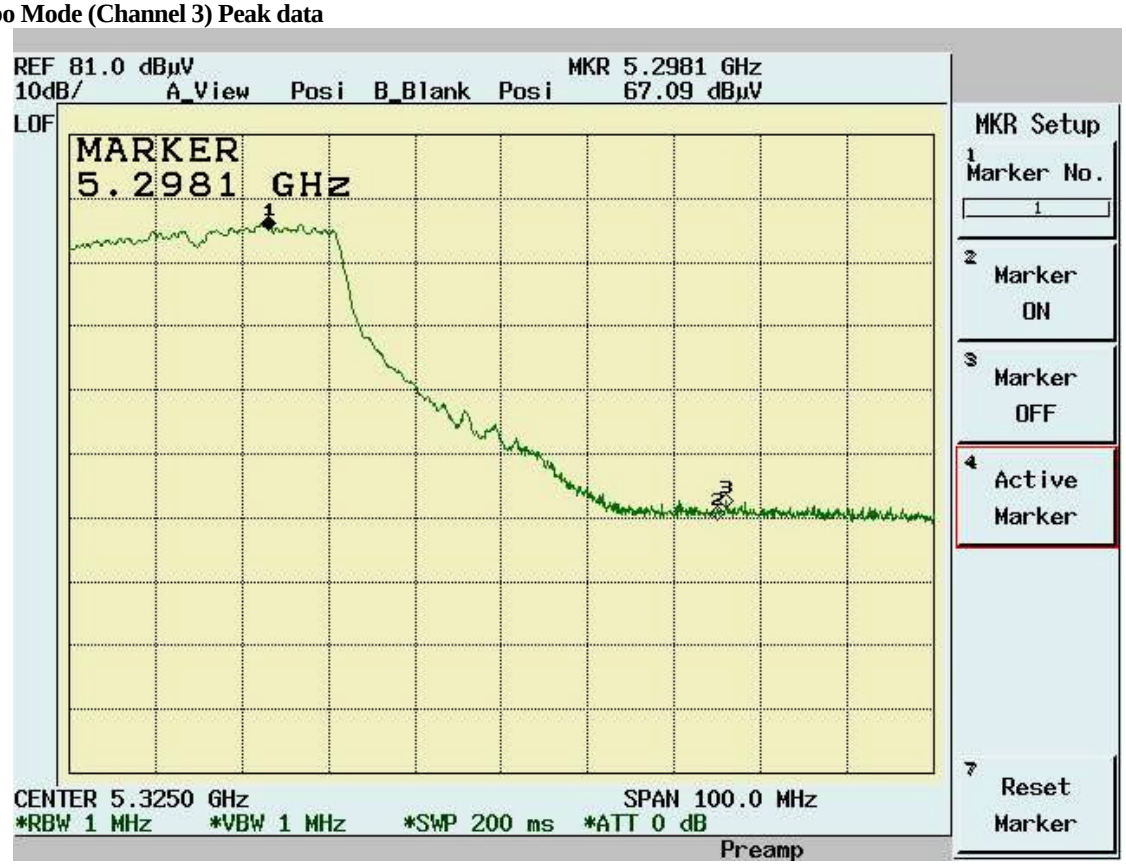
Band Edge measurement for radiated emission in Restricted Band(Radiated)
Turbo Mode (Channel 1) Peak data



Turbo Mode (Channel 1) Average data

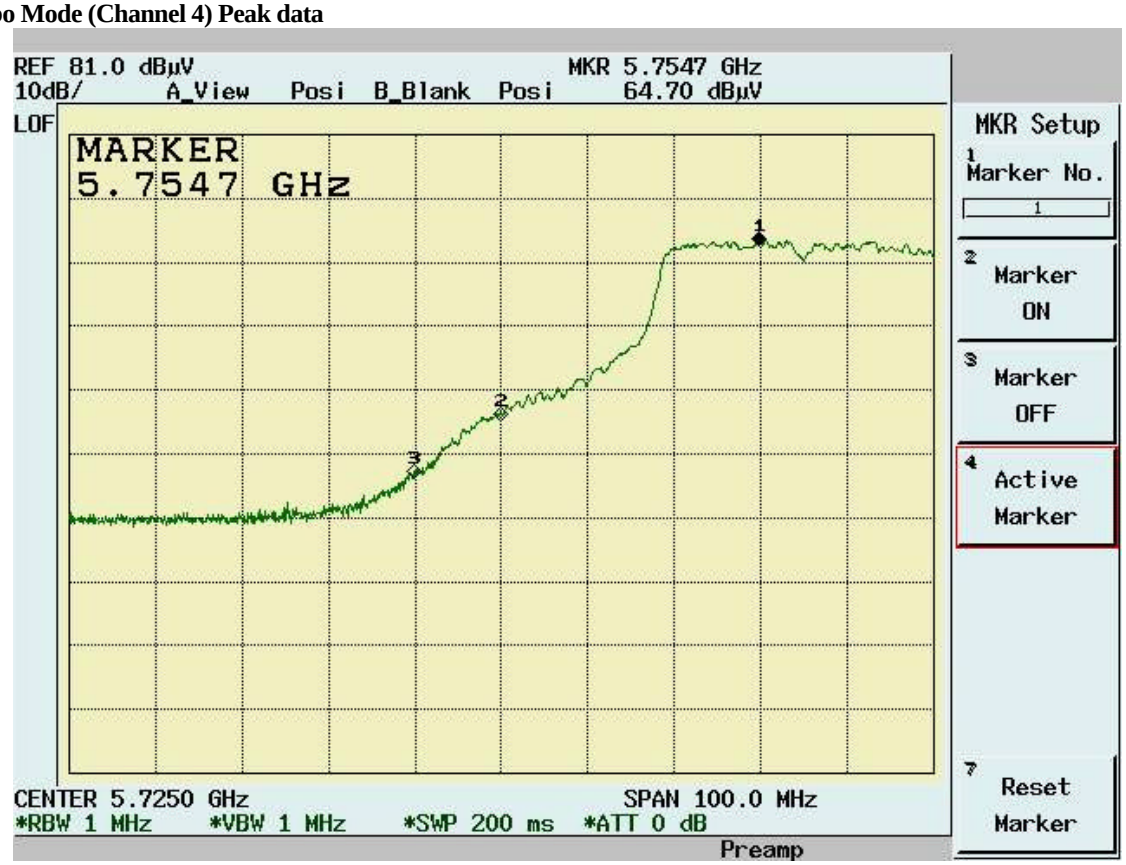


Turbo Mode (Channel 3) Peak data

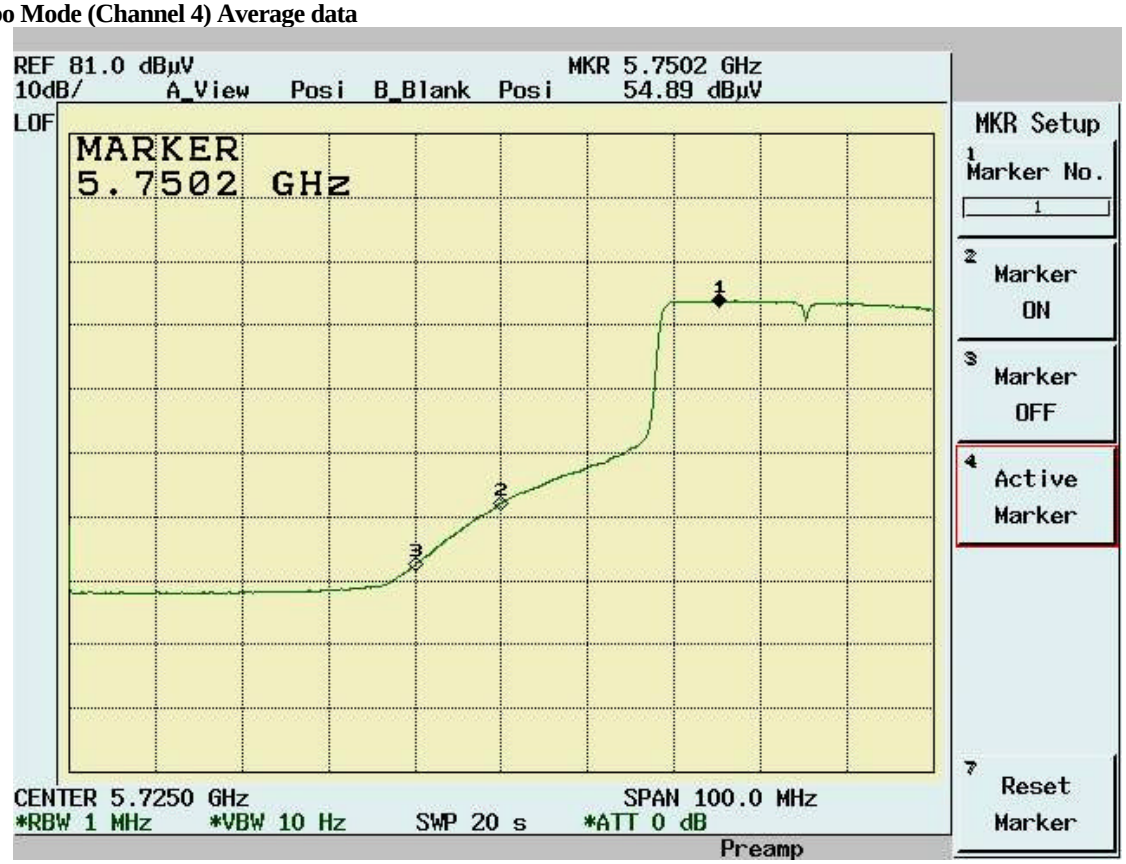


Turbo Mode (Channel 3) Average Data

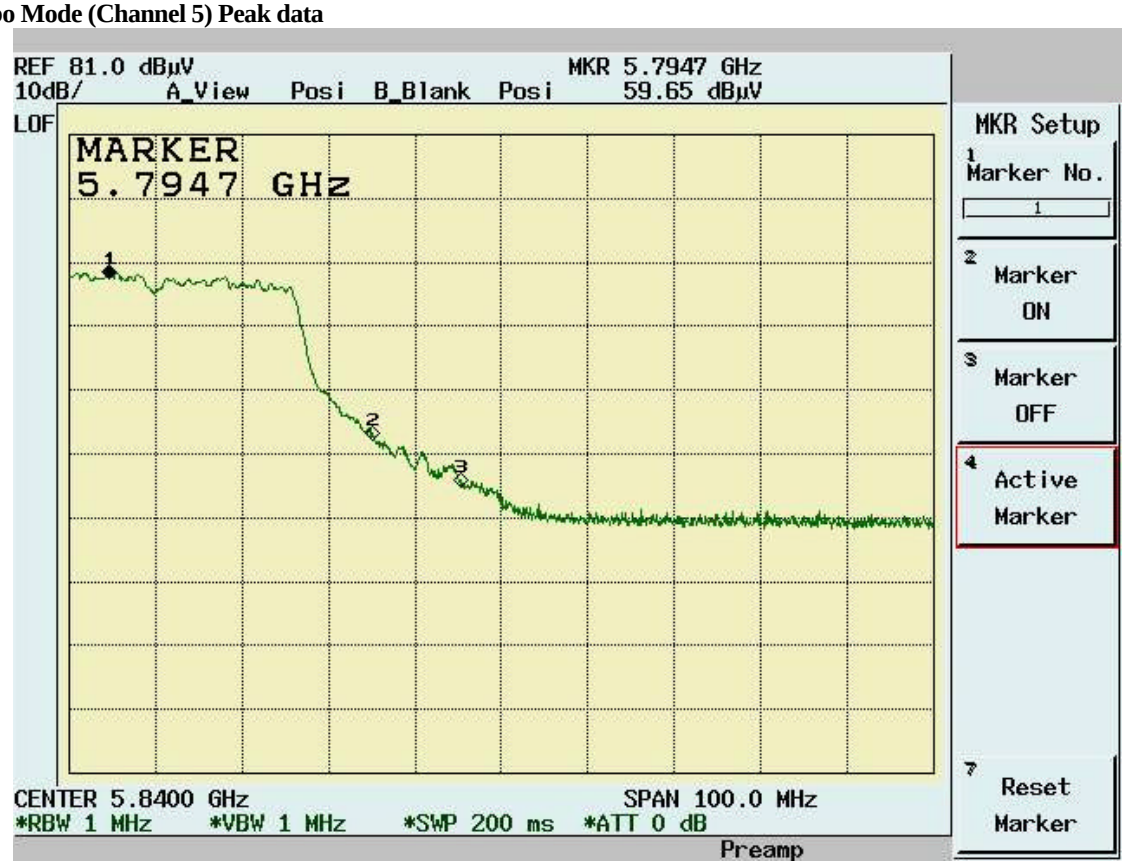
Turbo Mode (Channel 4) Peak data



Turbo Mode (Channel 4) Average data



Turbo Mode (Channel 5) Peak data



Turbo Mode (Channel 5) Average Data

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

Refer to MPE Test Report

6.8 Frequency Stability [Section 15.407(g)]

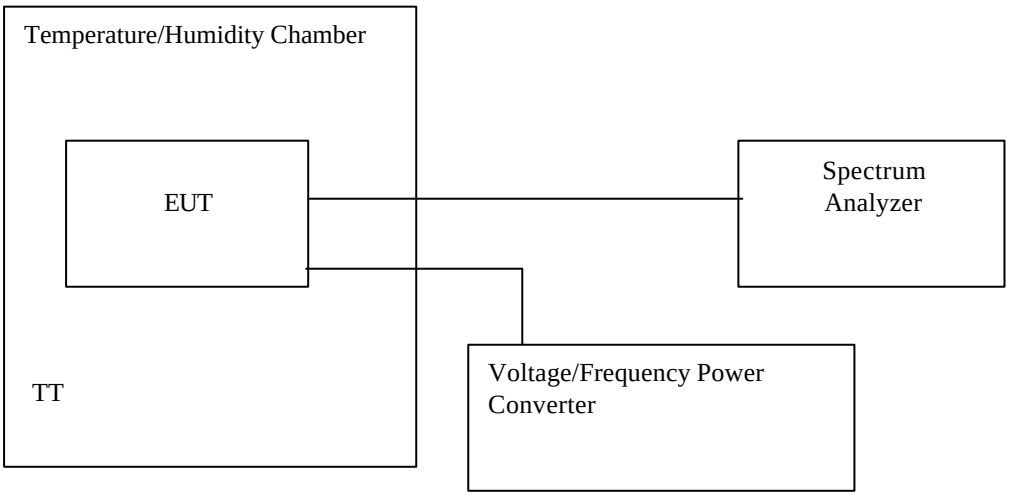
6.8.1 Limits of Frequency Stability Measurement

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 minutes.
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

Test Engr: Mailes Hsieh

Operating Frequency:	5180 (Mhz)			Limit: +/- 0.02%			
Temp.	Power Supply	2 minutes		5 minutes		10 minutes	
(^{0}C)	(V AC)	(MHz)	(%)	(MHz)	(%)	(MHz)	
35	132	5179.9836	-0.000317	5179.9670	-0.000637	5179.9810	-0.000367
	115	5179.9974	-0.000050	5179.9862	-0.000266	5179.9730	-0.000521
	97	5180.0062	0.000120	5179.9842	-0.000305	5179.9870	-0.000251
0	132	5180.0134	0.000259	5180.0004	0.000008	5180.0116	0.000224
	115	5180.0018	0.000035	5180.0032	0.000062	5180.0086	0.000166
	97	5180.0144	0.000278	5180.0104	0.000201	5180.0116	0.000224
20	132	5179.9424	-0.001112	5179.9778	-0.000429	5179.9710	-0.000560
	115	5179.9876	-0.000239	5179.9748	-0.000486	5179.9712	-0.000556
	97	5179.9678	-0.000622	5179.9692	-0.000595	5179.9680	-0.000618

7. Appendix

7.1 Appendix A: Measurement Procedure for Power line Conducted Emissions

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 required standard. 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 emission. 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 emission. 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	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	06/02/2003	06/02/2004
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	12/04/2002	12/04/2004
Conduction	EMI Receiver 03	HP	85460A	3448A00209	01/08/2004	01/08/2005
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	04/30/2003	04/30/2004
Conduction	LISN 04	EMCO	3810/2	9604-1429	12/18/2003	12/18/2004
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/03/2003	06/03/2004
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	09/09/2003	09/09/2004
Radiation	Microwave Cable Chmb 02 3M	HUBER+SUHNER AG.	Sucoflex 103	42731/3 & 42729/3	03/17/2004	03/17/2005
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	12/04/2002	12/04/2004
Radiation	EMI Receiver 02	HP	85460A	3448A00183	10/02/2003	10/02/2004
Radiation	EMI Receiver 04	AFJ	ER 55CR	55390143233	05/20/2003	05/20/2004
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	02/12/2004	02/12/2005
Rad. Above 1Ghz	Horn Antenna 02	Com-Power	AH-118	10088	02/17/2004	02/17/2005
Rad. Above 1Ghz	Horn Antenna 04	Com-Power	AH-826	081-001	01/07/2004	01/07/2005
Rad. Above 1Ghz	Horn Antenna 05	Com-Power	AH-640	100A	09/18/2003	09/18/2005
Rad. Above 1Ghz	Microwave Cable RF SK-01	HUBER+SUHNER AG.	Sucoflex 102	22139 /2	02/17/2004	02/17/2005
Rad. Above 1Ghz	Peak Power Analyzer	HP	8990A	3621A01269	01/02/2004	01/02/2005
Rad. Above 1Ghz	Power Sensor Radar	HP	84815A	3318A01828	01/02/2004	01/02/2006
Rad. Spurious Emission	Power Meter 01	HP	438A	3513U06187	01/07/2004	01/07/2005
Rad. Spurious Emission	Power Sensor RF 01	HP	8481H	MY41091048	06/17/2003	06/17/2004
Rad. Above 1Ghz	Preamplifier 02	MITEQ	AFS44-00102650-40-10P-44	728229	05/13/2003	05/13/2004
Rad. Above 1Ghz	Preamplifier 09	MITEQ	AFS44-00102650-40-10P-44	858687	05/13/2003	05/13/2004
Rad. Above 1Ghz	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	N/A	N/A
Rad. Above 1Ghz	Spectrum Analyzer 07	Advantest	R3182	110600649	04/08/2004	04/08/2005

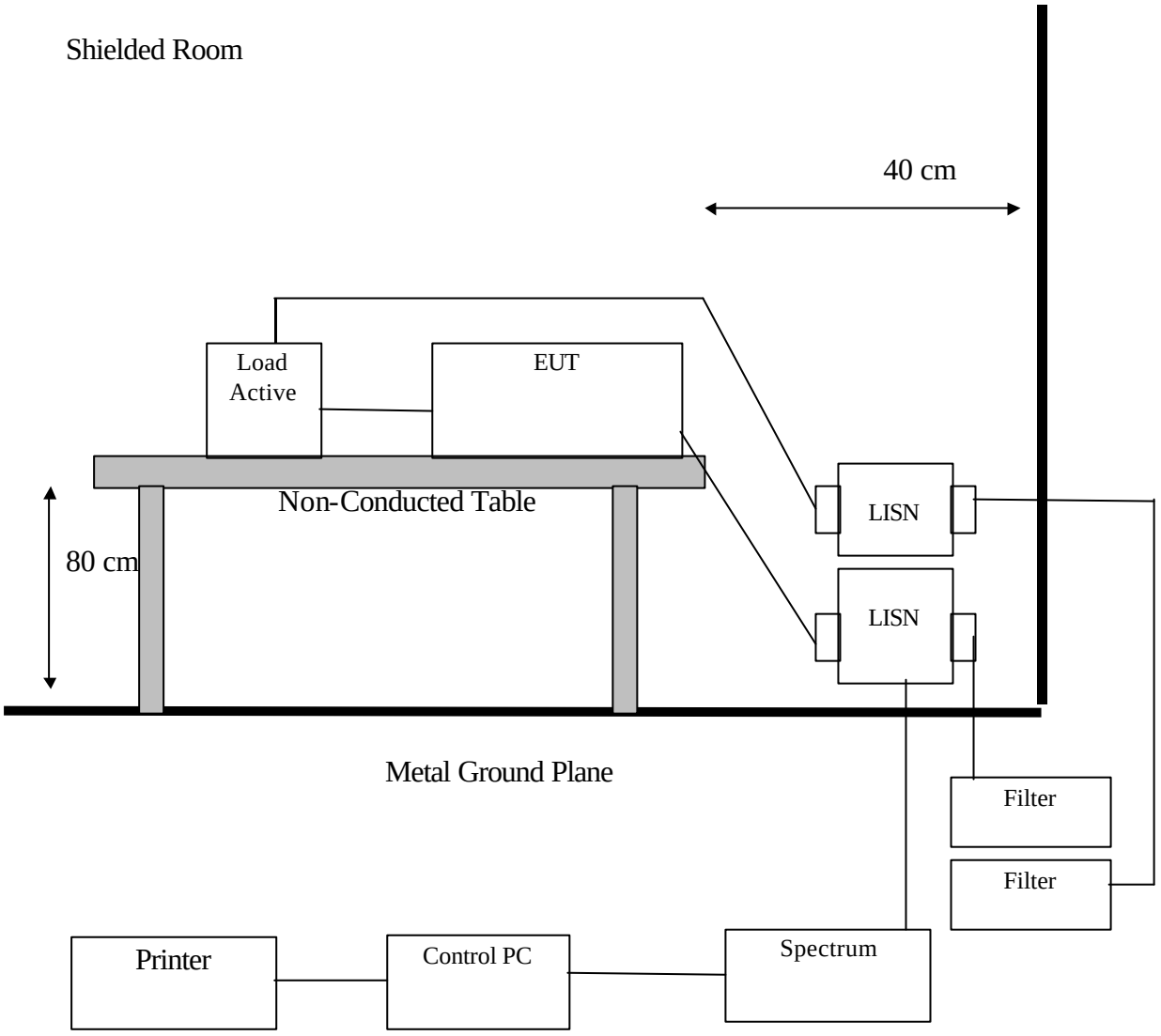
Note: Calibration is traceable to NIST or national or international standards.

7.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

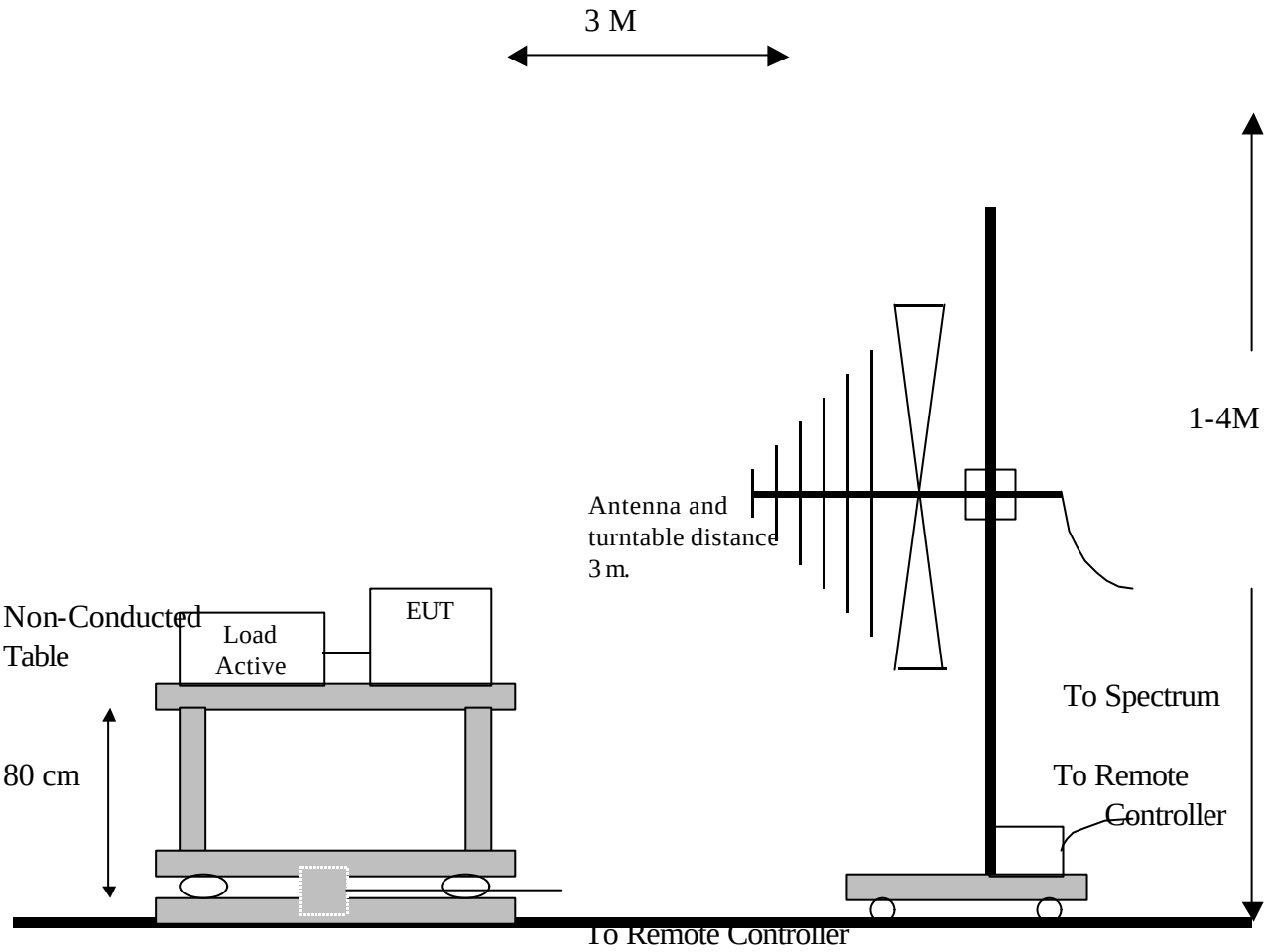
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

7.4 Appendix D: Layout of EUT and Support Equipment

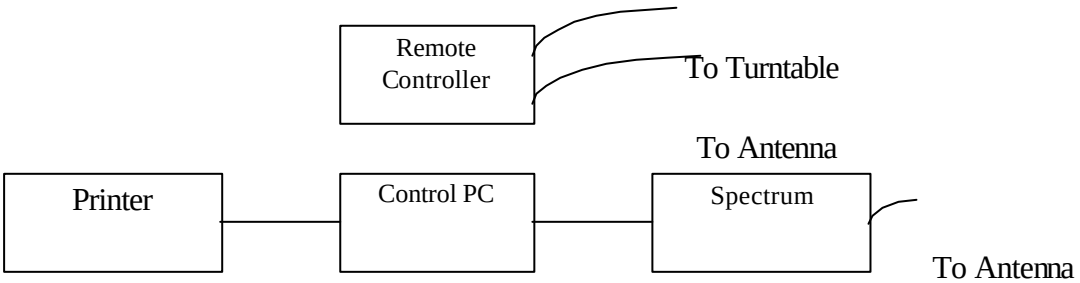
7.4.1 General Conducted Test Configuration



7.4.2 General Radiation Test Configuration



Metal Full Soldered Ground Plane



7.5 Appendix E: Description of Support Equipment

7.5.1 Description of Support Equipment

Description:	Notebook Personal Computer
Model:	MS2133
AC Adapter:	Lite-On (Model: PA-1500-02) 3 Pins
Hard Disk Driver:	Fujitsu (Model: MHS2060AT) 60GB
SDRAM:	Infineon (Model: HYS64D64020GBDL-7-B) 512MB
Modem Module Card:	Ambit (Model: T60M283.00 3A)
Bluetooth + Modem (MDC):	Ambit (Model: T60M665.00)
Wireless LAN Card:	Ambit (Model: T60H677.01)
USB Connector:	two 4-pin
VGA Port:	one 15-pin
LAN Connector:	one 8-pin
Modem Connector:	one 4-pin
1394 Port:	one 4-pin
PCMCIA Slot:	one 68-pin
Port Replicator:	one 100-pin
Line Out Port:	one
Line In Port:	one
Power In Port:	one
Power Cord:	Shielded, Detachable (3 pins)
Battery:	SANYO (Model: BTP-42C1)
LCD:	TOSHIBA 10.4 inch TFT XGA (Model: TLM10C321K)
Display:	LCD & CRT (1024× 768)
Maximum display Resolution:	LCD & CRT 1024 x 768 Non-interlaced
Speed & CPU	100MHz Pentium III 800MHz

7.5.2 Software for Controlling Support Unit

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

A. Link (Http://192.168.1.1/) to set EUT function.
B. Repeat the above steps.

Lan	IEXPLORE.exe	8/3/2001

7.5.3 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V to AC Power Cord Inlet (2-pin)	1.8M	Nonshielded, Detachable	Plastic Head
LAN Data Cable	EUT LAN Port to PC LAN Port	33 feet	Non-shielded, Detachable	Plastic 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:

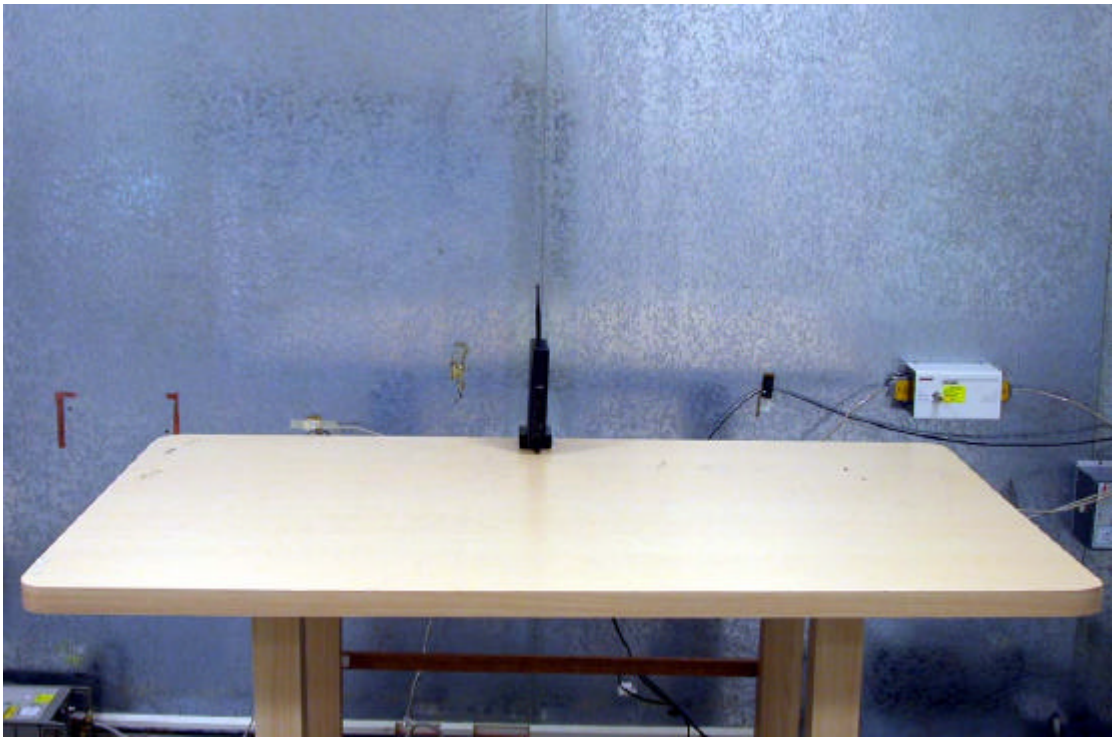
Uc (y) = square root ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)

U = 2 * Uc (y)

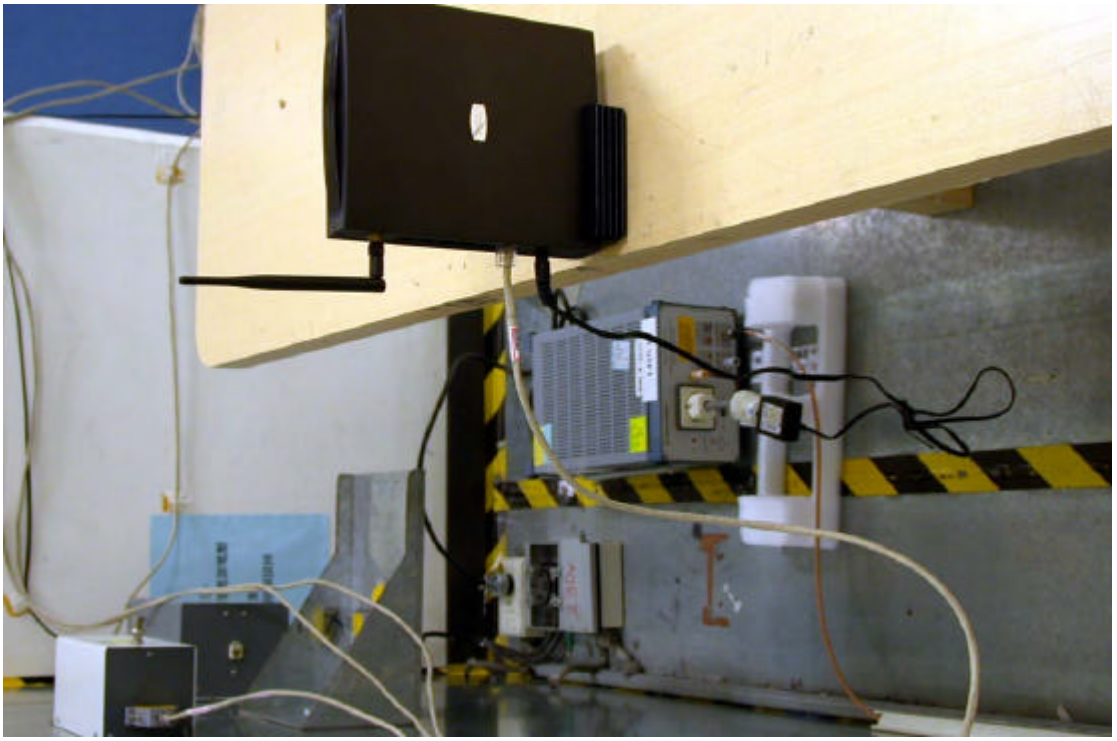
Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

7.7 Appendix G: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT

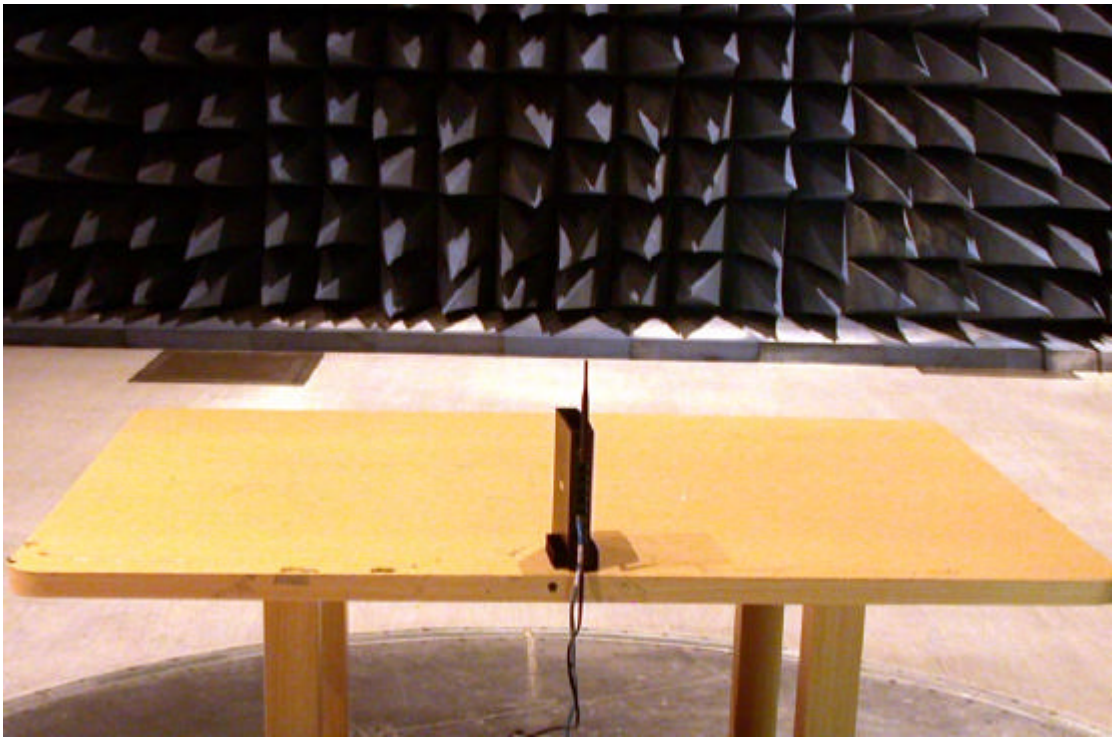


The Back View of Highest Conducted Set-up For EUT



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.