

4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

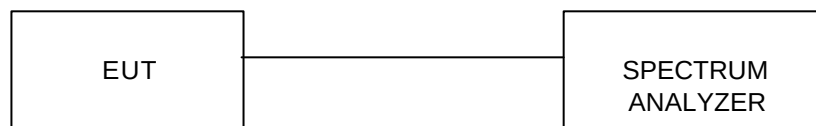
4.3.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

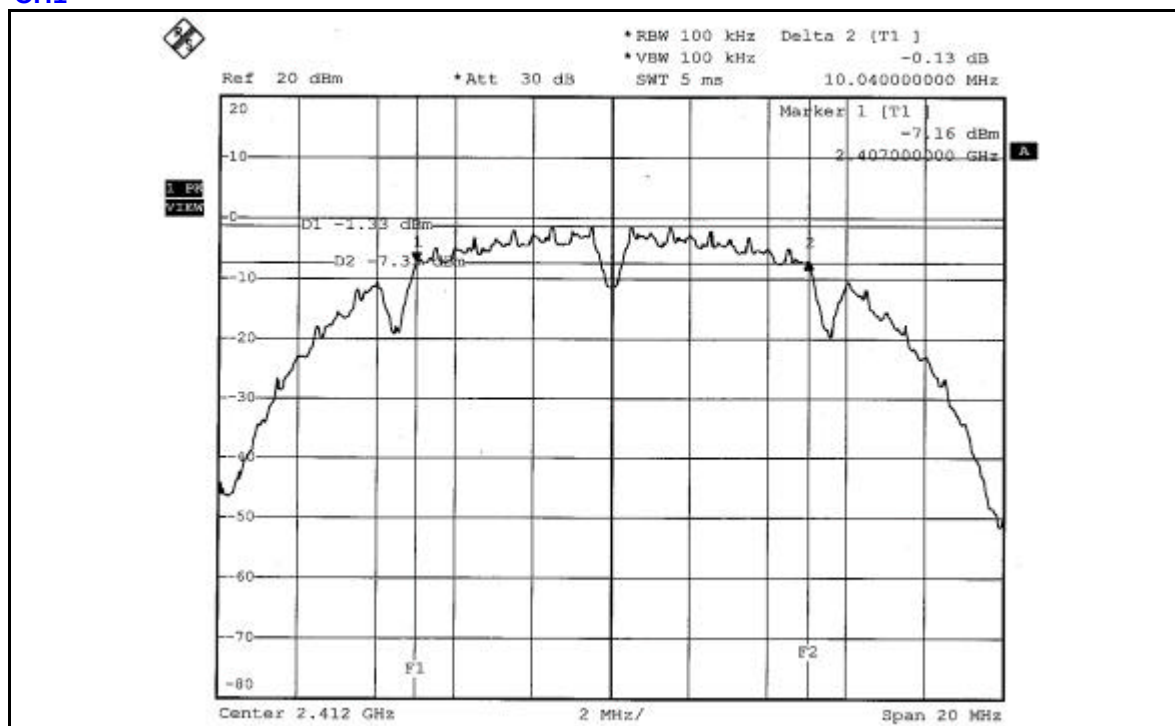
4.3.7 TEST RESULTS

802.11b DSSS MODULATION

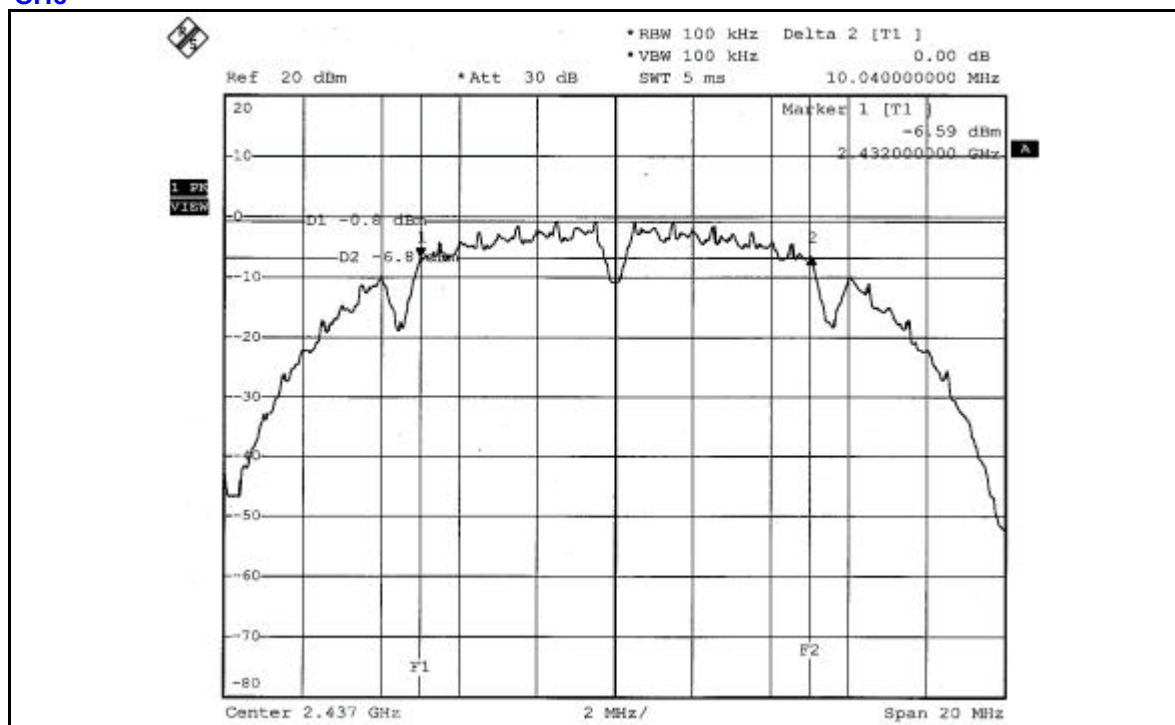
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	10.04	0.5	PASS
6	2437	10.04	0.5	PASS
11	2462	10.08	0.5	PASS

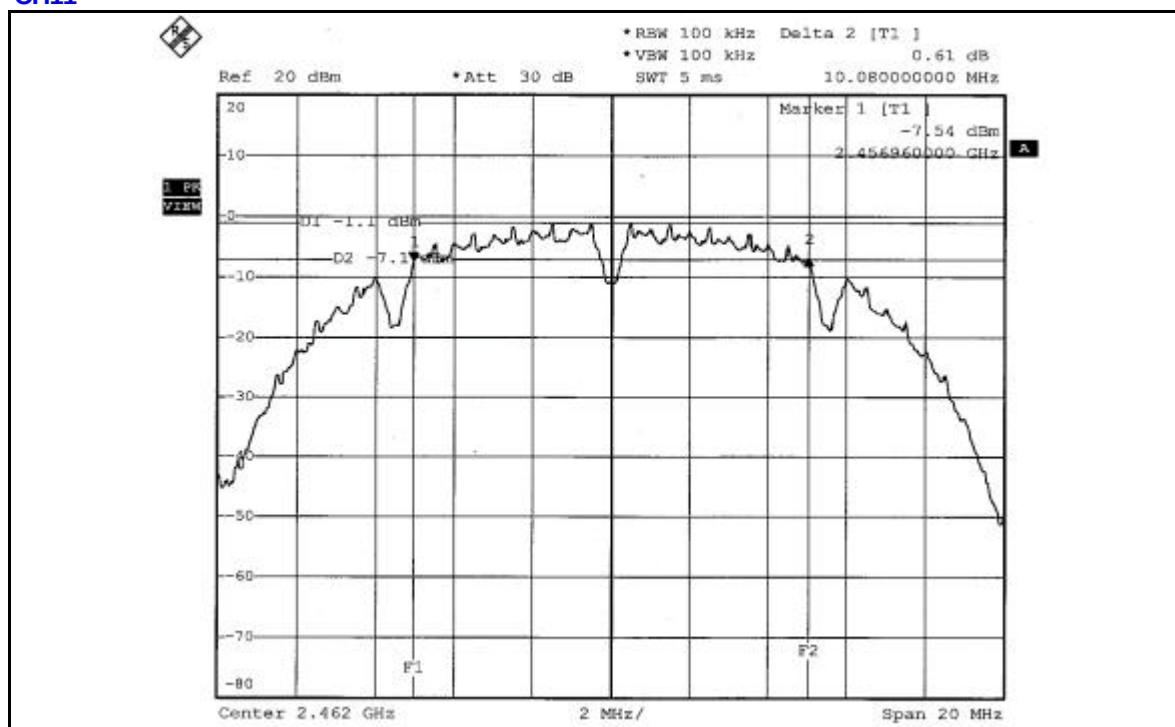
CH1



CH6



CH11

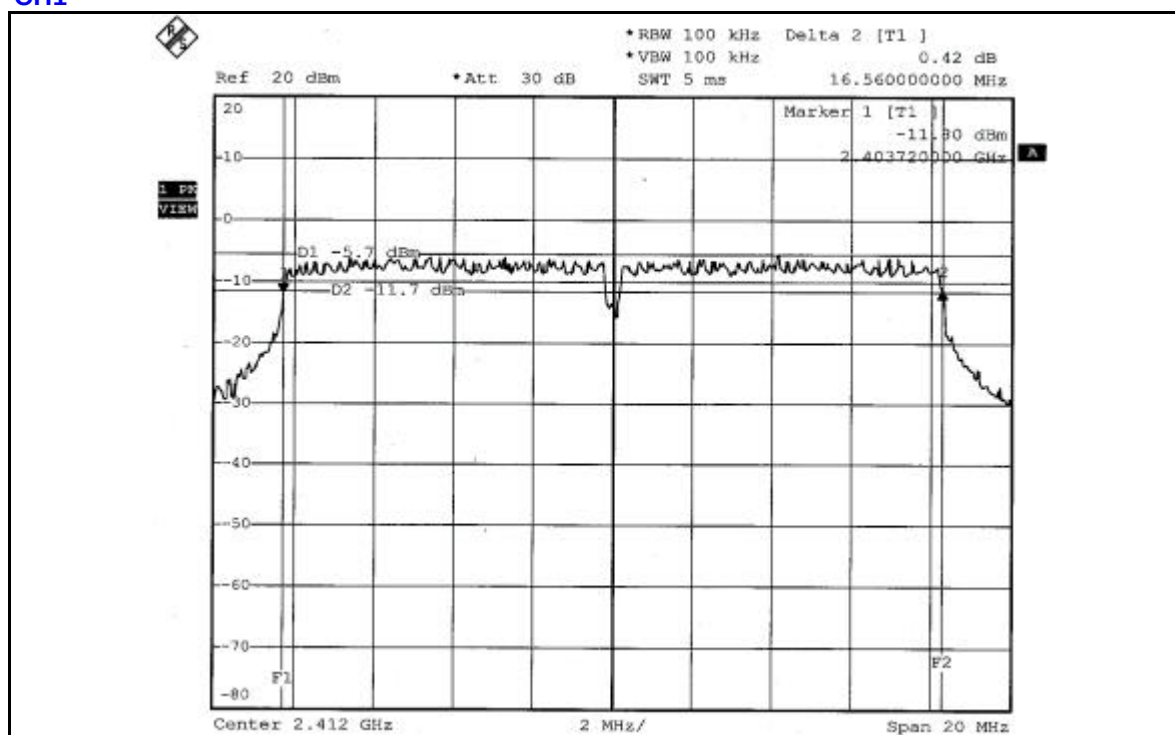


802.11g OFDM MODULATION

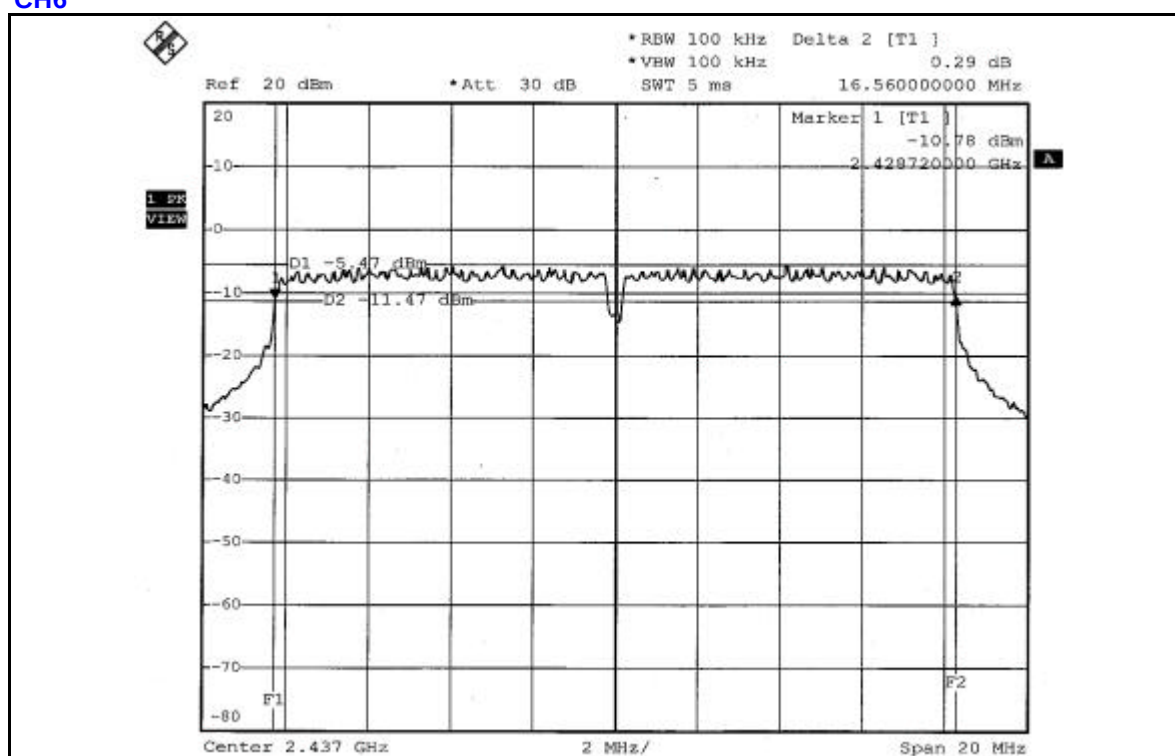
MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	6 dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS/FAIL
1	2412	16.56	0.5	PASS
6	2437	16.56	0.5	PASS
11	2462	16.56	0.5	PASS

CH1



CH6



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm. .

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED UNTIL
R&S SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006
AGILENT SIGNAL GENERATOR	E8257C	MY43320668	Dec. 05, 2006
DIGITAL RT OSCILLOSCOPE	TDS1012	C037299	Dec. 06, 2006
NARDA DETECTOR	4503A	FSCM99899	NA

NOTE:

The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURES

1. A detector was used on the output port of the EUT. An oscilloscope was used to peak the response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same peak reading on oscilloscope. Record the power level.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6

4.4.7 TEST RESULTS

802.11b DSSS MODULATION

MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	19.953	13.00	30	PASS
6	2437	20.324	13.08	30	PASS
11	2462	20.091	13.03	30	PASS

802.11g OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER OUTPUT (mW)	PEAK POWER OUTPUT (dBm)	PEAK POWER LIMIT (dBm)	PASS/FAIL
1	2412	20.324	13.08	30	PASS
6	2437	20.184	13.05	30	PASS
11	2462	20.230	13.06	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time=span/3kHz.

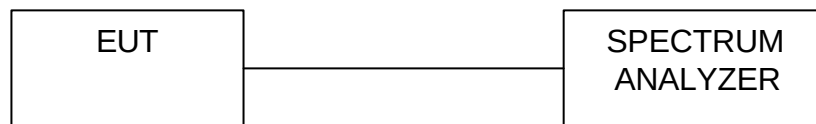
The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6

4.5.7 TEST RESULTS

802.11b DSSS MODULATION

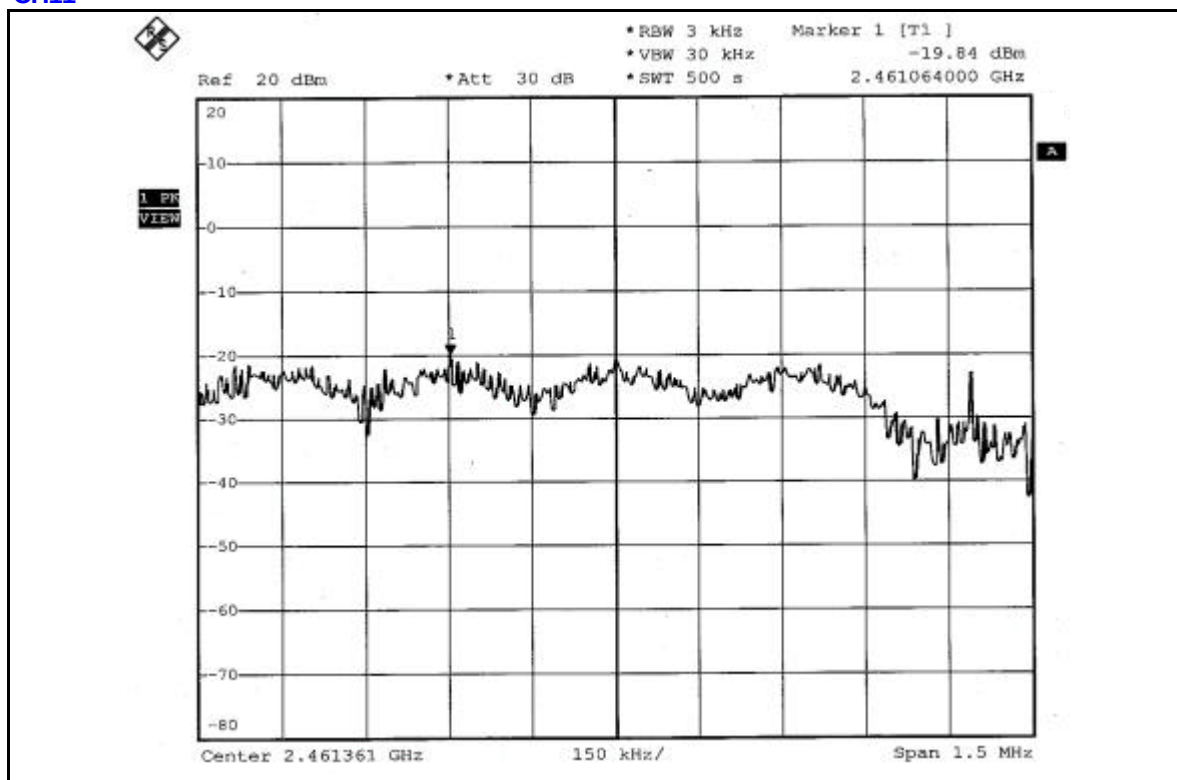
MODULATION TYPE	DBPSK	TRANSFER RATE	1Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-18.92	8	PASS
6	2437	-18.77	8	PASS
11	2462	-18.70	8	PASS

802.11g OFDM MODULATION

MODULATION TYPE	BPSK	TRANSFER RATE	6Mbps
INPUT POWER (SYSTEM)	120Vac, 60 Hz	ENVIRONMENTAL CONDITIONS	26deg.C, 66%RH, 991hPa
TESTED BY	Long Chen		

CHANNEL	CHANNEL FREQUENCY (MHz)	RF POWER LEVEL IN 3 kHz BW (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-19.69	8	PASS
6	2437	-19.98	8	PASS
11	2462	-19.84	8	PASS



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
SPECTRUM ANALYZER	FSEK30	100049	Aug. 14, 2006

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100kHz with suitable frequency span including 100MHz bandwidth from band edge. The band edges was measured and recorded. The spectrum plots (Peak RBW=VBW=100kHz; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.6 TEST RESULTS

The spectrum plots are attached on the following 12 images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

802.11b DSSS MODULATION (FOR ANTENNA NO. 1)

NOTE 1: The band edge emission plot of DSSS technique on page 70 shows 47.99dBc between carrier maximum power and local maximum emission in restrict band (2.3606GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 102.01dBuV/m (Peak), so the maximum field strength in restrict band is $102.01 - 47.99 = 54.02$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 70 shows 59.57dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 98.32dBuV/m (Average), so the maximum field strength in restrict band is $98.32 - 59.57 = 38.75$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of DSSS technique on page 71 shows 47.37dBc between carrier maximum power and local maximum emission in restrict band (2.4904GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 102.11dBuV/m (Peak), so the maximum field strength in restrict band is $102.11 - 47.37 = 54.74$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 72 shows 59.67dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 98.41dBuV/m (Average), so the maximum field strength in restrict band is $98.41 - 59.67 = 38.74$ dBuV/m which is under 54dBuV/m limit.

802.11b DSSS MODULATION (FOR ANTENNA NO. 2)

NOTE 1: The band edge emission plot of DSSS technique on page 702 shows 47.99dBc between carrier maximum power and local maximum emission in restrict band (2.3606GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 102.01dBuV/m (Peak), so the maximum field strength in restrict band is $102.01 - 47.99 = 54.02$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 70 shows 59.57dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 98.26dBuV/m (Average), so the maximum field strength in restrict band is $98.26 - 59.57 = 38.69$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of DSSS technique on page 71 shows 47.37dBc between carrier maximum power and local maximum emission in restrict band (2.4904GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 101.89dBuV/m (Peak), so the maximum field strength in restrict band is $101.89 - 47.37 = 54.52$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 72 shows 59.67dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 98.22dBuV/m (Average), so the maximum field strength in restrict band is $98.22 - 59.67 = 38.55$ dBuV/m which is under 54dBuV/m limit.

802.11b DSSS MODULATION (FOR ANTENNA NO. 3)

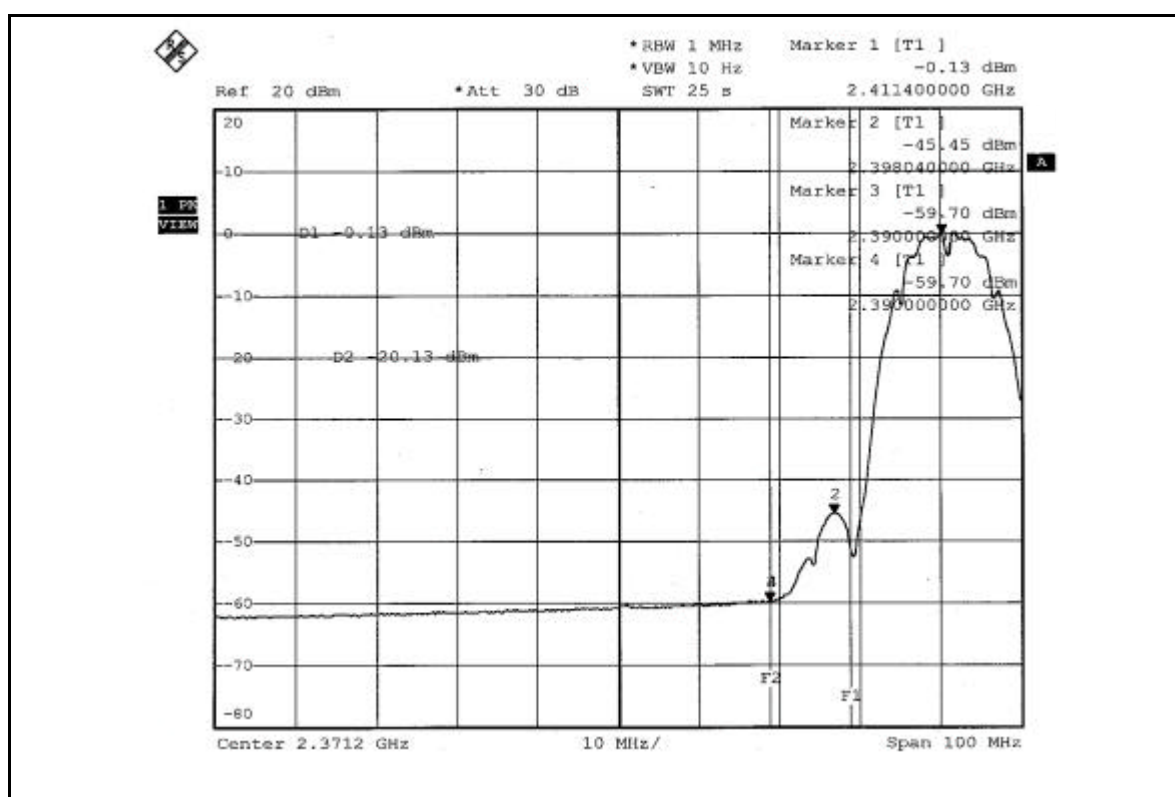
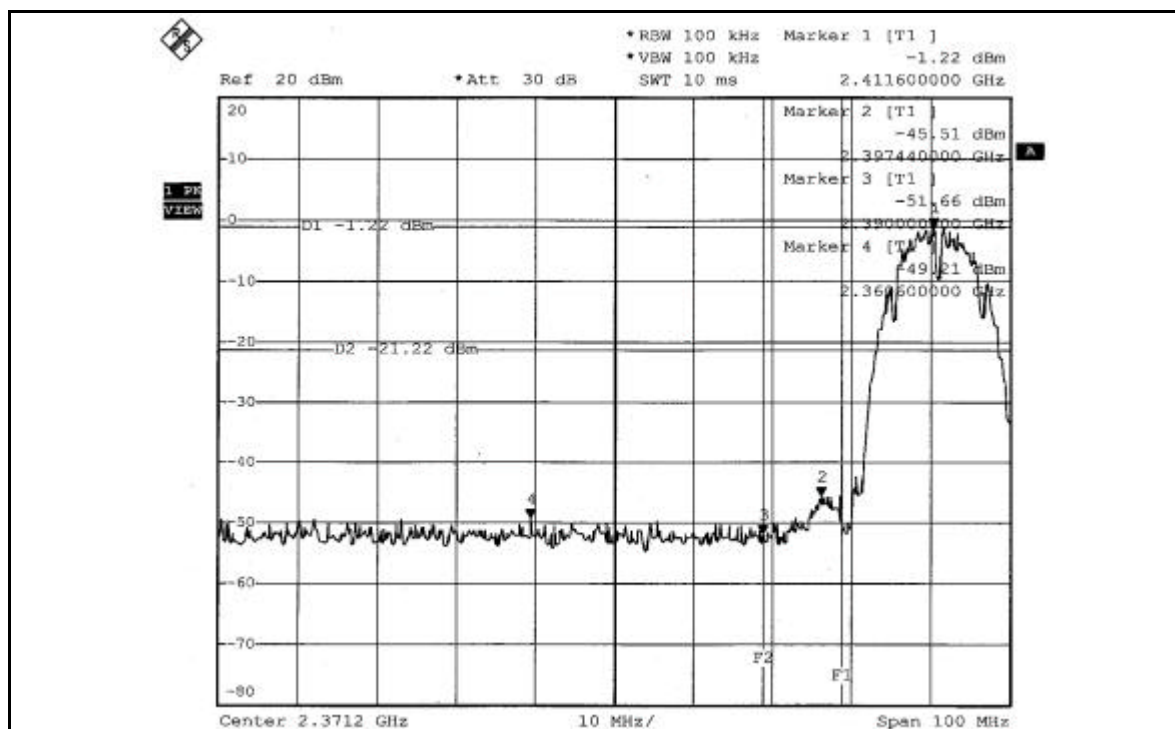
NOTE 1: The band edge emission plot of DSSS technique on page 70 shows 47.99dBc between carrier maximum power and local maximum emission in restrict band (2.3606GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 102.41dBuV/m (Peak), so the maximum field strength in restrict band is $102.41 - 47.99 = 54.42$ dBuV/m which is under 74dBuV/m limit.

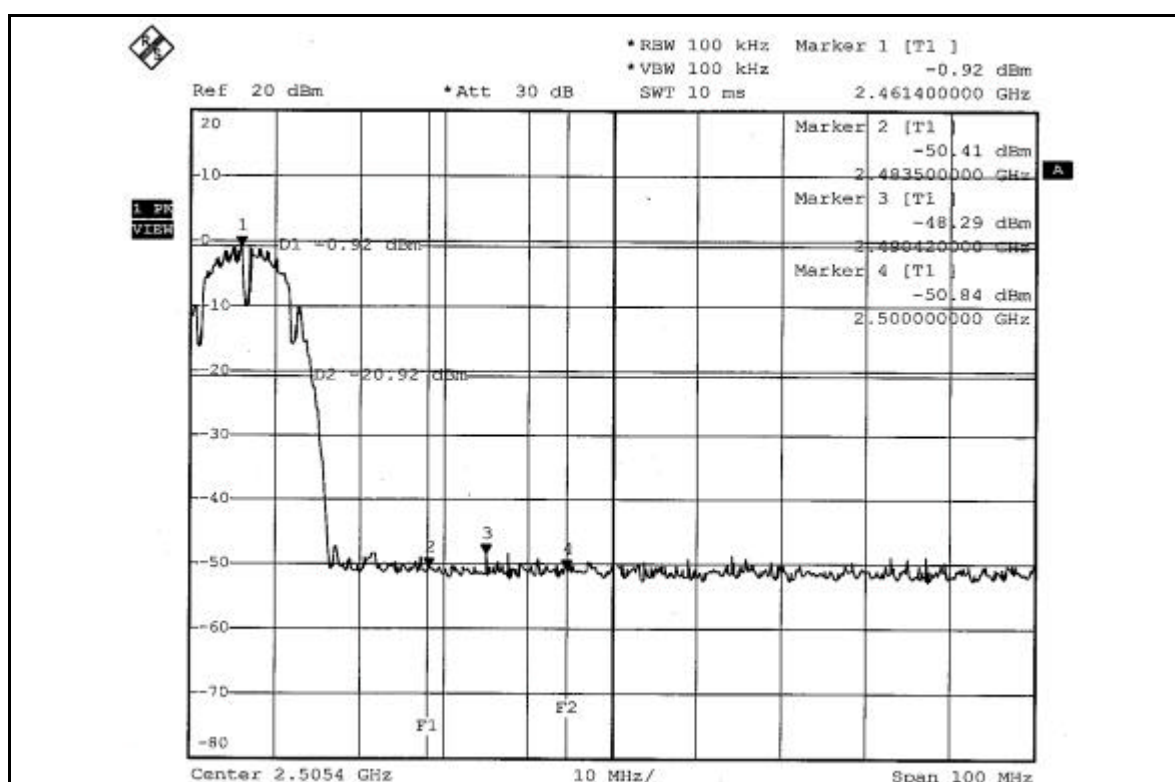
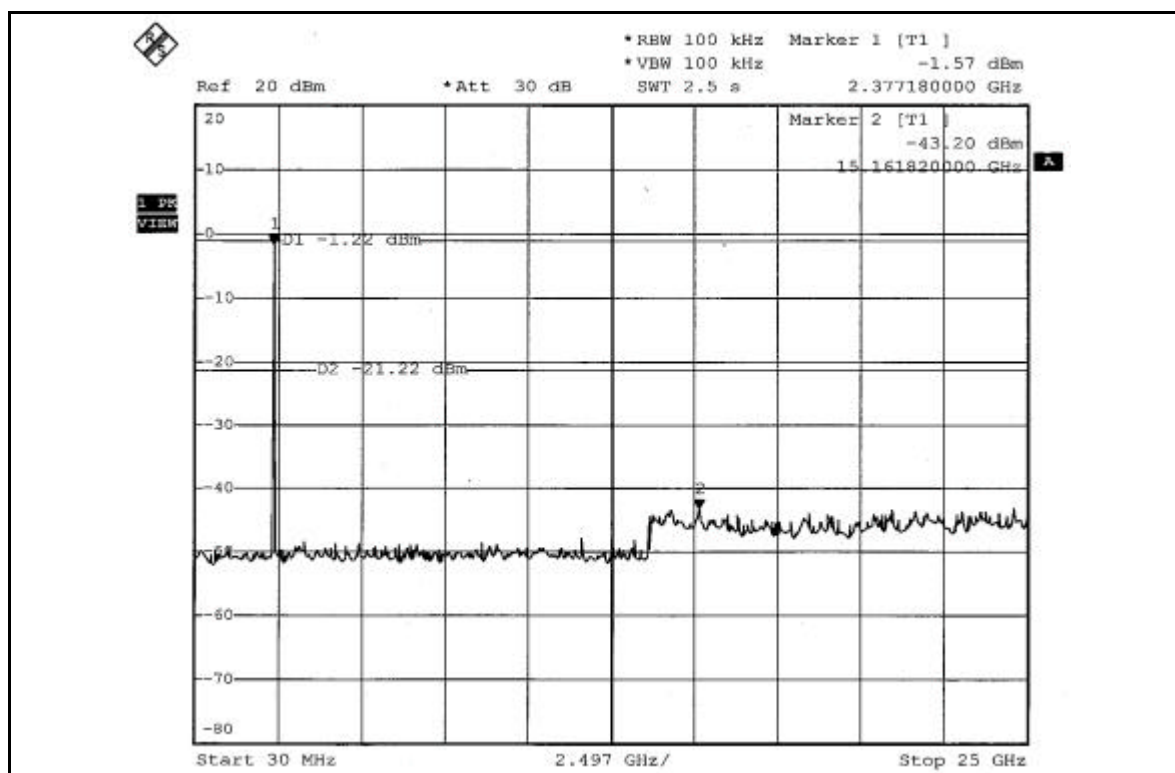
The band edge emission plot of DSSS technique on page 70 shows 59.57dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 98.50dBuV/m (Average), so the maximum field strength in restrict band is $98.50 - 59.57 = 38.93$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of DSSS technique on page 71 shows 47.37dBc between carrier maximum power and local maximum emission in restrict band (2.4904GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 102.02dBuV/m (Peak), so the maximum field strength in restrict band is $102.02 - 47.37 = 54.65$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of DSSS technique on page 72 shows 59.67dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 98.11dBuV/m (Average), so the maximum field strength in restrict band is $98.11 - 59.67 = 38.44$ dBuV/m which is under 54dBuV/m limit.

802.11b DSSS MODULATION





802.11g OFDM MODULATION (FOR ANTENNA NO. 1)

NOTE 1: The band edge emission plot of OFDM technique on page 76 shows 43.19dBc between carrier maximum power and local maximum emission in restrict band (2.3734GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.01dBuV/m (Peak), so the maximum field strength in restrict band is $100.01 - 43.19 = 56.82$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of OFDM technique on page 76 shows 51.32dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 91.02dBuV/m (Average), so the maximum field strength in restrict band is $91.02 - 51.32 = 39.70$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of OFDM technique on page 77 shows 43.00dBc between carrier maximum power and local maximum emission in restrict band (2.4851GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 100.11dBuV/m (Peak), so the maximum field strength in restrict band is $100.11 - 43.00 = 57.11$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of OFDM technique on page 78 shows 52.11dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 90.89dBuV/m (Average), so the maximum field strength in restrict band is $90.89 - 52.11 = 38.78$ dBuV/m which is under 54dBuV/m limit.

802.11g OFDM MODULATION (FOR ANTENNA NO. 2)

NOTE 1: The band edge emission plot of OFDM technique on page 76 shows 43.19dBc between carrier maximum power and local maximum emission in restrict band (2.3734GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 100.05dBuV/m (Peak), so the maximum field strength in restrict band is $100.05 - 43.19 = 56.86$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of OFDM technique on page 76 shows 51.32dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 91.05dBuV/m (Average), so the maximum field strength in restrict band is $91.05 - 51.32 = 39.73$ dBuV/m which is under 54dBuV/m limit.

NOTE 2: The band edge emission plot of OFDM technique on page 77 shows 43.00dBc between carrier maximum power and local maximum emission in restrict band (2.4851GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 99.97dBuV/m (Peak), so the maximum field strength in restrict band is $99.97 - 43.00 = 56.97$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of OFDM technique on page 78 shows 52.11dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 90.98dBuV/m (Average), so the maximum field strength in restrict band is $90.98 - 52.11 = 38.87$ dBuV/m which is under 54dBuV/m limit.

802.11g OFDM MODULATION (FOR ANTENNA NO. 3)

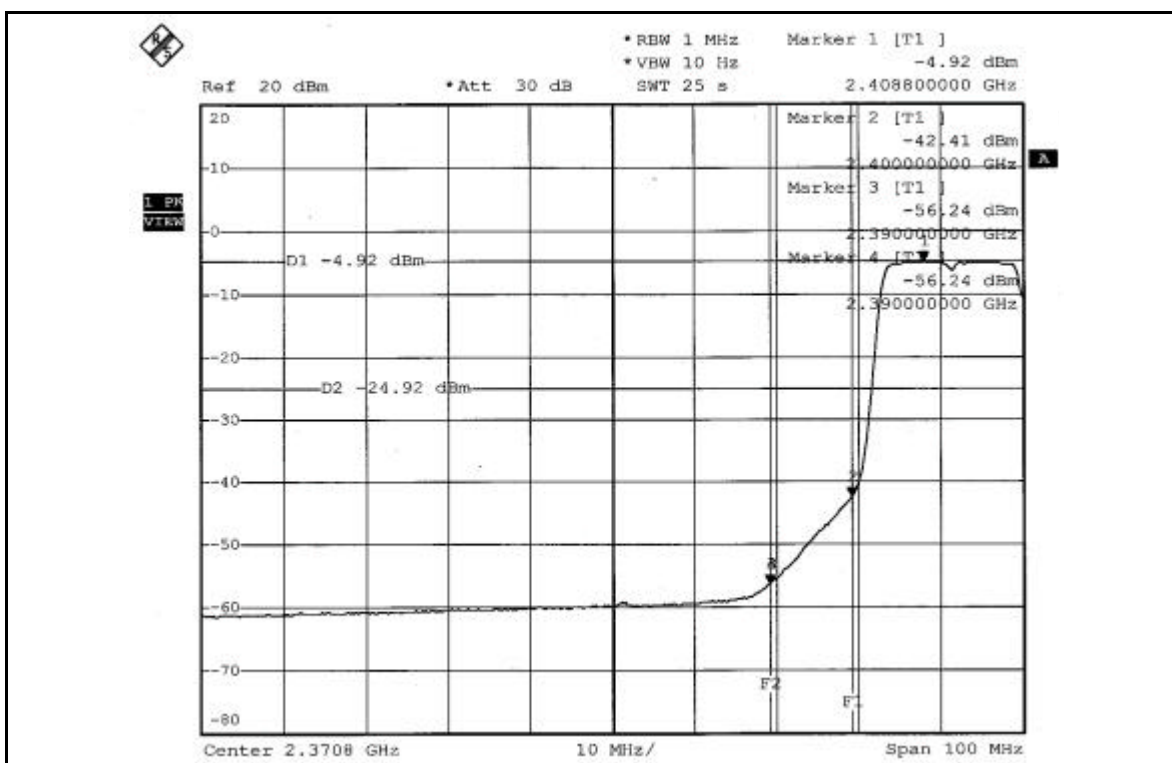
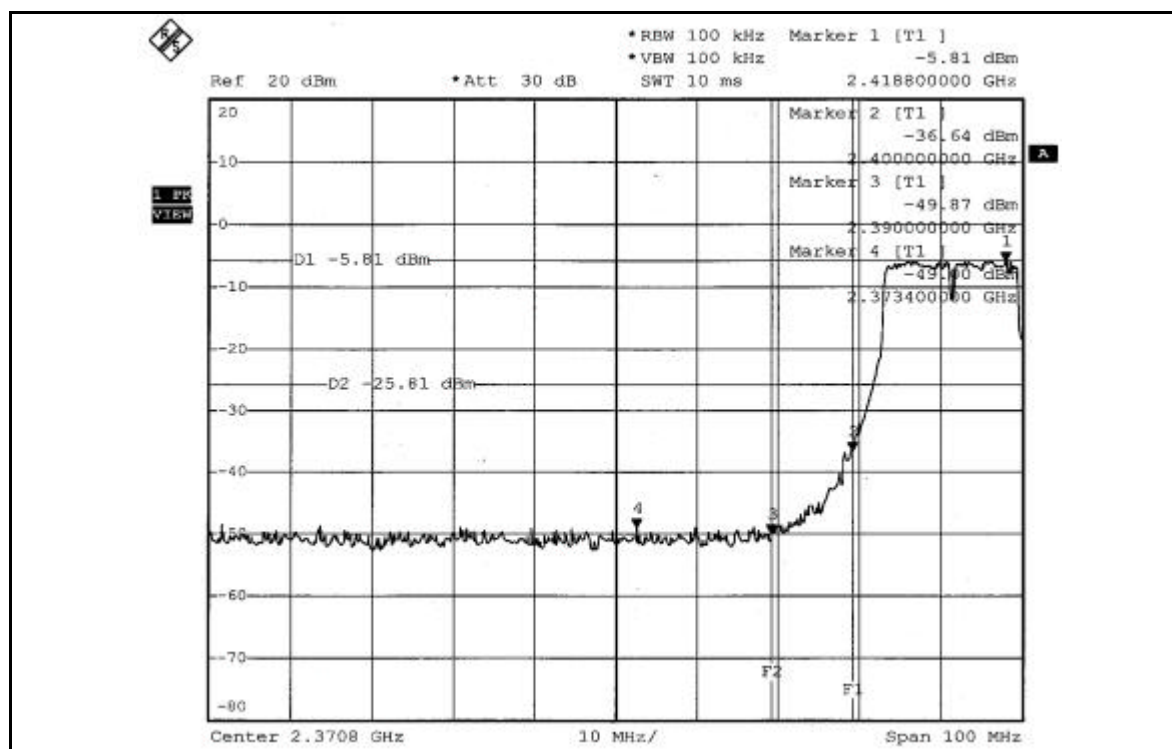
NOTE 1: The band edge emission plot of OFDM technique on page 76 shows 43.19dBc between carrier maximum power and local maximum emission in restrict band (2.3734GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 101.02dBuV/m (Peak), so the maximum field strength in restrict band is $101.02 - 43.19 = 57.83$ dBuV/m which is under 74dBuV/m limit.

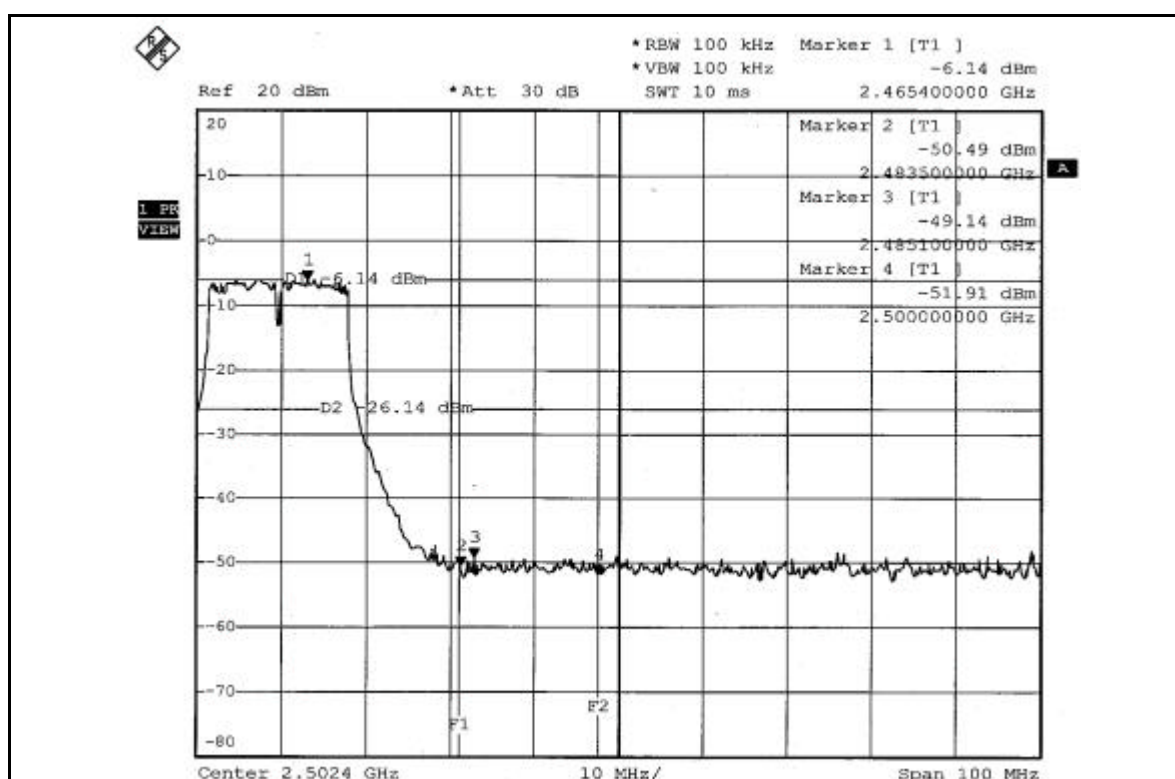
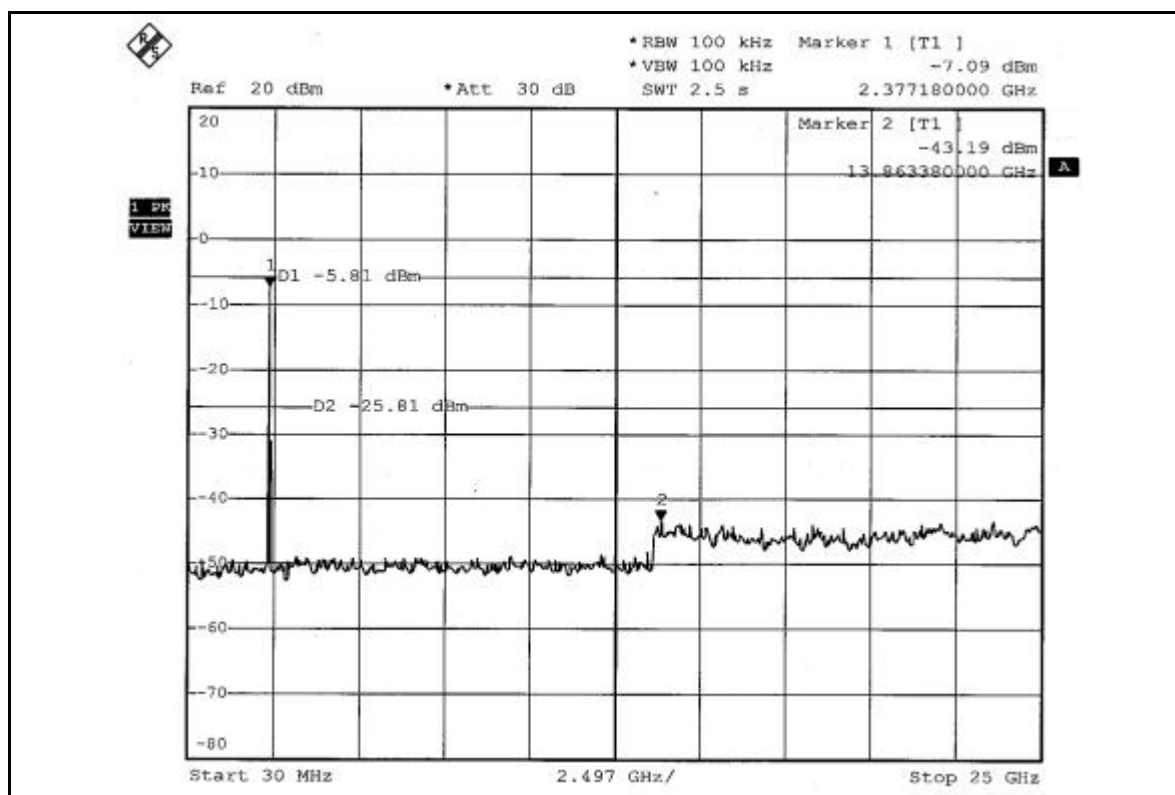
The band edge emission plot of OFDM technique on page 76 shows 51.32dBc between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2.7 is 92.11dBuV/m (Average), so the maximum field strength in restrict band is $92.11 - 51.32 = 40.79$ dBuV/m which is under 54dBuV/m limit.

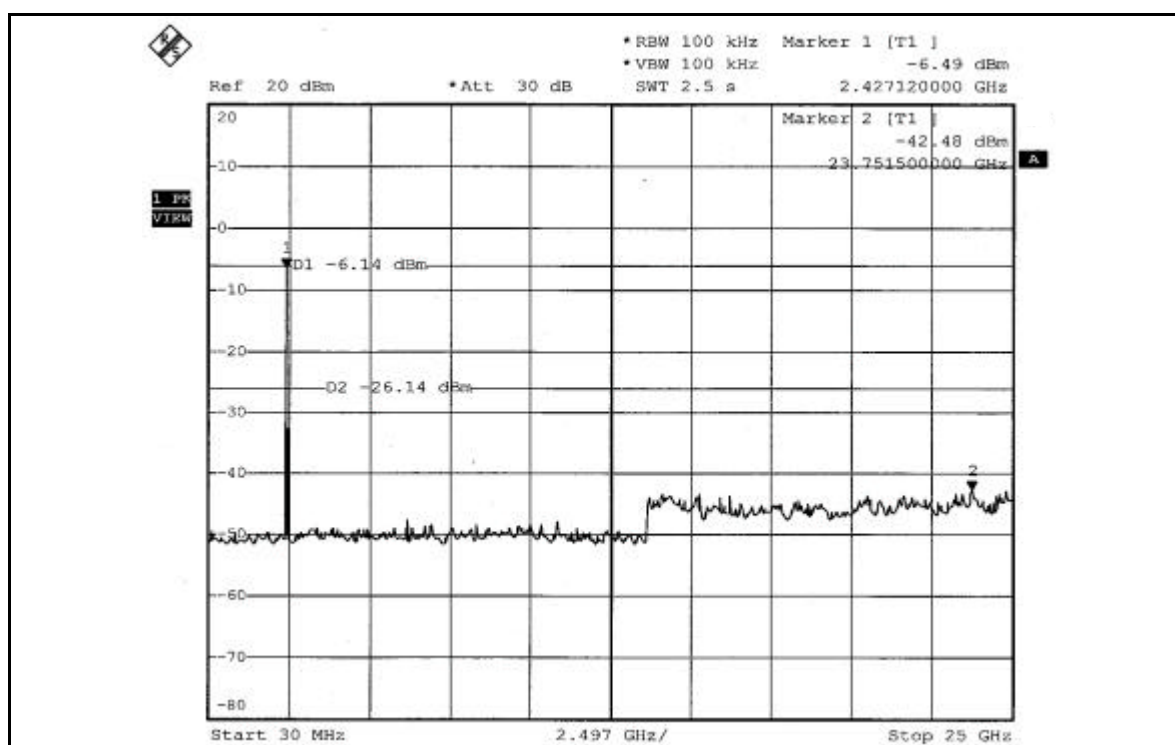
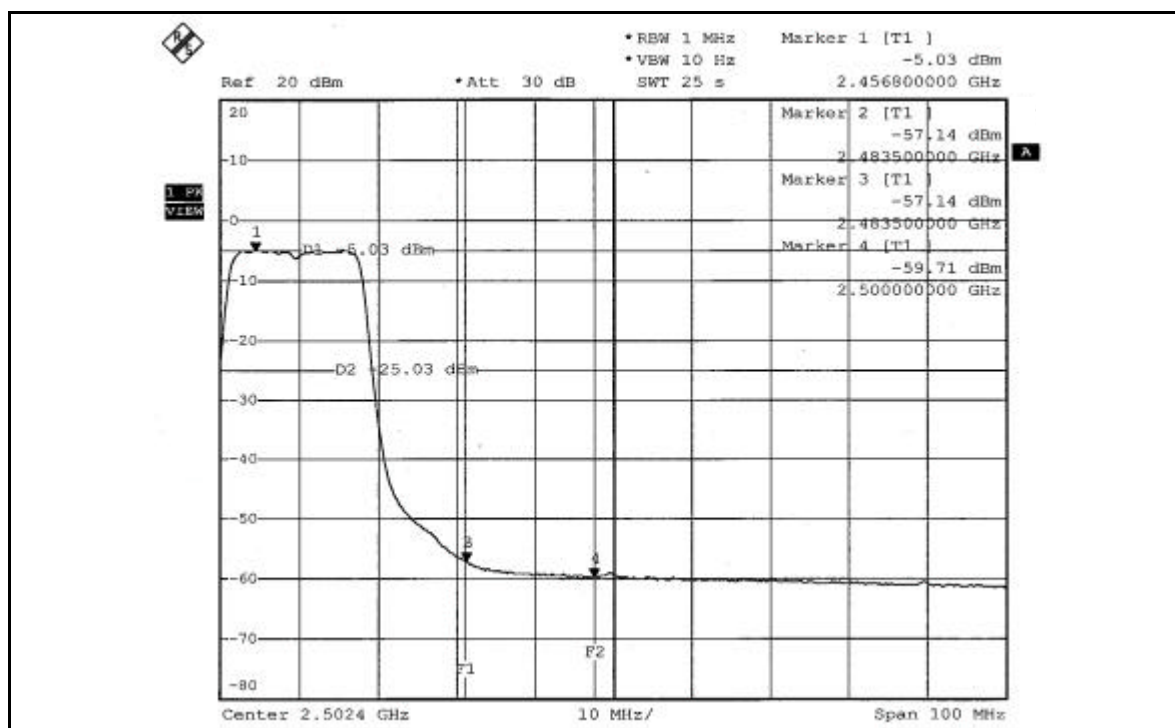
NOTE 2: The band edge emission plot of OFDM technique on page 77 shows 43.00dBc between carrier maximum power and local maximum emission in restrict band (2.4851GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 102.11dBuV/m (Peak), so the maximum field strength in restrict band is $102.11 - 43.00 = 59.11$ dBuV/m which is under 74dBuV/m limit.

The band edge emission plot of OFDM technique on page 78 shows 52.11dBc between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2.7 is 92.32dBuV/m (Average), so the maximum field strength in restrict band is $92.32 - 52.11 = 40.21$ dBuV/m which is under 54dBuV/m limit.

802.11g OFDM MODULATION







4.7 ANTENNA REQUIREMENT

4.7.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

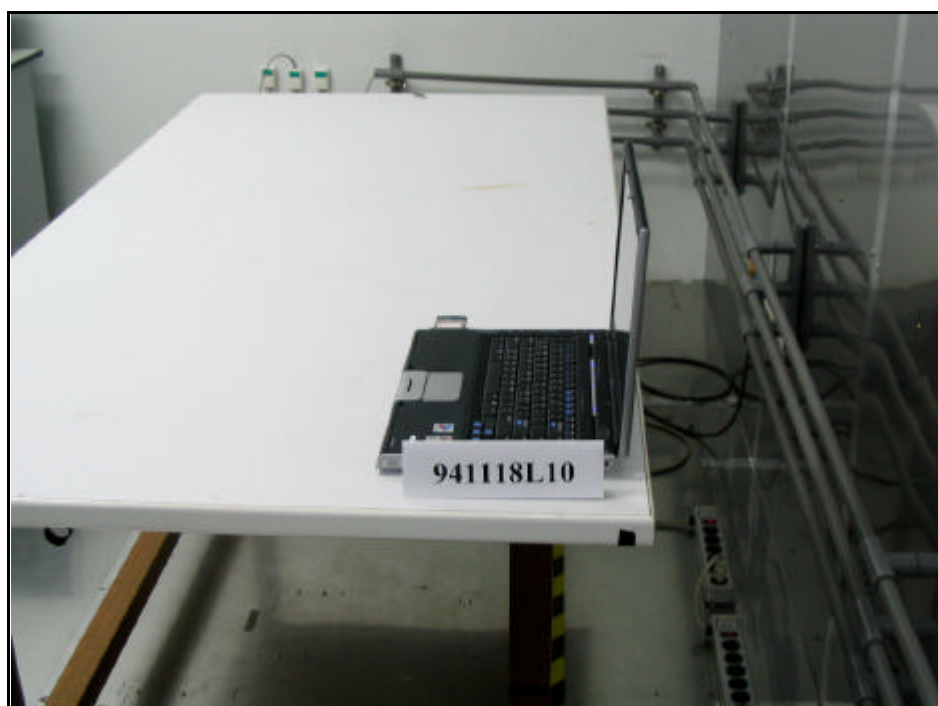
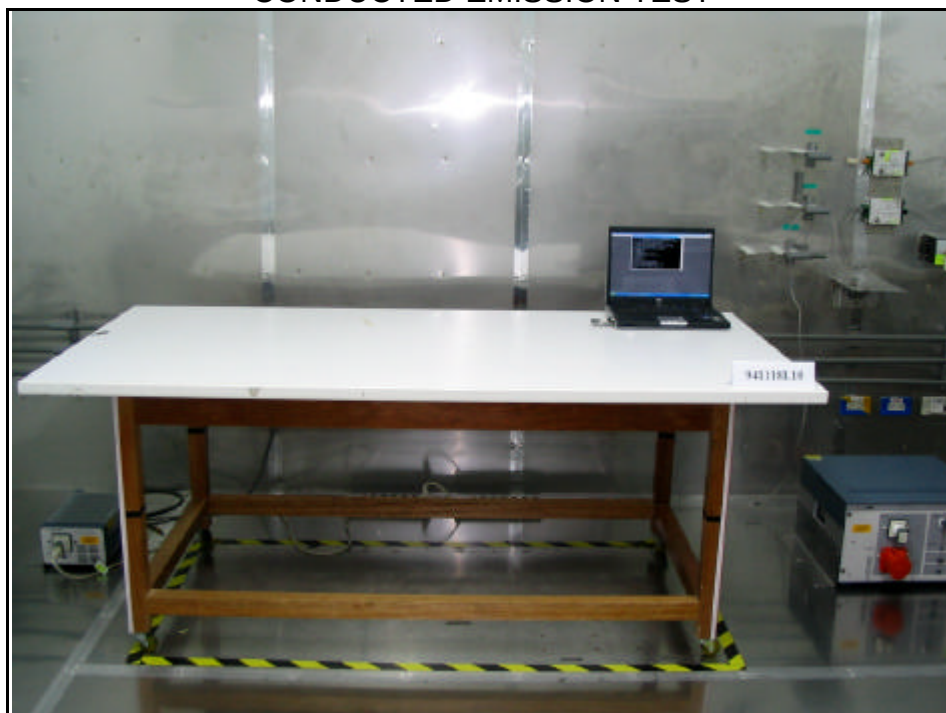
And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

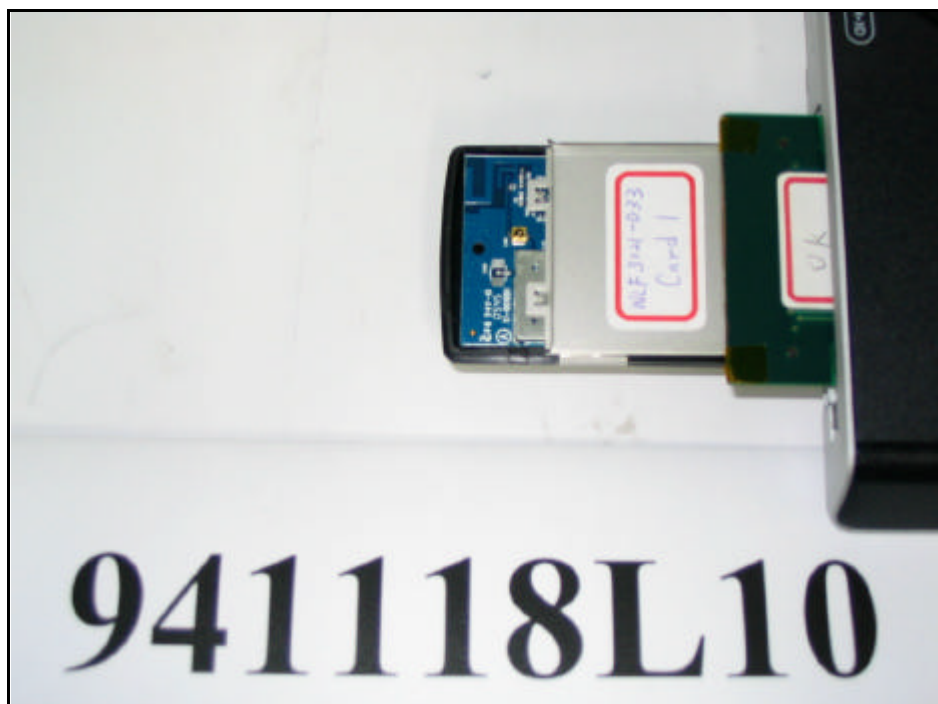
4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antennas used in this product are Printed antenna without any connector, PIFA antenna with UFL connector and PCB antenna with UFL connector. The maximum Gain of the antenna is 0.47dBi.

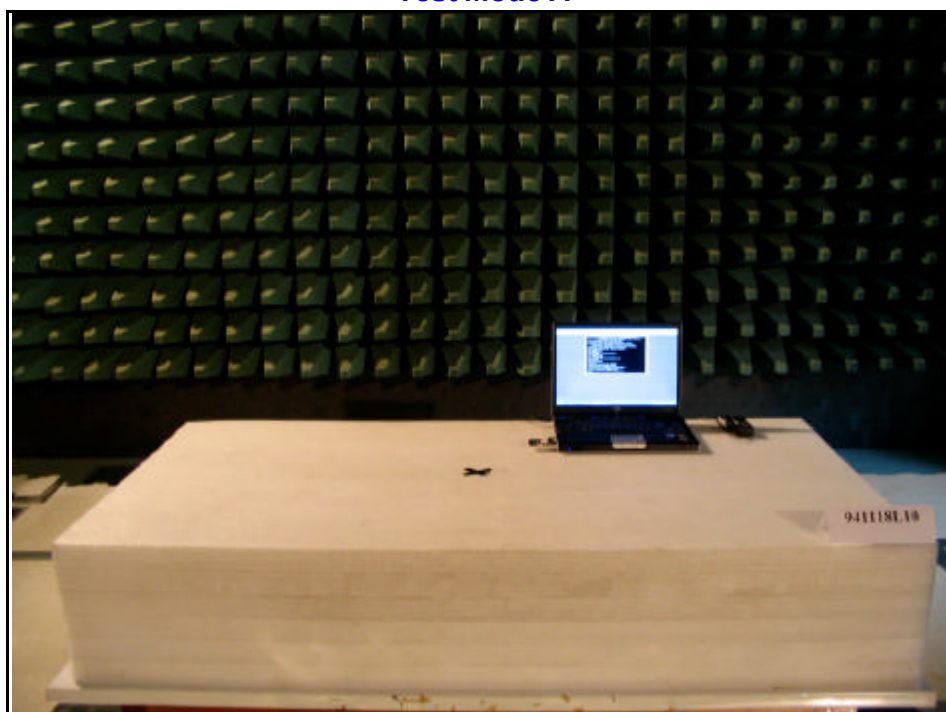
5 PHOTOGRAPHS OF THE TEST CONFIGURATION

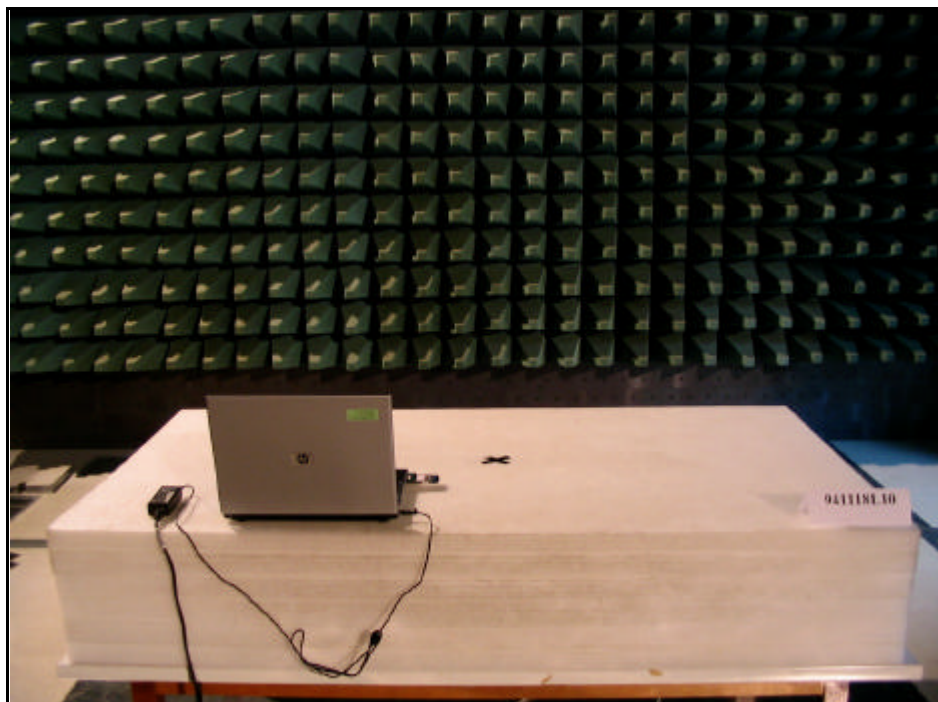
CONDUCTED EMISSION TEST



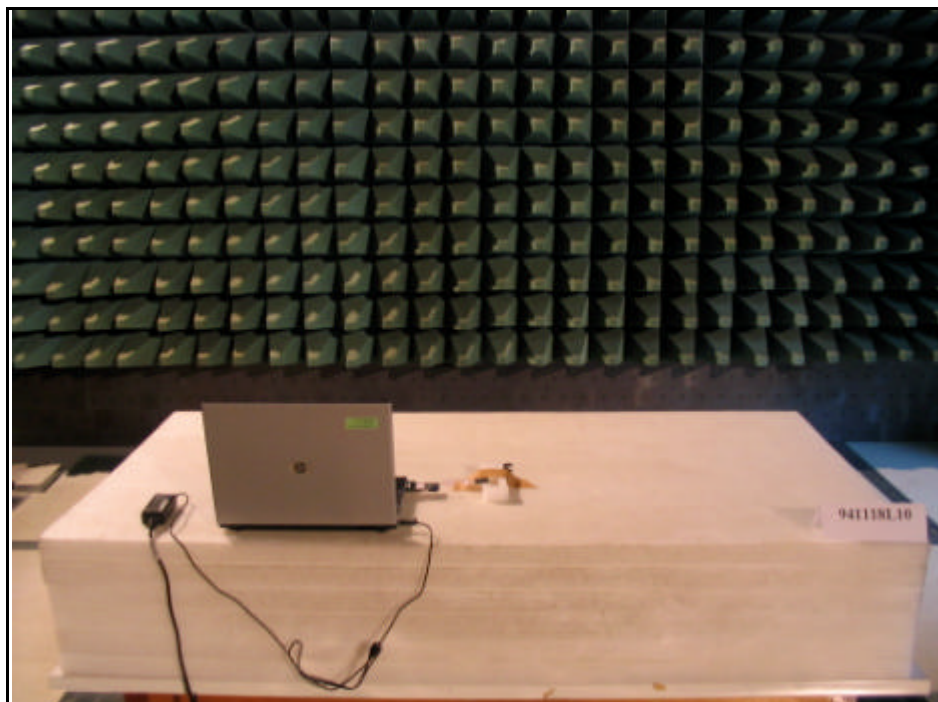
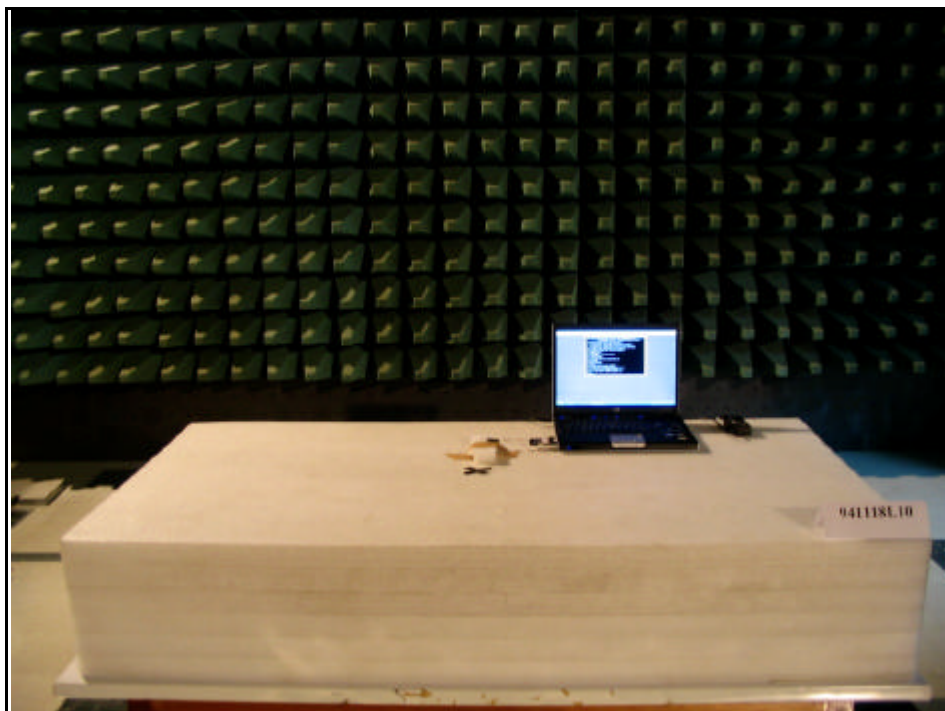


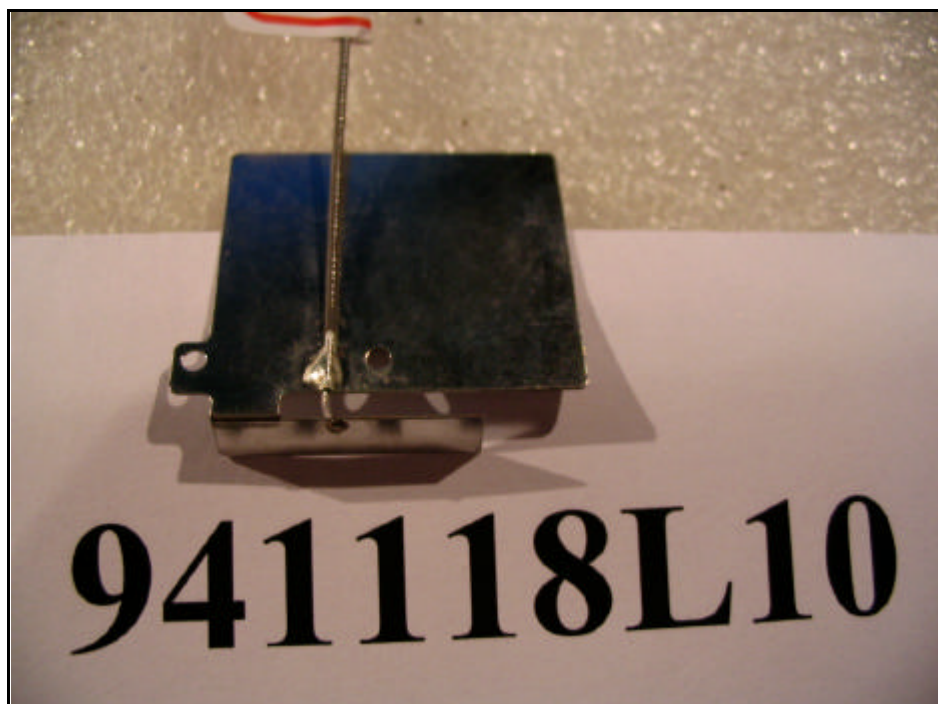
RADIATED EMISSION TEST
Test Mode A



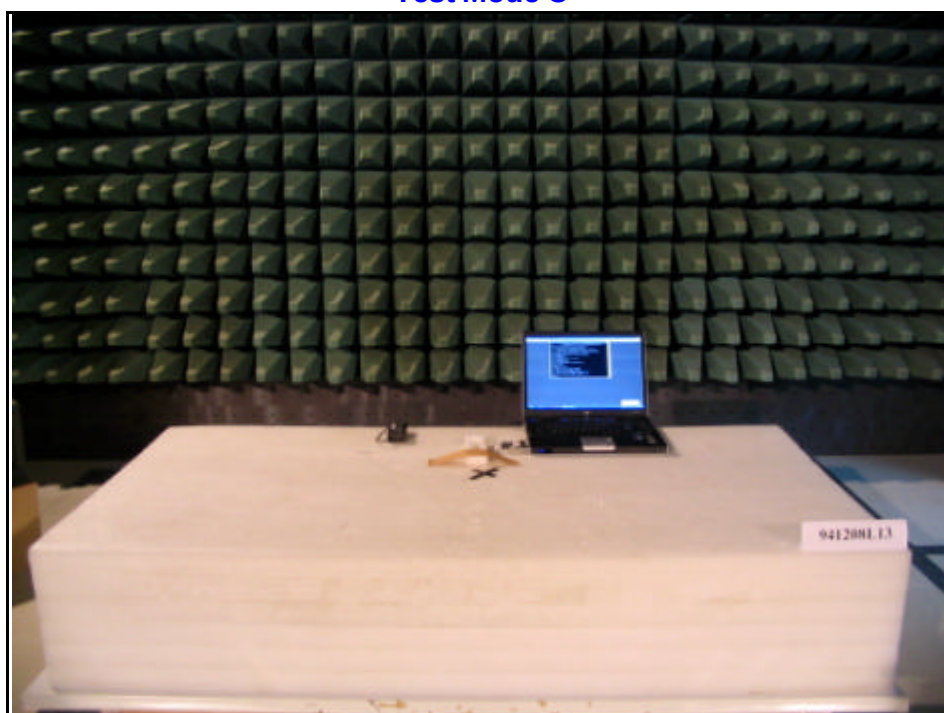


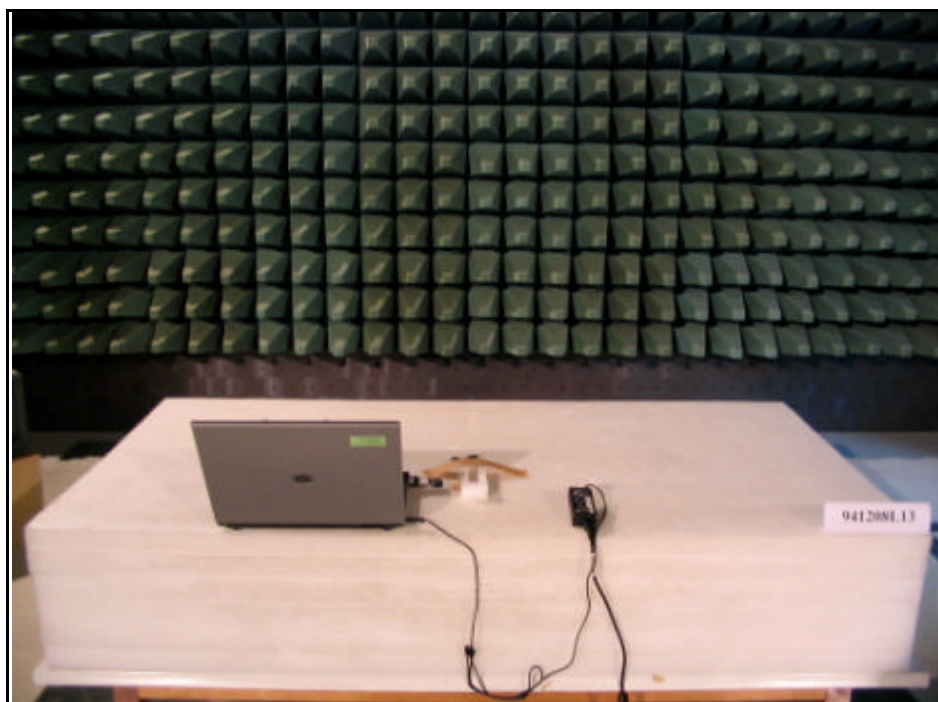
Test Mode B



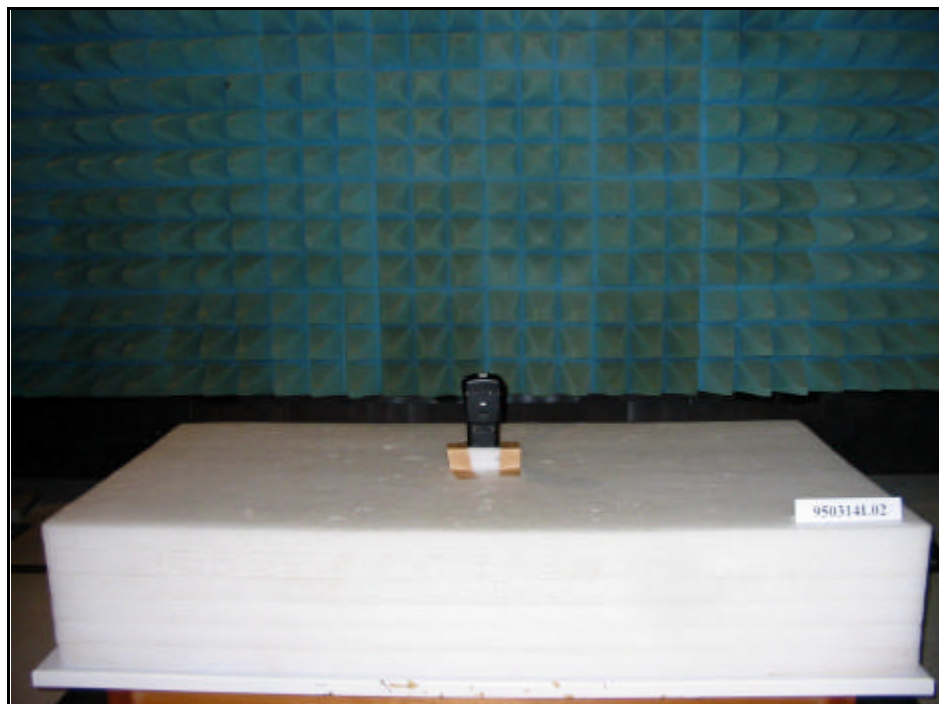
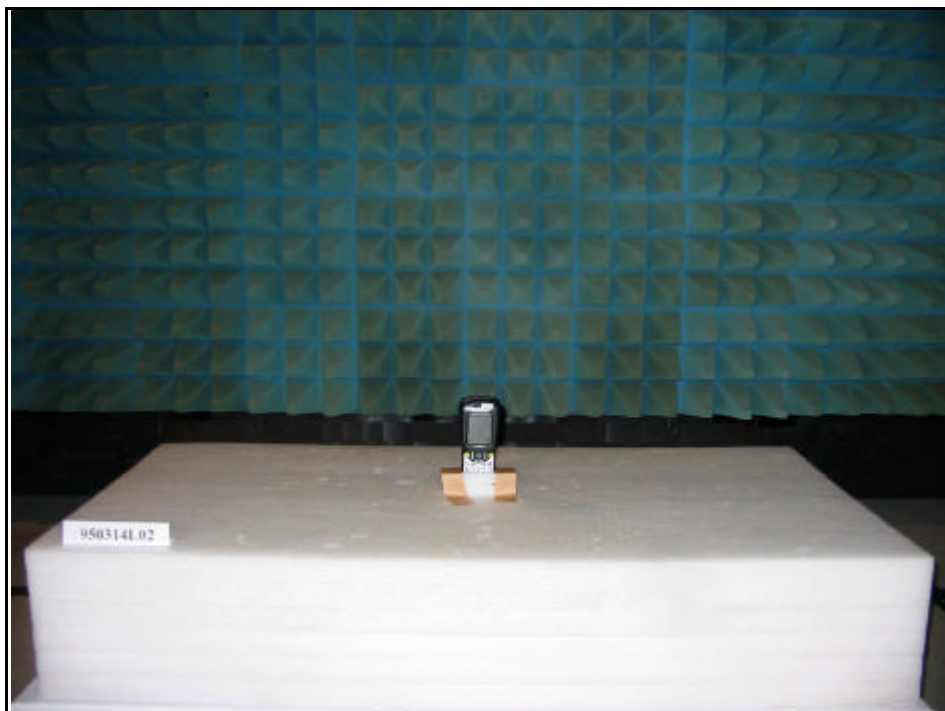


Test Mode C

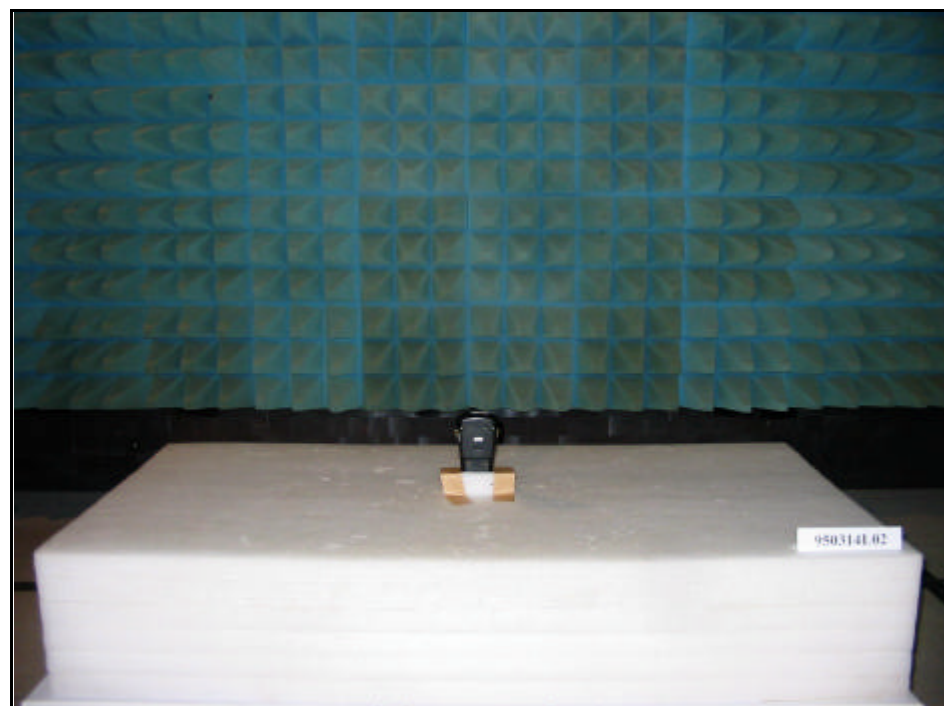
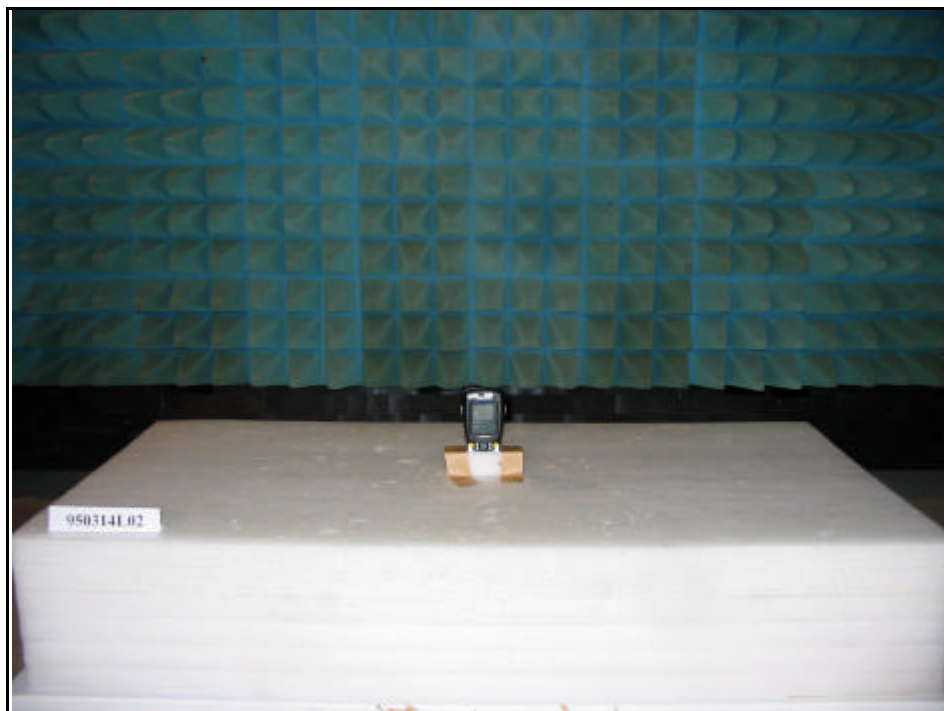




Test Mode D



Test Mode E



6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025

USA	FCC, UL, A2LA
Germany	TUV Rheinland
Japan	VCCI
Norway	NEMKO
Canada	INDUSTRY CANADA , CSA
R.O.C.	CNLA, BSMI, DGT
Netherlands	Telefication
Singapore	PSB , GOST-ASIA(MOU)
Russia	CERTIS(MOU)

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

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Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

APPENDIX-A

MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.