FCC Test Report

Report No.: AGC02Y110301F1

TEST NAME	:	FCC Part 15
FCC ID	:	ZDB-BRK3500BC
PRODUCT DESIGNATION	:	Bluetooth Keyboard
BRAND NAME	:	rollmax
TEST MODEL	:	BRK3500BC
CLIENT	:	Tianyu Technology Co., Ltd
DATE OF ISSUE	:	Mar.09, 2011
STANDARD(S)	:	FCC Part 15 Rules

Attestation of ***G***lobal ***C***ompliance Co., Ltd.

VERIFICATION OF COMPLIANCE

Applicant:	Tianyu Technology Co., Ltd
Address	1st building, Rongtaijia industrial park, Lisonglang 2nd industrial zone, Gongming Town,Guangming District, Shenzhen, 518106, China
Manufacturer Name:	Tianyu Technology Co., Ltd
Address:	1st building, Rongtaijia industrial park, Lisonglang 2nd industrial zone, Gongming Town,Guangming District, Shenzhen, 518106, China
Product Description:	Bluetooth Keyboard
Brand Name:	rollmax
Model Name:	BRK3500BC, ITIP-4000,BRK3700BC,BRK3400BC, BRK3900BC
Model Difference	They have the same PCB, Only color and size are different
FCC ID	ZDB-BRK3500BC
Report Number:	AGC02Y110301F1
Date of Test:	Mar. 04, 2010 to Mar.08, 2011

WE HEREBY CERTIFY THAT:

The above equipment was tested by Shenzhen Attestation of Global Compliance Science & Technology Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

Checked By: Jekey Zhang

Jekey Zhang Mar.09, 2011

Authorized By King Zhang

King Zhang Mar.09, 2011

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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

The EUT is a **Bluetooth Keyboard;** It is short range, lower power. And it is designed by way of utilizing the FHSS technology to achieve the system operation.

A major technical description of EUT is described as following:

Operation Frequency	2.402 GHz to 2.480GHz
Output Power	BT(1Mbps): 2.25dBm BT EDR(2Mbps): 2.40dBm BT EDR(3Mbps): 2.53dBm
Modulation	BT(1Mbps): GFSK BT EDR(2Mbps): Π/4-DQPSK BT EDR(3Mbps): 8-DPSK
Number of channels	79
Antenna Designation	Integrated Antenna
Antenna Gain	0.8dBi
Power Supply	Internal Lion Composite Battery DC 3.7V by battery Charge from only PC

1.2 TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	0	2402MHZ
	1	2403MHZ
	:	:
	38	2440 MHZ
	39	2441 MHZ
	40	2442 MHZ
	:	:
	77	2479 MHZ
	78	2480 MHZ

1.3 RECEIVER INPUT BANDWIDTH AND BEHAVIOUR FOR REPEATED SINGLE OR MULTIPLE PACKETS

The input bandwidth of the receiver is 1MHz,In every connection one Bluetooth device is the master and the other one is slave.The master determines the hopping sequence.The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master.
Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection.The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection.Also the slave of the connection will use these settings.
Repeating of a packet has no influence on the hopping sequence.The hopping sequence generated by the master of the connection will be followed in any case.That means,a repeated packet will not be send on the same frequency,it is send on the next frequency of the hopping sequence.

1.4 EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode:
40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67
56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59
72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75
09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06
01,51,03,55,05,04

1.5EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:
1 LAP/UAP of the master of the connection
2 Internal master clock
The LAP(lower address part) are the 24 LSB's of the 48 BD_ADDRESS.The BD_ADDRESS is an unambiguous number of every Bluetooth unit.The UAP(upper address part) are the 24MSB's of the 48BD_ADDRESS
The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and Is never turned off.For synchronisation with other units only offset are used.It has no relation to the time Of the day.Its resolution is at least half the RX/TX slot length of 312.5us.The clock has a cycle of about One day(23h30).In most case it is implemented as 28 bit counter.For the deriving of the hopping sequence the entire.
LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used.With this input values different mathematical procedures(permutations,additions,XOR-operations)are performed to generate te Sequence.This will be done at the beginning of every new transmission.
Regarding short transmissions the Bluetooth system has the following behaviour:
The first connection between the two devices is established,a hopping sequence was generated.For Transmitting the wanted data the complete hopping sequence was not used.The connection ended.
The second connection will be established.A new hopping sequence is generated.Due to the fact the Bluetooth clock has a different value,because the period between the two transmission is longer(and it Cannot be shorter)than the minimum resolution of the clock(312.5us).The hopping sequence will always Differ from the first one.

1.6 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID**: filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

1.7TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

1.8TEST FACILITY

All measurement facilities used to collect the measurement data are located at
Attestation of Global Compliance Co., Ltd.

1F, No.2 Building, Huafeng No.1 Technical,Industrial Park, Sanwei, Xixiang, Baoan District,,

Shenzhen, China
The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003.
FCC register No.: 259865

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with preselectors and quasi-peak detectors are used to perform radiated measurements.

1.9SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

2. SYSTEM TEST CONFIGURATION

2.1 CONFIGURATION OF TESTED SYSTEM

2.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID
EUT	Bluetooth Keyboard	rollmax	BRK3500BC	
AE	PC	HEDY	K4	--

2.3 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Peak Conducted Output Power	±0.8dB	Confidence levels of 95%
Hopping Channel Separation	$\pm 8.5 \times 10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.207	Conduction Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Maximum Output Power	Compliant
§15.247	20 dB Bandwidth	Compliant
§15.247	Band Edges	Compliant
§15.247	Spurious Emission	Compliant
§15.247	Frequency Separation	Compliant
§15.247	Number of Hopping Frequency	Compliant
§15.247	Time of Occupancy	Compliant

4. DESCRIPTION OF TEST MODES

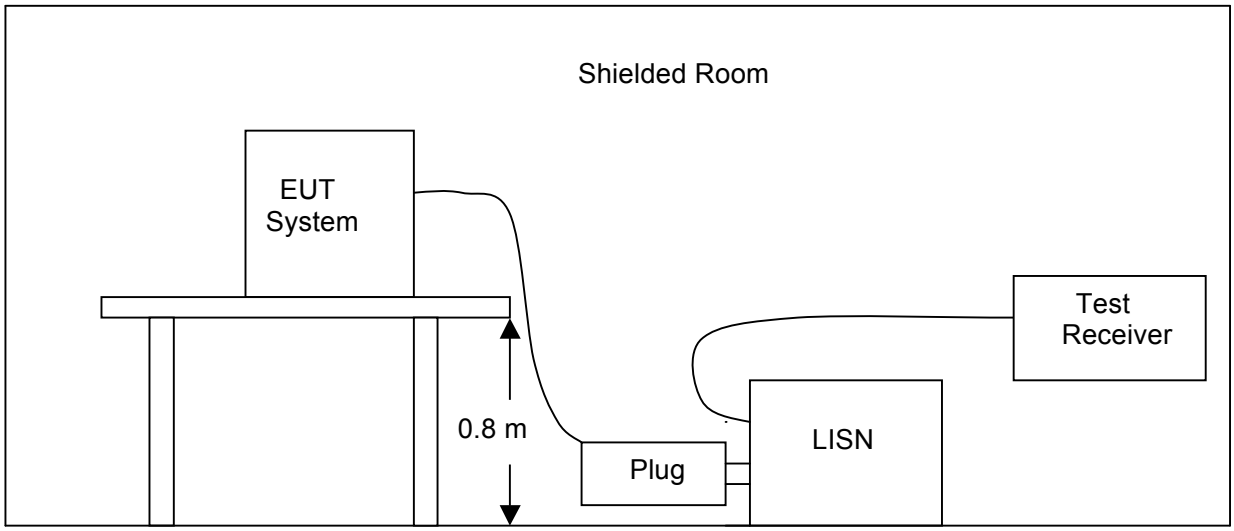
1. The EUT has been set to operate continuously on the lowest, the middle and the highest operation frequency individually.
2. The EUT stays in continuous transmitting mode on the operation frequency being set.

5. CONDUCTION EMISSIONS

5.1 MEASUREMENT PROCEDURE:

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. The EUT received DC3.0V through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



5.3 MEASUREMENT EQUIPMENT USED:

Conducted Emission Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Cal. Date**
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2011
LISN	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2011
LISN	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2011
50 Ω Coaxial Switch	Anritsu	MP59B	M20531	05/29/2011

5.4 LIMITS AND MEASUREMENT RESULT:

LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

1**Note: 1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

MEASURING INSTRUMENT AND SETTING

The following table is the setting of receiver.

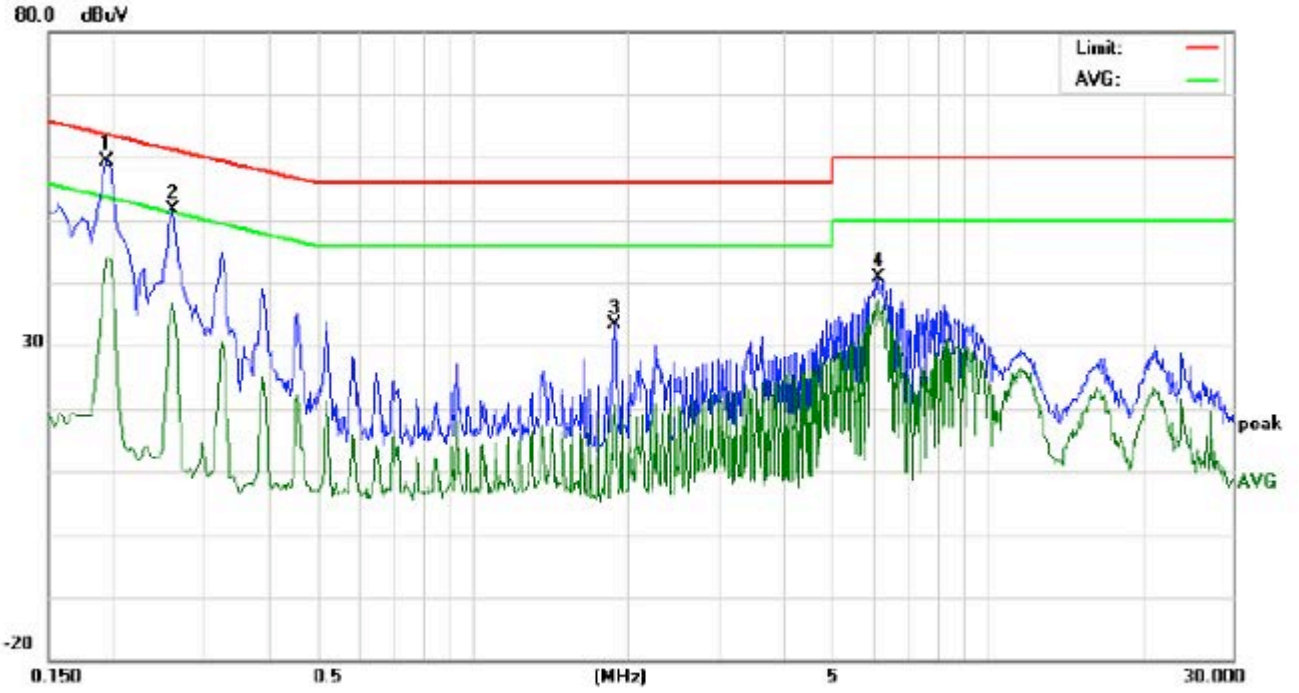
Receiver Parameter	Setting
Attenuation	10dB
Start Frequency	0.15MHz
Stop Frequency	30MHz
6dB bandwidth	9KHz for QP
IF bandwidth	9KHz for AV

TEST RESULT :

TEST RESULT AT CHARGE MODE:

Operation Mode:	CHARGE(connected to PC)	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Humidity:	55 % RH	Polarity:	--

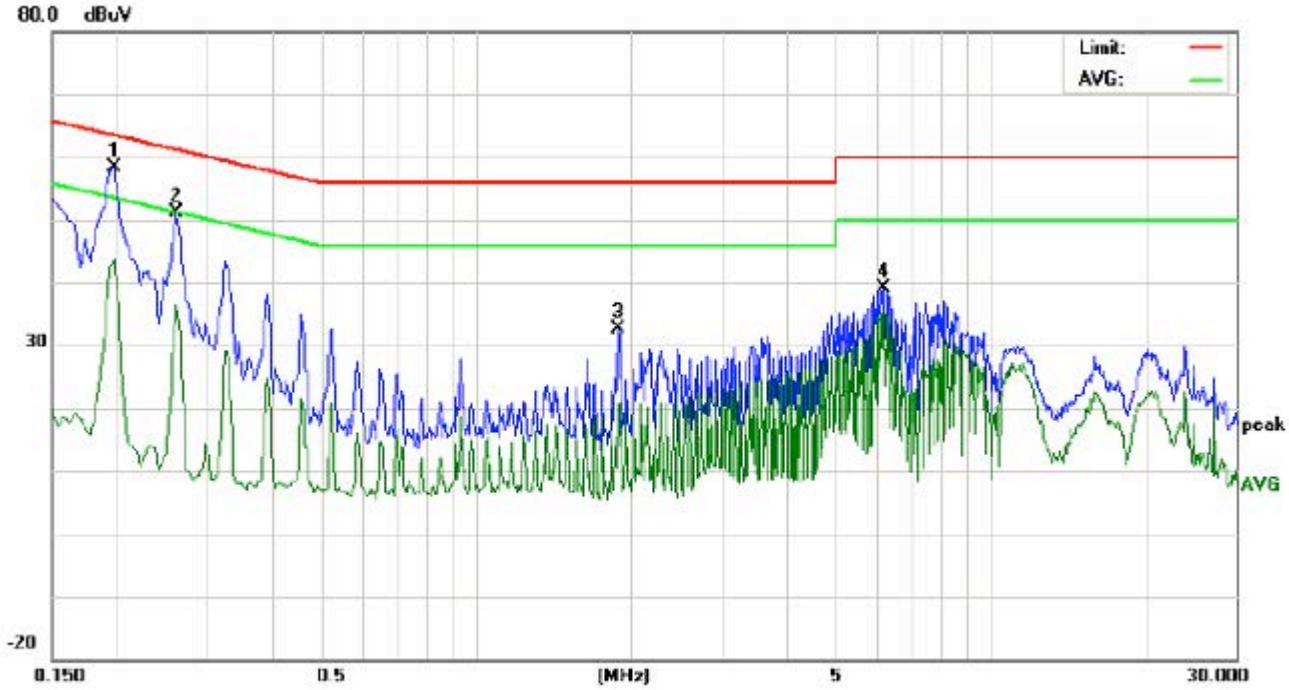
TEST RESULT OF LINE –L CONDUCTED EMISSION TEST



Site: Conduction Phase: *L1* Temperature: 26
Limit: FCC Class B Conduction(QP) Power: AC 120V/60Hz Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1940	49.14		33.75	10.21	59.35		43.96	63.86	53.86	-4.51	-9.90	P	
2	0.2620	41.34		26.43	10.27	51.61		36.70	61.36	51.36	-9.75	-14.66	P	
3	1.8900	23.06		10.39	10.26	33.32		20.65	56.00	46.00	-22.68	-25.35	P	
4	6.1220	30.67		27.17	10.28	40.95		37.45	60.00	50.00	-19.05	-12.55	P	

TEST RESULT OF LINE –N CONDUCTED EMISSION TEST



Site: Conduction | Phase: *N* | Temperature: 26
Limit: FCC Class B Conduction(QP) | Power: AC 120V/60Hz | Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1980	48.12		33.35	10.21	58.33		43.56	63.69	53.69	-5.36	-10.13	P	
2	0.2620	40.84		26.06	10.27	51.11		36.33	61.36	51.36	-10.25	-15.03	P	
3	1.8940	22.36		10.12	10.25	32.61		20.37	56.00	46.00	-23.39	-25.63	P	
4	6.2140	28.94		24.86	10.29	39.23		35.15	60.00	50.00	-20.77	-14.85	P	

6. MAXIMUM OUTPUT POWER

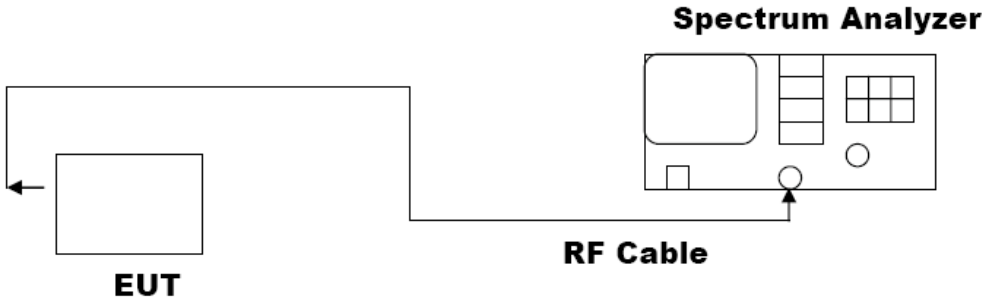
6.1 MEASUREMENT PROCEDURE:

CONDUCTED METHOD
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Set SPA Centre Frequency = Operation Frequency, RBW= 1 MHz,
   VBW= 1 MHz.
5. Set SPA Trace 1 Max hold, then View.

RADIATED METHOD
According to ANSI C63.4:2003

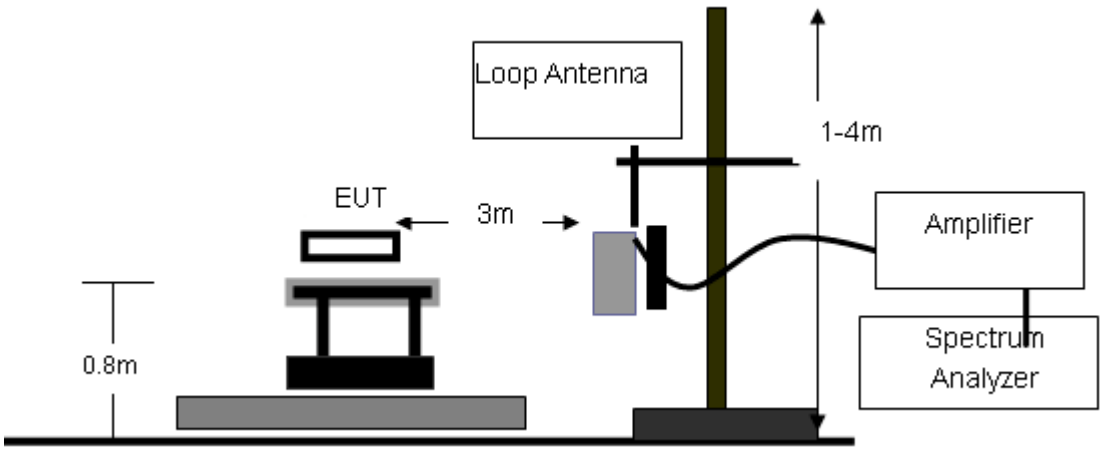
6.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

CONDUCTED METHOD

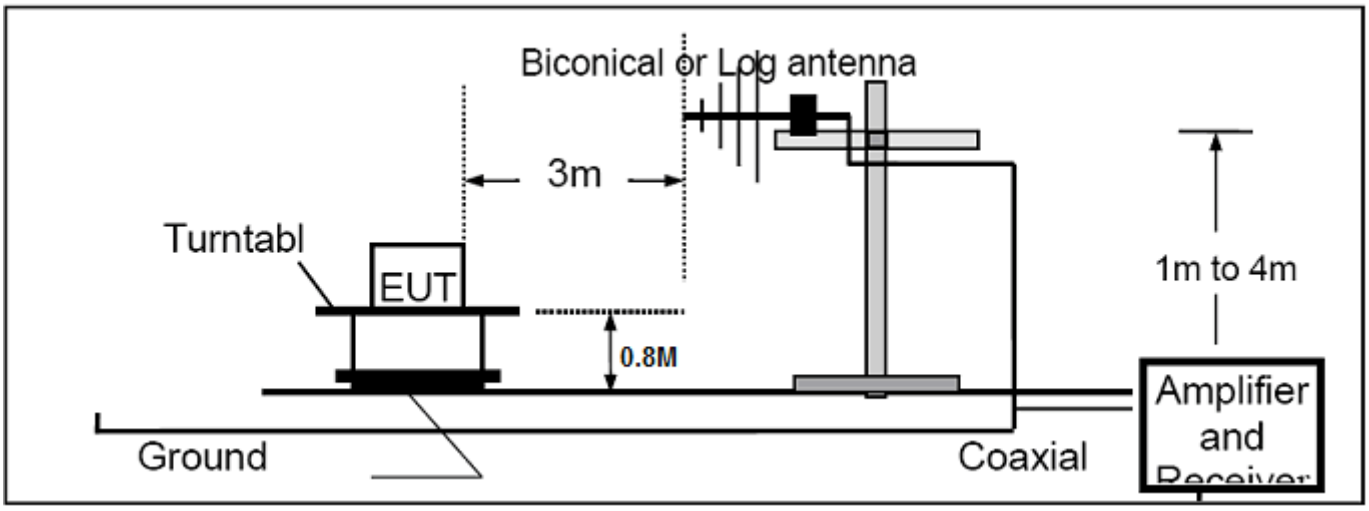


RADIATED EMISSION TEST SETUP

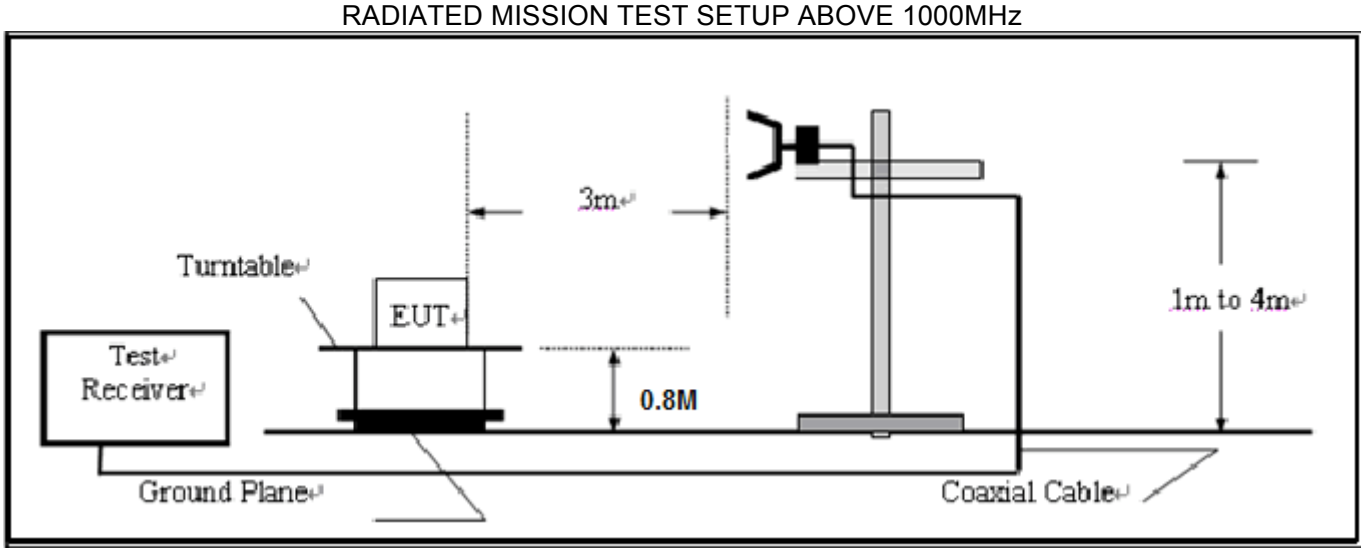
RADIATED MISSION TEST SETUP BELOW 30MHz



RADIATED MISSION TEST SETUP 30MHz-1000MHz



RADIATED MISSION TEST SETUP ABOVE 1000MHz



6.3 MEASUREMENT EQUIPMENT USED:

Description	Manufacturer	Model	SERIAL NUMBER	Cal. Date	Cal. Due
Spectrum Analyzer	Rohde & Schwarz	FSEM30	849720/019	05/29/2010	05/29/2011
Amplifier	H.P.	8449B	3008A00277	05/29/2010	05/29/2011
Horn Antenna	Sunol Sciences	DRH-118	A052604	05/29/2010	05/29/2011
Horn Antenna	A.H. Systems Inc.	SAS-574	--	05/29/2010	05/29/2011
EMI Test Receiver	Rohde & Schwarz	ESCI	100028	05/29/2010	05/29/2011
Amplifier	H.P.	HP8447E	1937A01046	05/29/2010	05/29/2011
Broadband Antenna	Sunol Sciences	JB1	A040904-2	05/29/2010	05/29/2011
LOOP ANTENNA	R&S	HM525	--	05/29/2010	05/29/2011

6.4 LIMITS AND MEASUREMENT RESULT:

Operation Mode:	**RF MODE**	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Humidity:	55 % RH		

BT (1Mbps)

Channel	Frequency (MHZ)	Reading (dBm)	Limit (dBm)	Result
0	2402	2.25	30	Pass
39	2441	2.14	30	Pass
78	2480	1.62	30	Pass

BT EDR (2Mbps)

Channel	Frequency (MHZ)	Reading (dBm)	Limit (dBm)	Result
0	2402	2.40	30	Pass
39	2441	2.03	30	Pass
78	2480	1.33	30	Pass

BT EDR (3Mbps)

Channel	Frequency (MHZ)	Reading (dBm)	Limit (dBm)	Result
0	2402	2.53	30	Pass
39	2441	2.22	30	Pass
78	2480	1.50	30	Pass

7. 20 DB BANDWIDTH

7.1 MEASUREMENT PROCEDURE

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW= 100 KHz.
4. Set SPA Trace 1 Max hold, then View.

7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The Same as described in Section 6.2

7.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 6.3

7.4 LIMITS AND MEASUREMENT RESULTS:

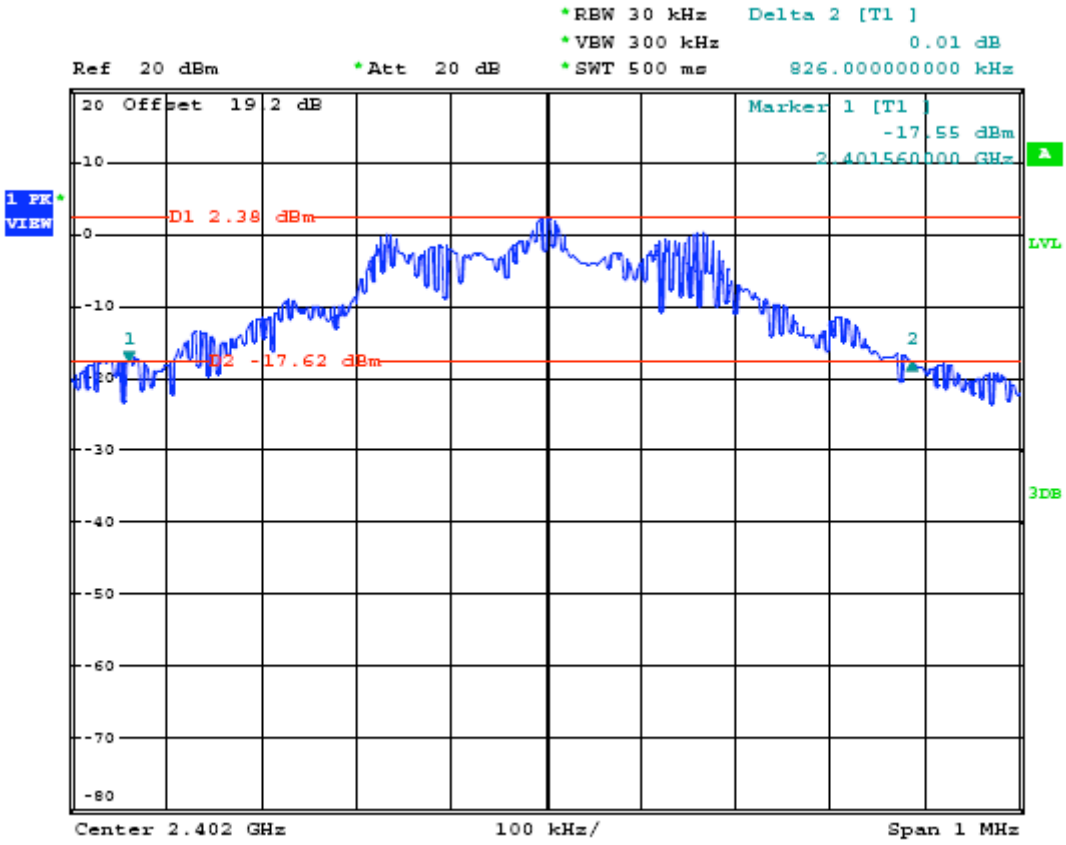
Operation Mode:	RF MODE	Test Date:	Mar.03, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Humidity:	55 % RH	Polarity:	--

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	20 dB Bandwidth(1Mbps)		Criteria
--	Bottom Channel	0.826	PASS
	Middle Channel	0.838	PASS
	Top Channel	0.832	PASS

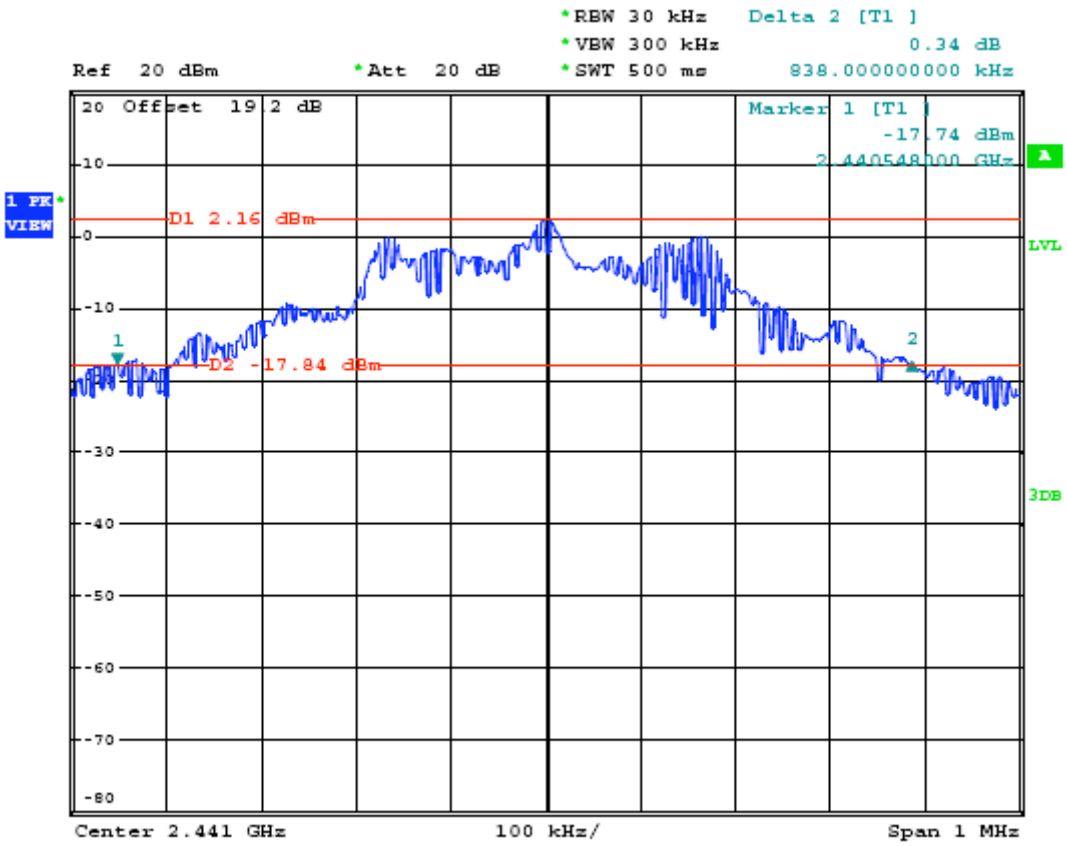
LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	20 dB Bandwidth(2Mbps)		Criteria
--	Bottom Channel	1.232	PASS
	Middle Channel	1.228	PASS
	Top Channel	1.224	PASS

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	20 dB Bandwidth(3Mbps)		Criteria
--	Bottom Channel	1.256	PASS
	Middle Channel	1.260	PASS
	Top Channel	1.256	PASS

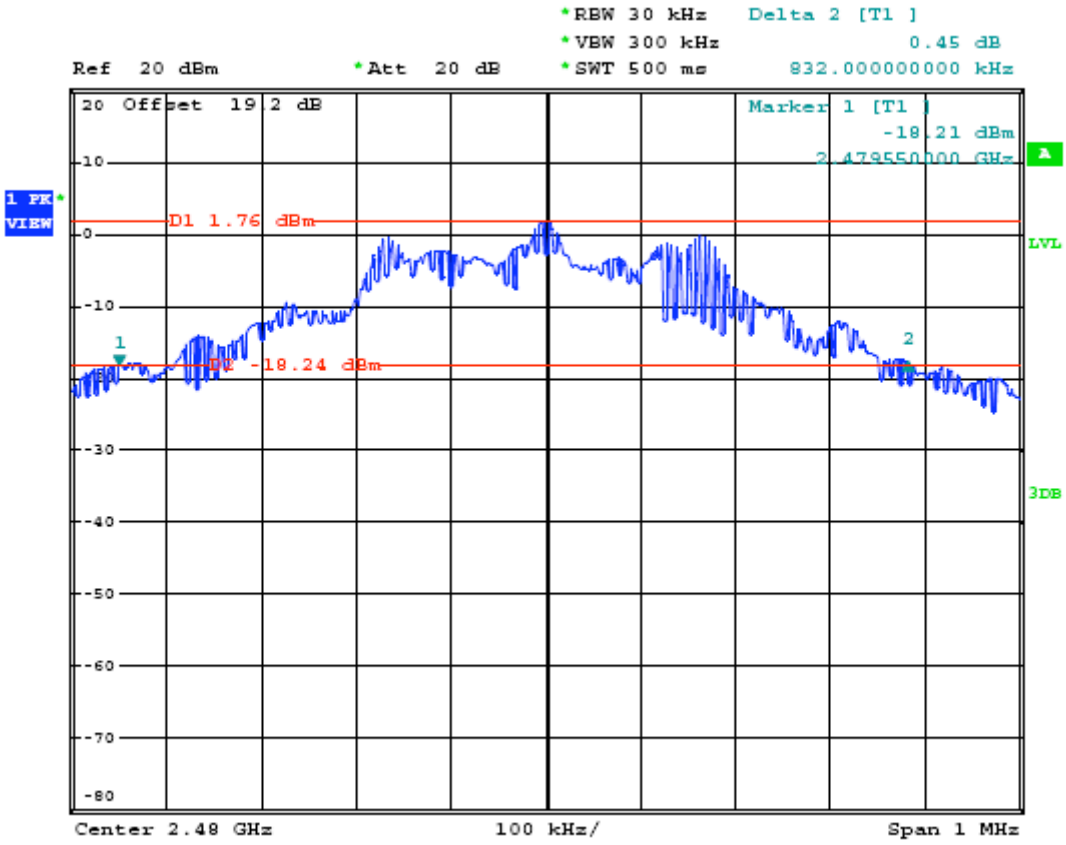
TEST PLOT OF BANDWIDTH FOR BOTTOM CHANNEL (1Mbps)



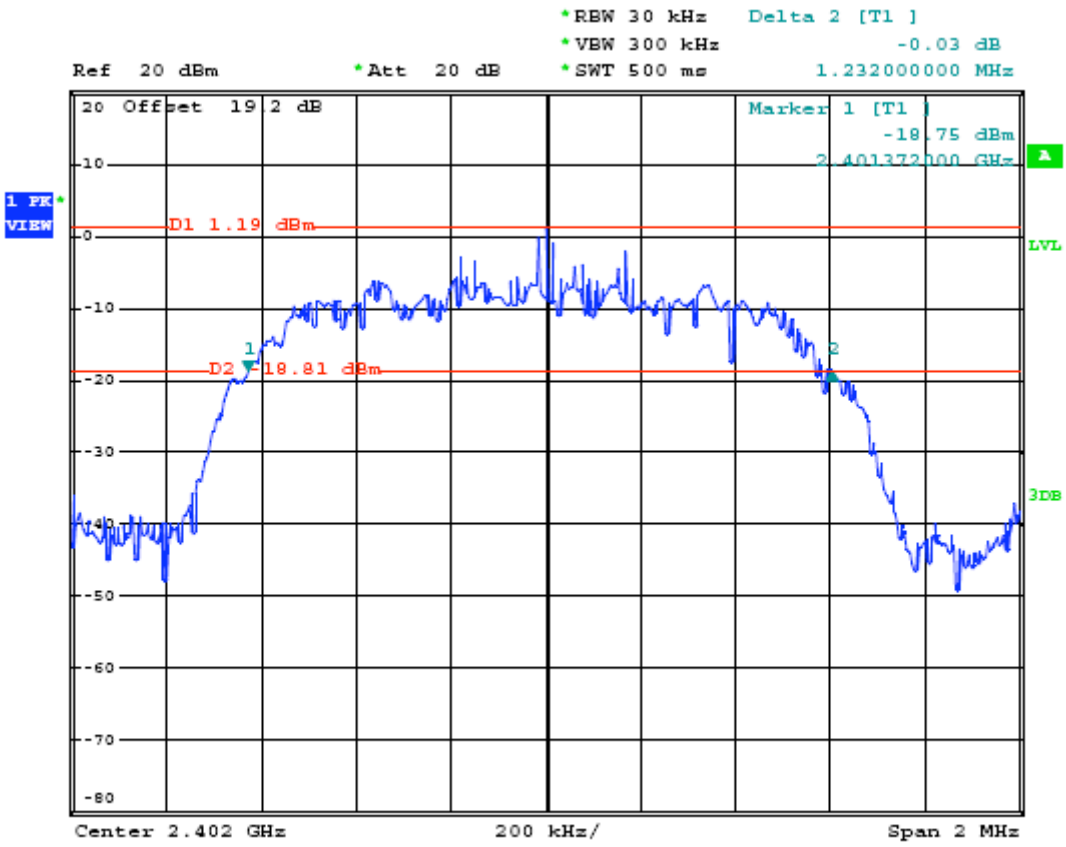
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL (1Mbps)



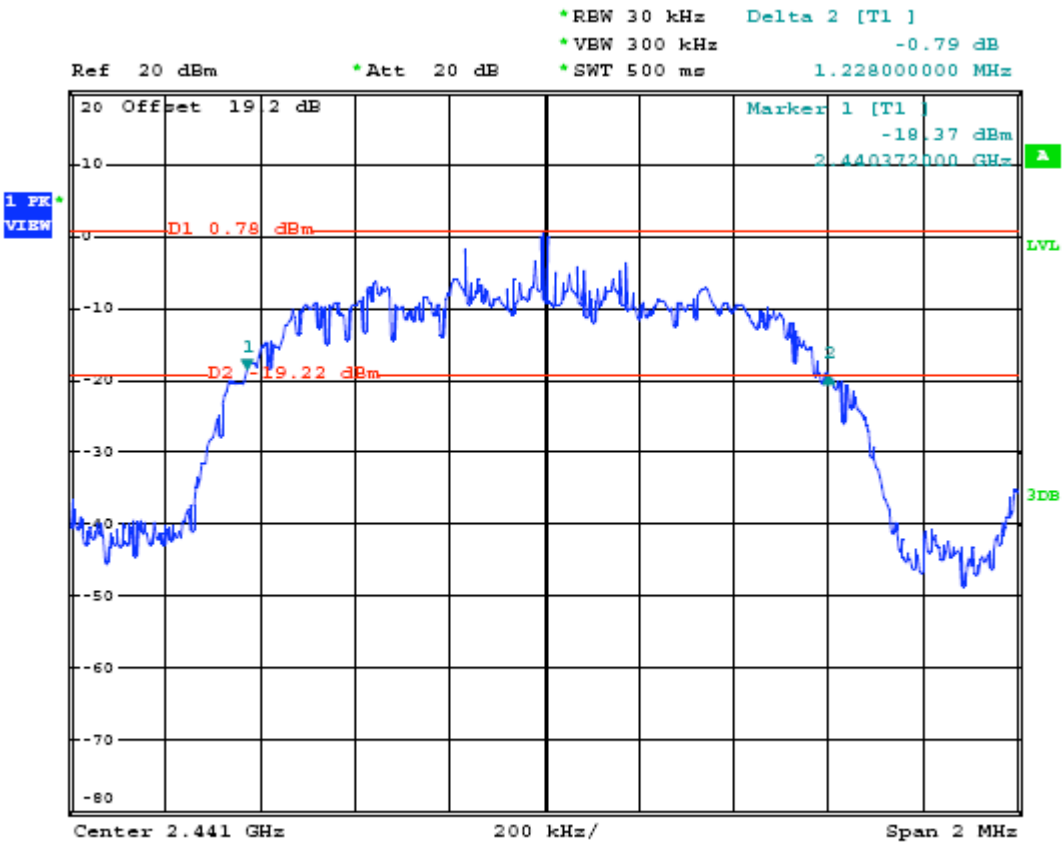
TEST PLOT OF BANDWIDTH FOR TOP CHANNEL (1Mbps)



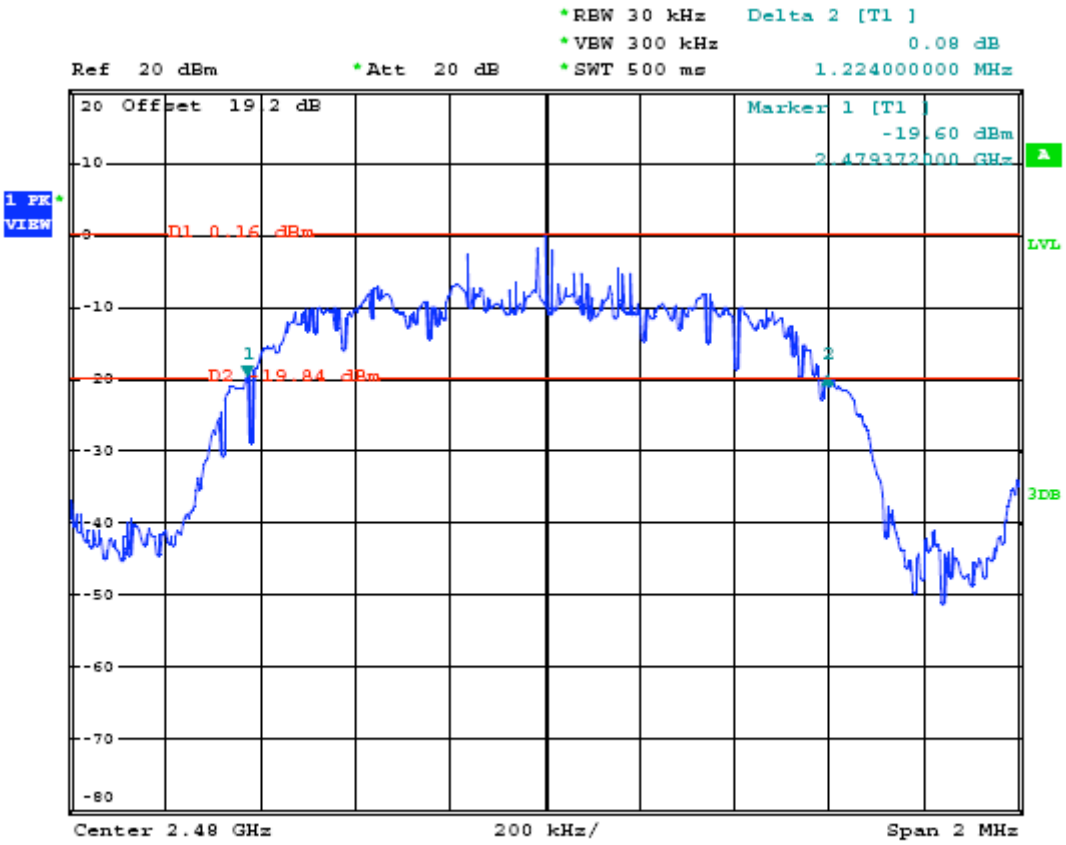
TEST PLOT OF BANDWIDTH FOR BOTTOM CHANNEL (2Mbps)



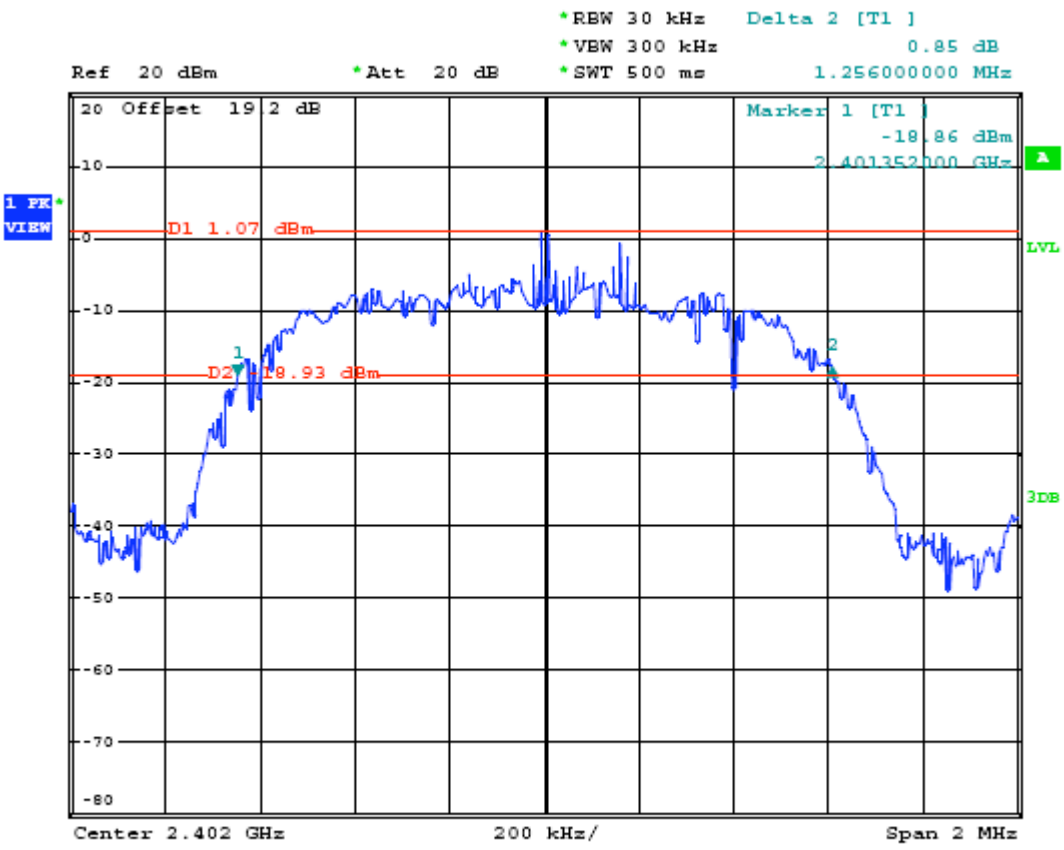
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL (2Mbps)



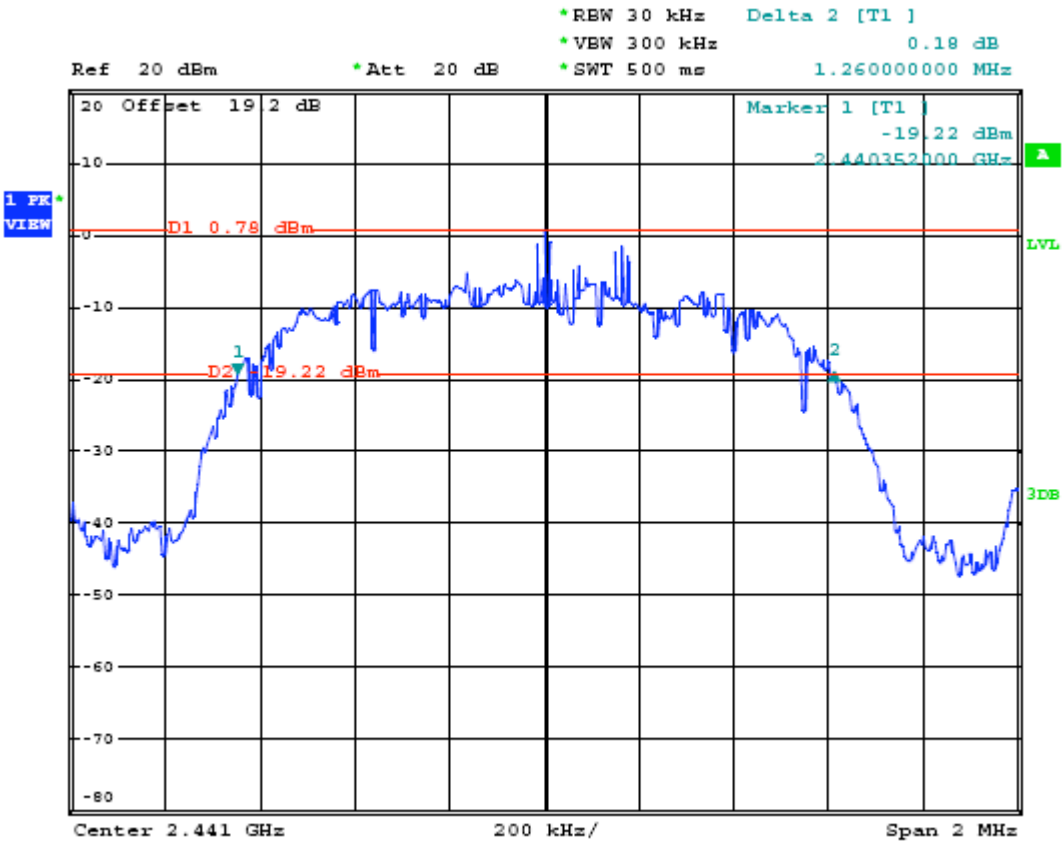
TEST PLOT OF BANDWIDTH FOR TOP CHANNEL (2Mbps)



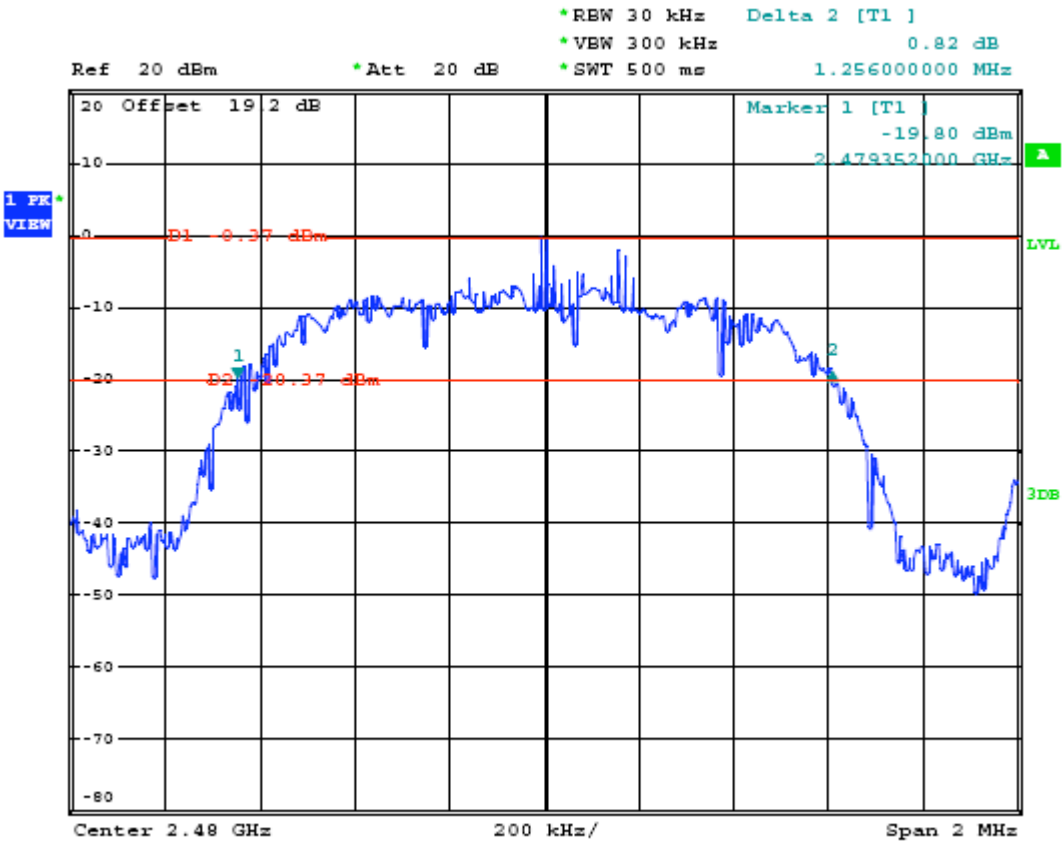
TEST PLOT OF BANDWIDTH FOR BOTTOM CHANNEL (3Mbps)



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL (3Mbps)



TEST PLOT OF BANDWIDTH FOR TOP CHANNEL (3Mbps)

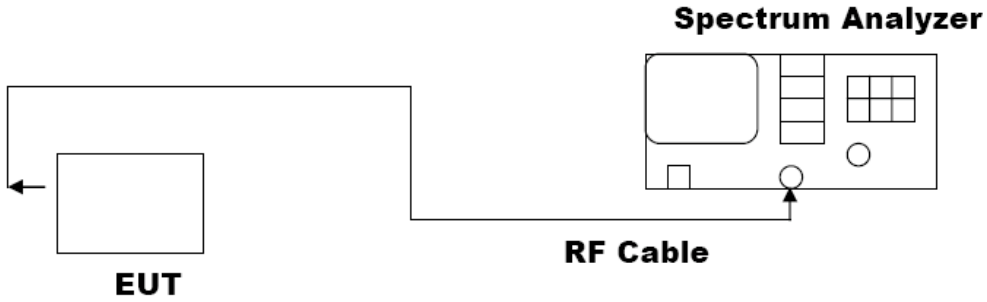


8. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY (N/A)

8.1 MEASUREMENT PROCEDURE:

(1). The EUT was placed on a turn table which is 0.8m above ground plane.
(2). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
(3), Set the EUT Work on the top, the middle and the bottom operation frequency individually.
(4). Set SPA Centre Frequency = Operation Frequency, RBW= 3 KHz,
VBW= 10 KHz., Sweep time= Auto
(5). Set SPA Trace 1 Max hold, then View.

8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



8.3 MEASUREMENT EQUIPMENT USED:

SHIELDING ROOM					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4440A	US41421290	04/16/2010	04/15/2011

8.4 LIMITS AND MEASUREMENT RESULT:

LIMITS AND MEASUREMENT RESULT			
Applicable Limits	Measurement Result		
	Test Data (dBm/3KHz)		Criteria
8 dBm / 3KHz	Bottom Channel	--	--
	Middle Channel	--	--
	Top Channel	--	--

9. OUT OF BAND EMISSION

9.1 MEASUREMENT PROCEDURE:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
3, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW= 100 KHz.
4. Set SPA Trace 1 Max hold, then View.

9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The Same as described in section 6.2

1. Conducted test setup
2. Radiated Emission test Setup

9.3 MEASUREMENT EQUIPMENT USED:

The Same as described in section 6.3

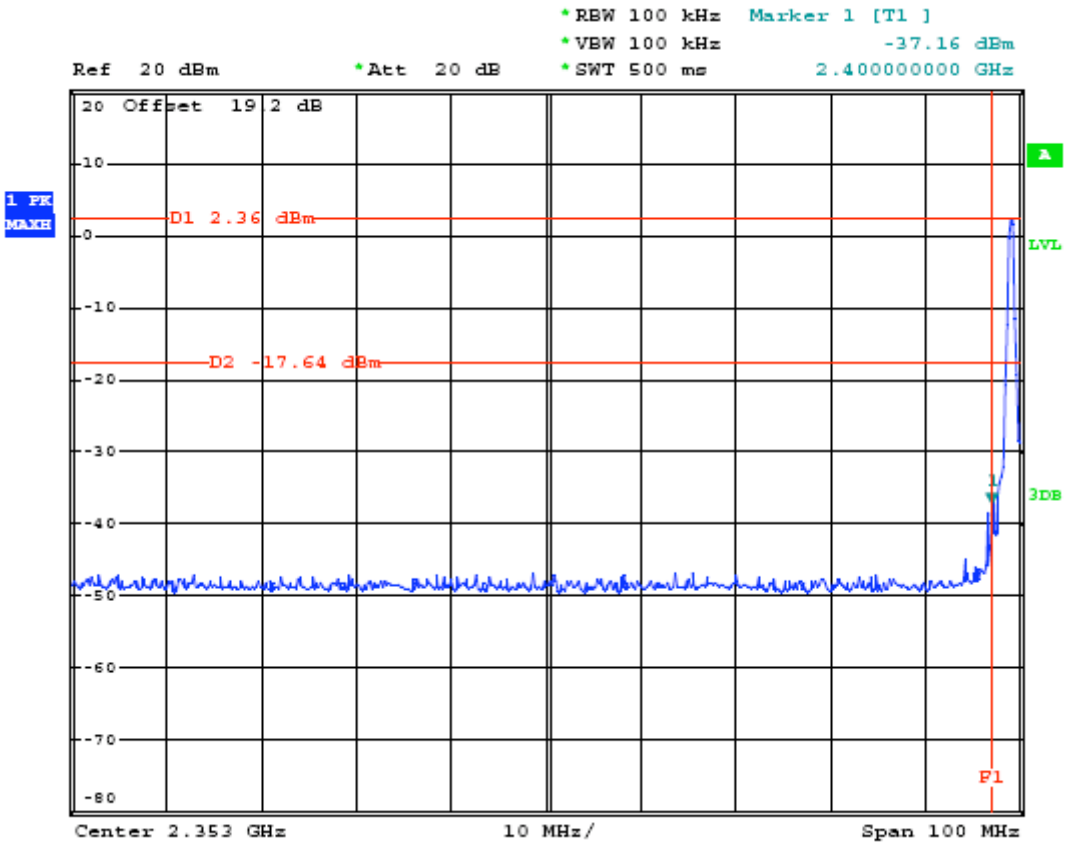
9.4 LIMITS AND MEASUREMENT RESULT:

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS

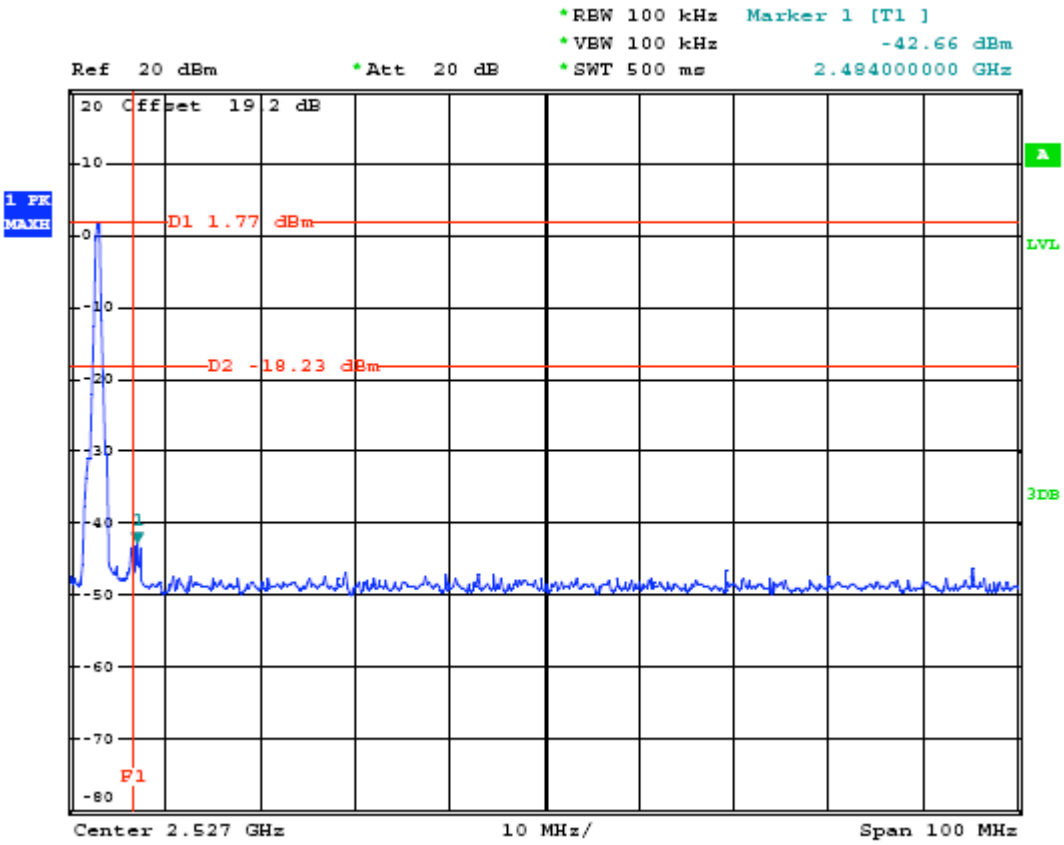
Humidity:	55 % RH	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Mary Liu
Test Method	Conducted		

BT (1Mbps)

TEST PLOT OF BAND ELDG FOR BOTTOM CHANNEL (2.402GHz)

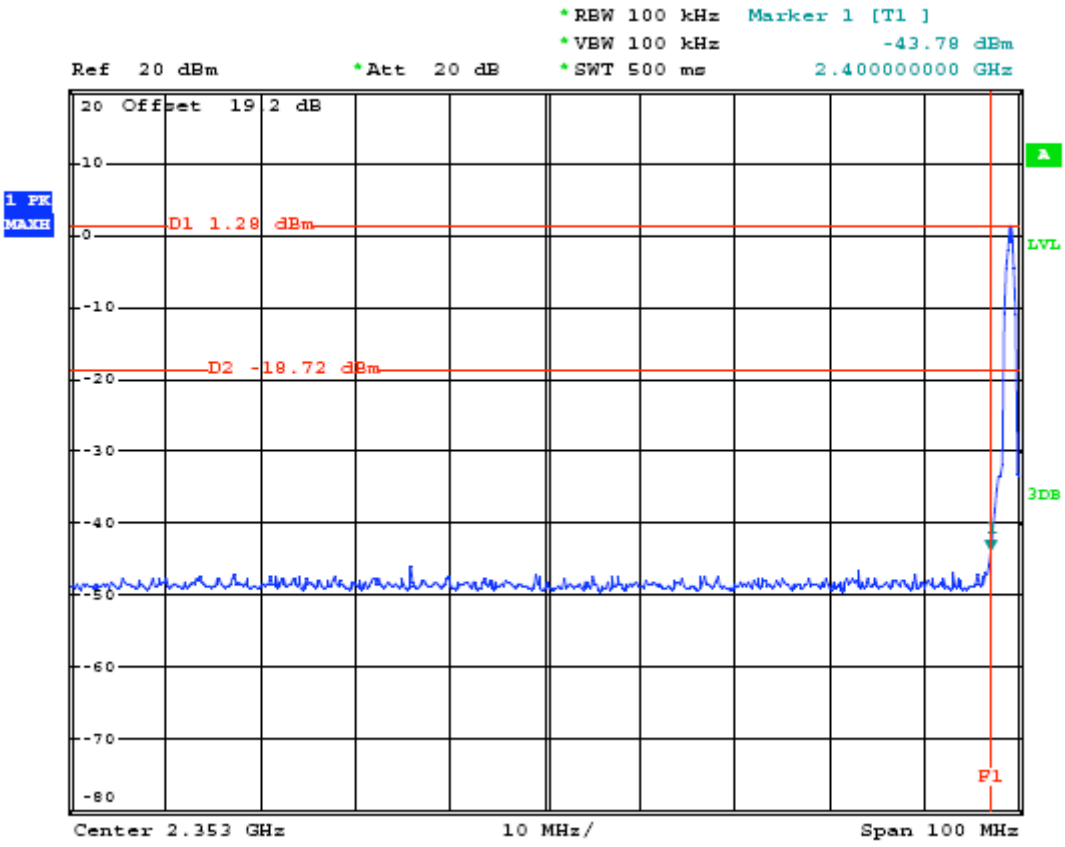


TEST PLOT OF BAND ELDG FOR TOP CHANNEL (2.480GHz)

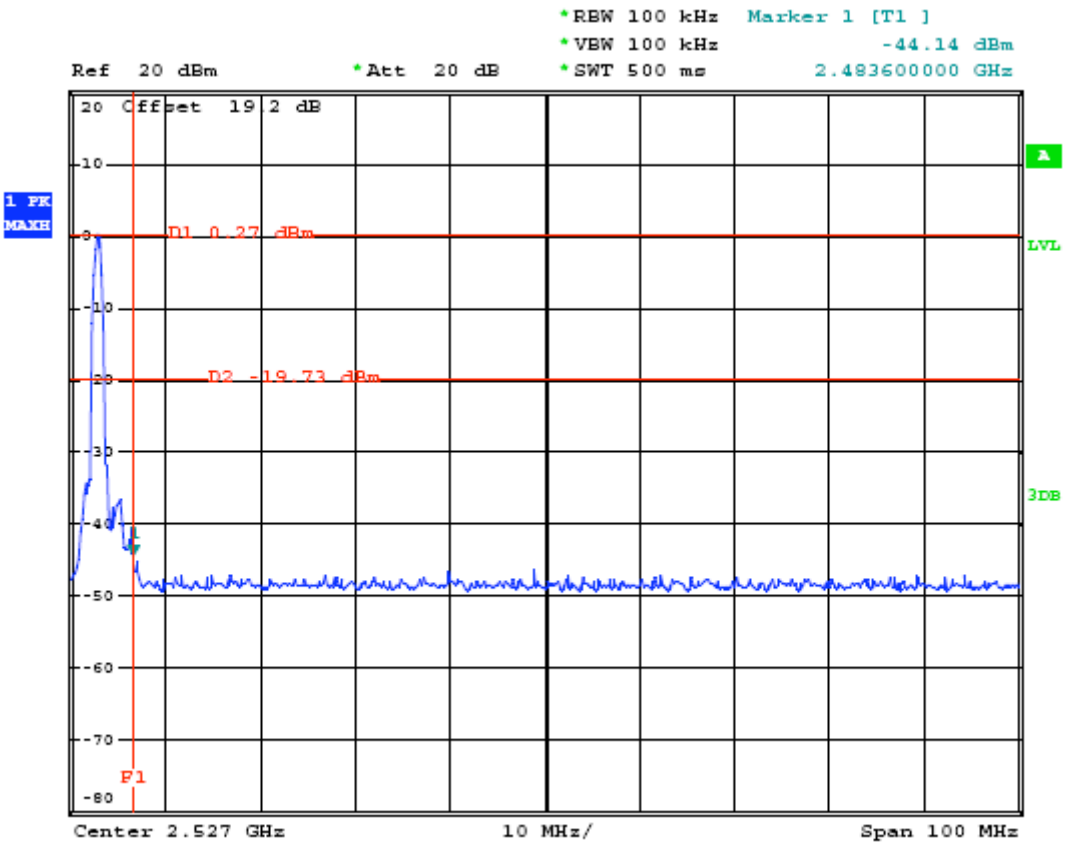


BT EDR (2Mbps)

TEST PLOT OF BAND ELDG FOR BOTTOM CHANNEL (2.402GHz)

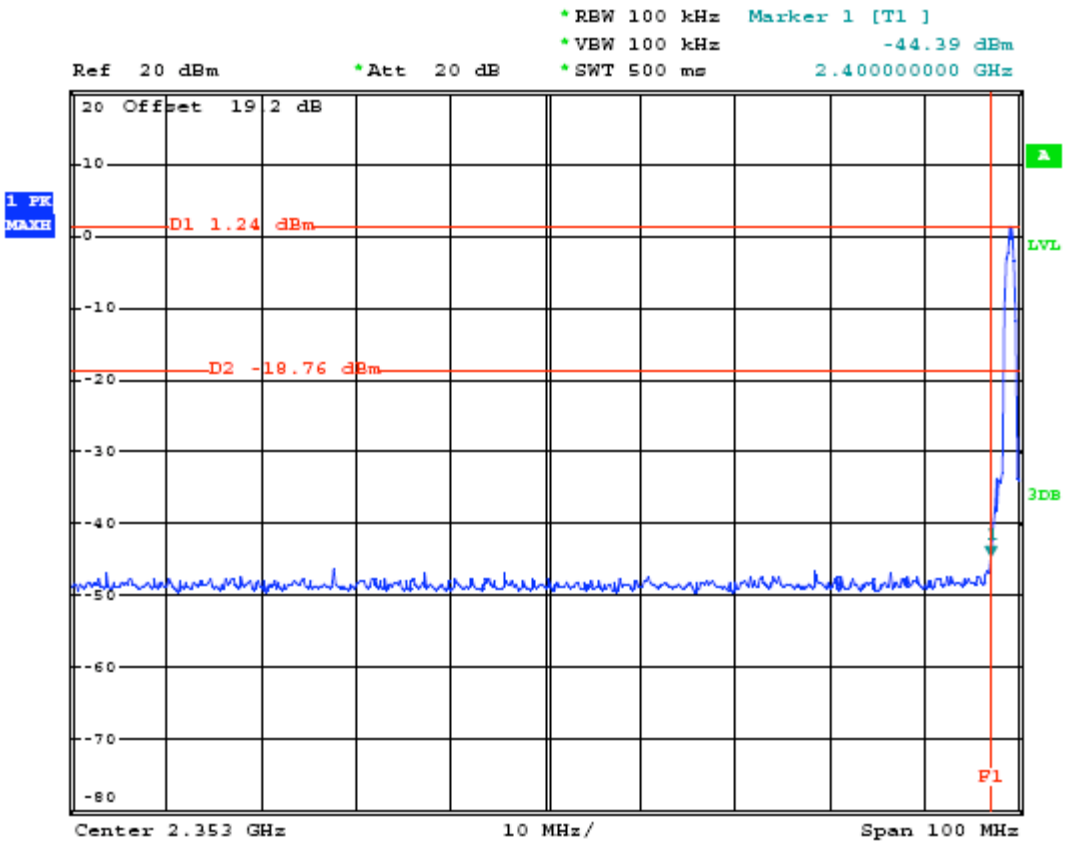


TEST PLOT OF BAND ELDG FOR TOP CHANNEL (2.480GHz)

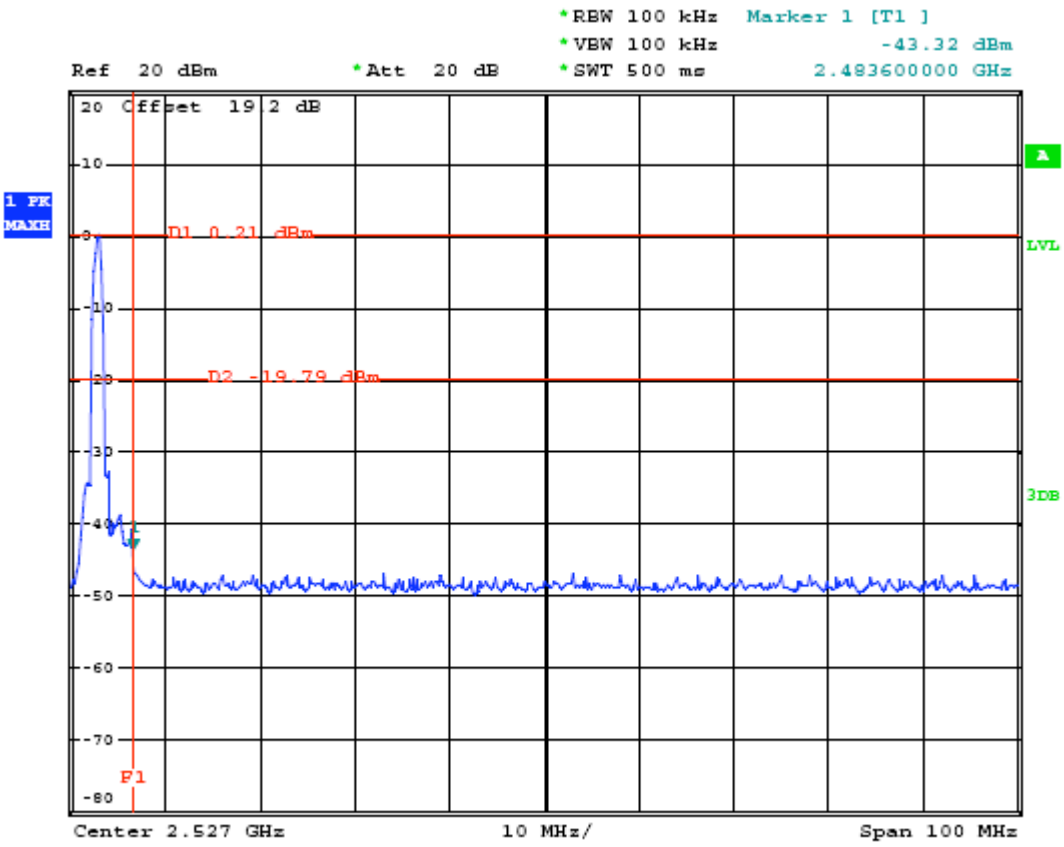


BT EDR (3Mbps)

TEST PLOT OF BAND ELDG FOR BOTTOM CHANNEL (2.402GHz)



TEST PLOT OF BAND ELDG FOR TOP CHANNEL (2.480GHz)



RADIATED EMISSSION

MEASUREMENT PROCEDURE

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.'

Spectrum Parameter	Setting
Start Frequency	1GHz
Stop Frequency	26.5GHz
RB/VB(Emission in restricted band)	1MHz/1MHz for Peark, 1MHz/10Hz for Average
RB/VB(Emission in non-restricted band)	1MHz/1MHz for Peak

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

TEST SET-UP

The Same as described in section 6.2

TEST RESULT OF RADIATED EMISSION TEST (9KHz ~30MHz)

Distance	3m	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Humidity:	55 % RH		

Operation Mode: RF Mode

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

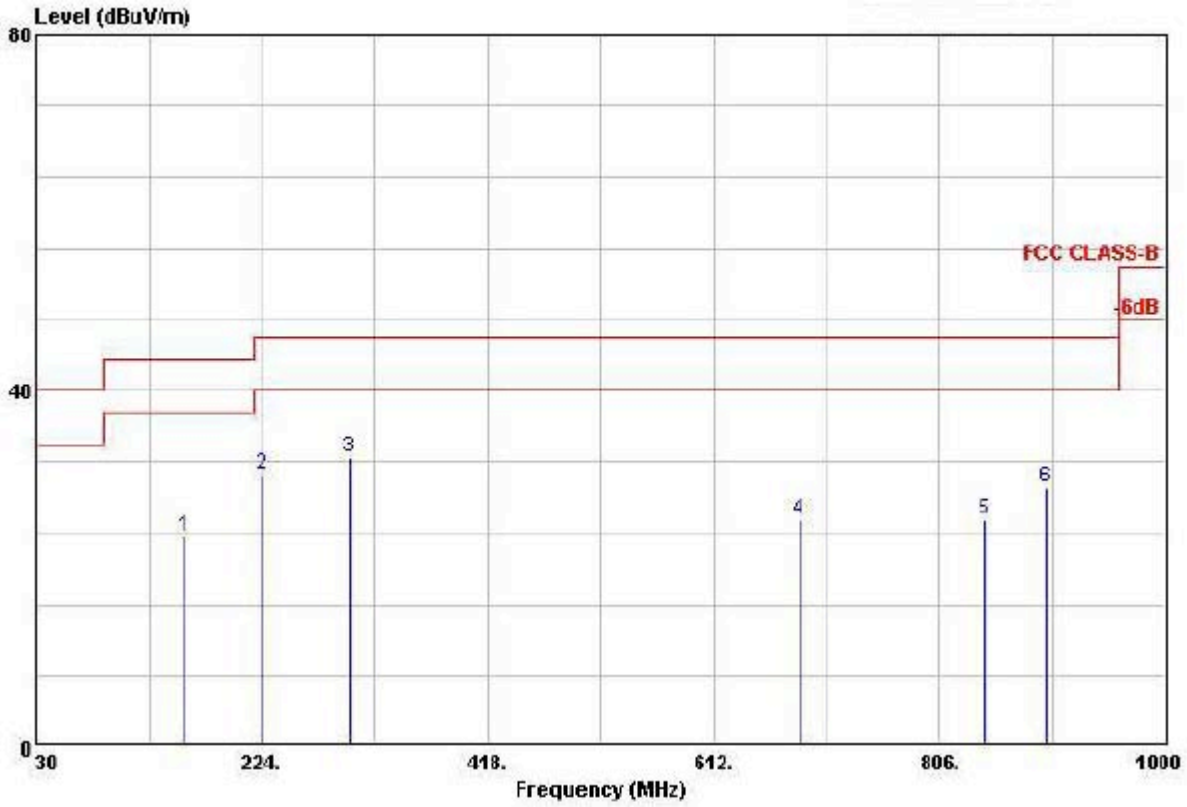
Distance extrapolation factor = 20 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

TEST RESULT OF RADIATED EMISSION TEST (30MHZ-1GHZ)

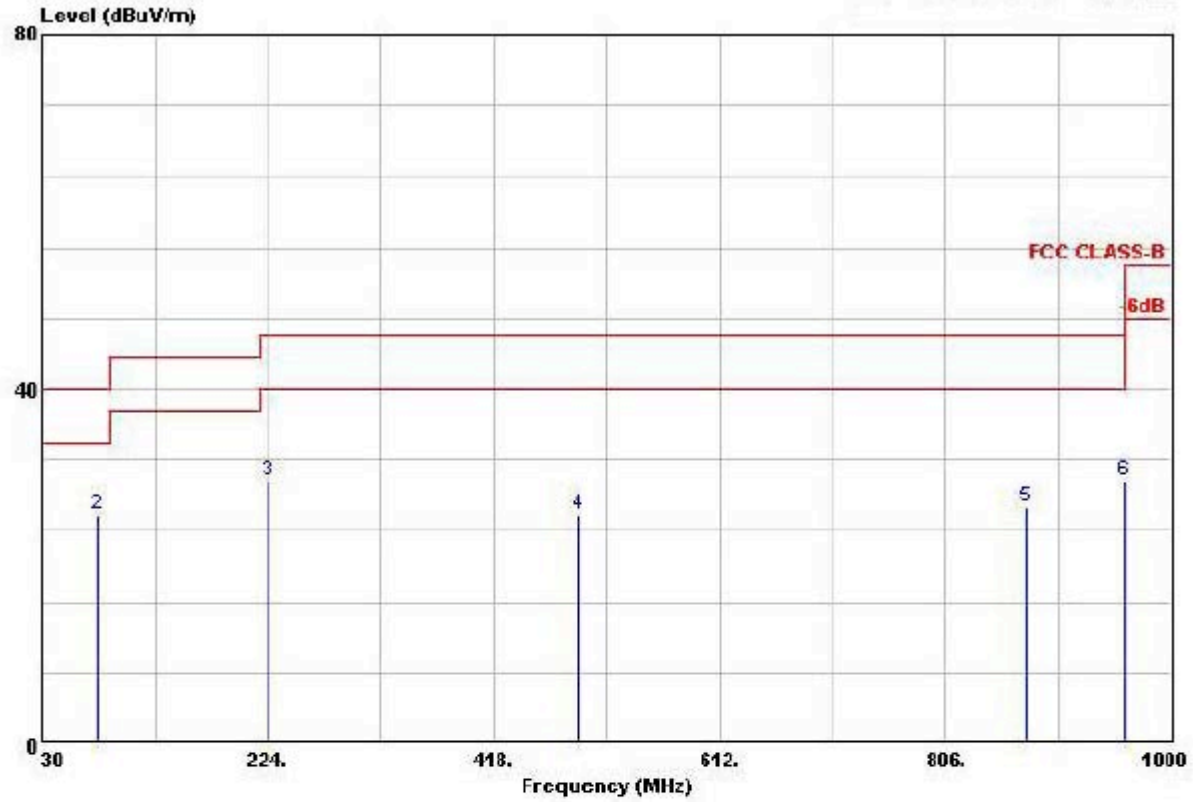
Operation Mode:	channel 00(1Mbps)	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Mary Liu
Humidity:	55 % RH		

Horizontal:



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	158.250	23.58	-19.92	43.50	40.35	9.51	1.68	27.97	---	---	Peak
2	224.940	30.55	-15.45	46.00	45.69	10.65	1.97	27.75	---	---	Peak
3	299.460	32.56	-13.44	46.00	45.61	12.31	2.24	27.60	100	157	Peak
4	605.700	25.49	-20.51	46.00	31.01	20.11	3.48	29.10	---	---	Peak
5	845.300	25.51	-20.49	46.00	29.00	21.52	3.84	28.85	---	---	Peak
6	897.800	29.15	-16.85	46.00	30.56	23.44	3.95	28.80	---	---	Peak

Vertical:

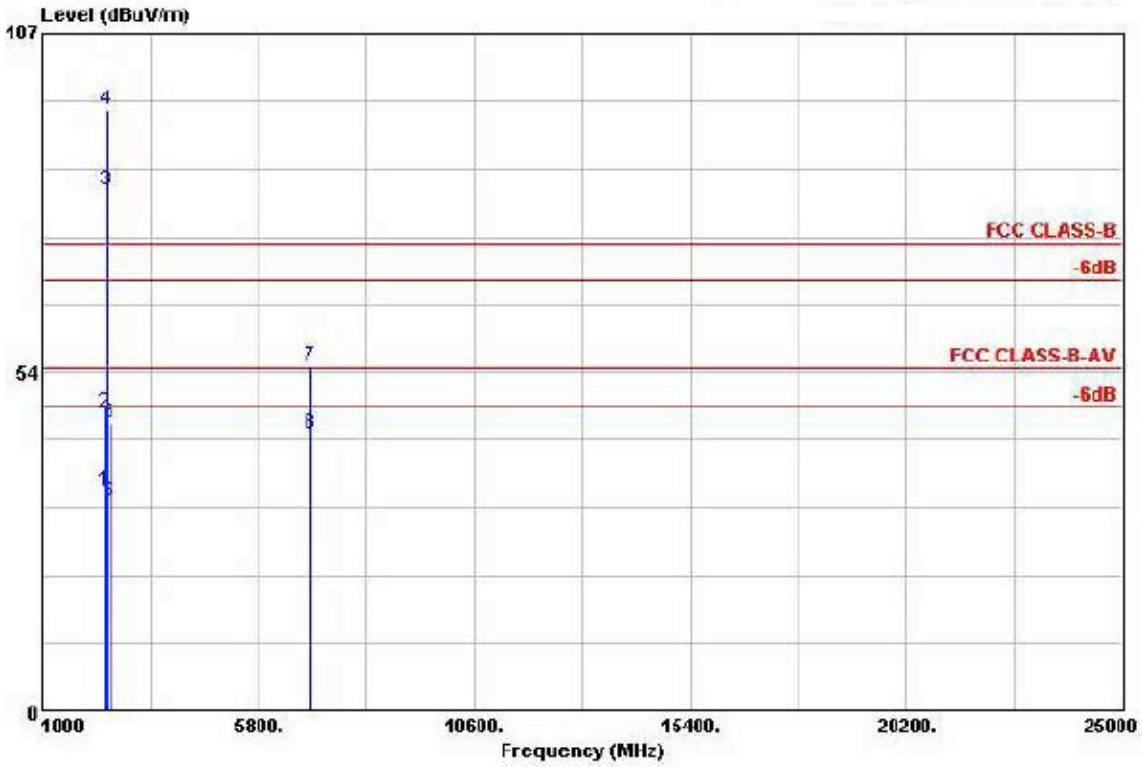


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	30.000	22.92	-17.08	40.00	33.92	16.30	0.87	28.25	---	---	Peak
2	77.250	25.78	-14.22	40.00	46.11	6.67	1.25	28.25	100	241	Peak
3	225.210	29.54	-16.46	46.00	44.68	10.65	1.97	27.75	---	---	Peak
4	491.800	25.79	-20.21	46.00	35.13	16.81	2.79	28.94	---	---	Peak
5	875.400	26.65	-19.35	46.00	28.94	22.62	3.92	28.82	---	---	Peak
6	959.400	29.61	-16.39	46.00	29.29	25.01	3.99	28.68	---	---	Peak

TEST RESULT OF RADIATED EMISSION TEST (1GHZ-10TH HARMONIC)

Operation Mode:	channel 00(1Mbps)	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Mary Liu
Humidity:	55 % RH		

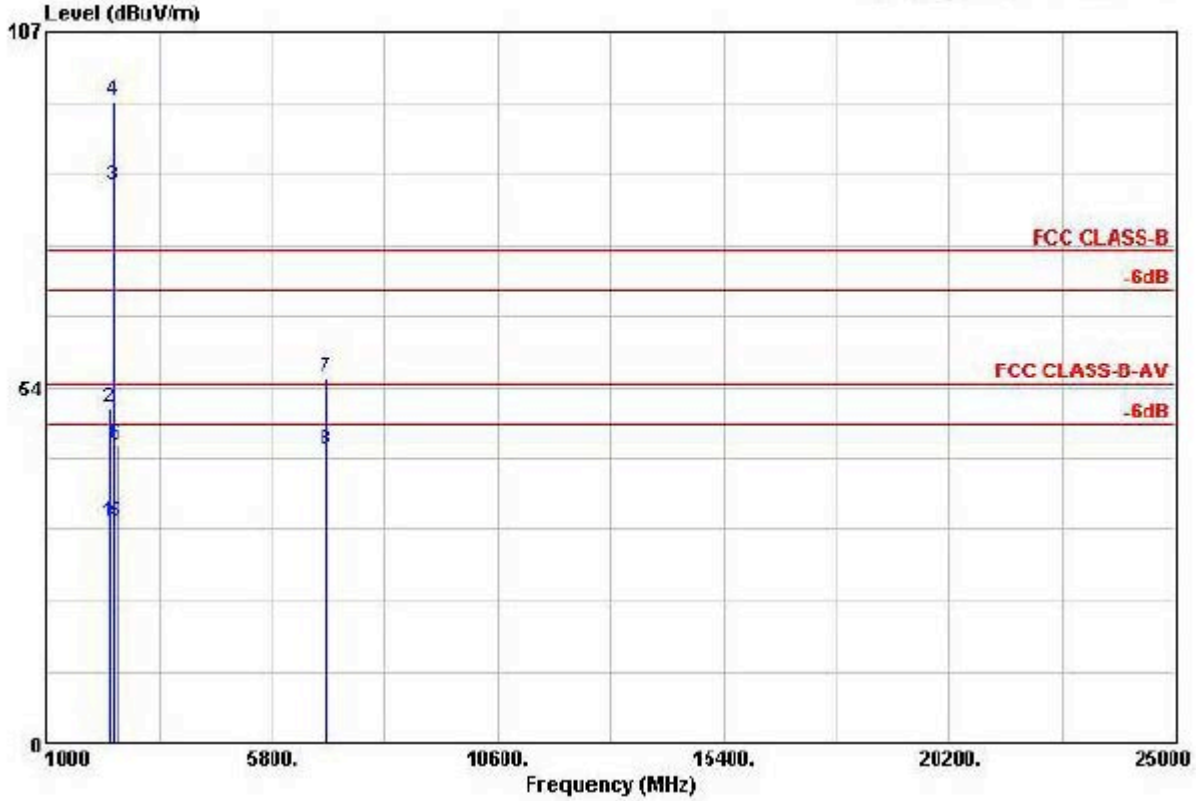
Horizontal



	Freq	Level	Over Limit	Linit Line	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2389.420	34.66	-19.34	54.00	32.16	32.54	3.74	33.78	160	101	Average
2	2389.420	46.99	-27.01	74.00	44.49	32.54	3.74	33.78	100	0	Peak
3 X	2402.000	82.26			79.76	32.54	3.74	33.78	160	101	Average
4 X	2402.000	95.07			92.57	32.54	3.74	33.78	100	0	Peak
5	2486.000	33.12	-20.88	54.00	30.49	32.59	3.84	33.80	160	101	Average
6	2486.000	45.26	-28.74	74.00	42.63	32.59	3.84	33.80	100	0	Peak
7	6942.000	54.41	-19.59	74.00	44.61	36.00	6.34	32.54	100	0	Peak
8	6942.000	43.60	-10.40	54.00	33.80	36.00	6.34	32.54	100	189	Average

Remark: #3 and #4 are Fundamental Signals

Vertical

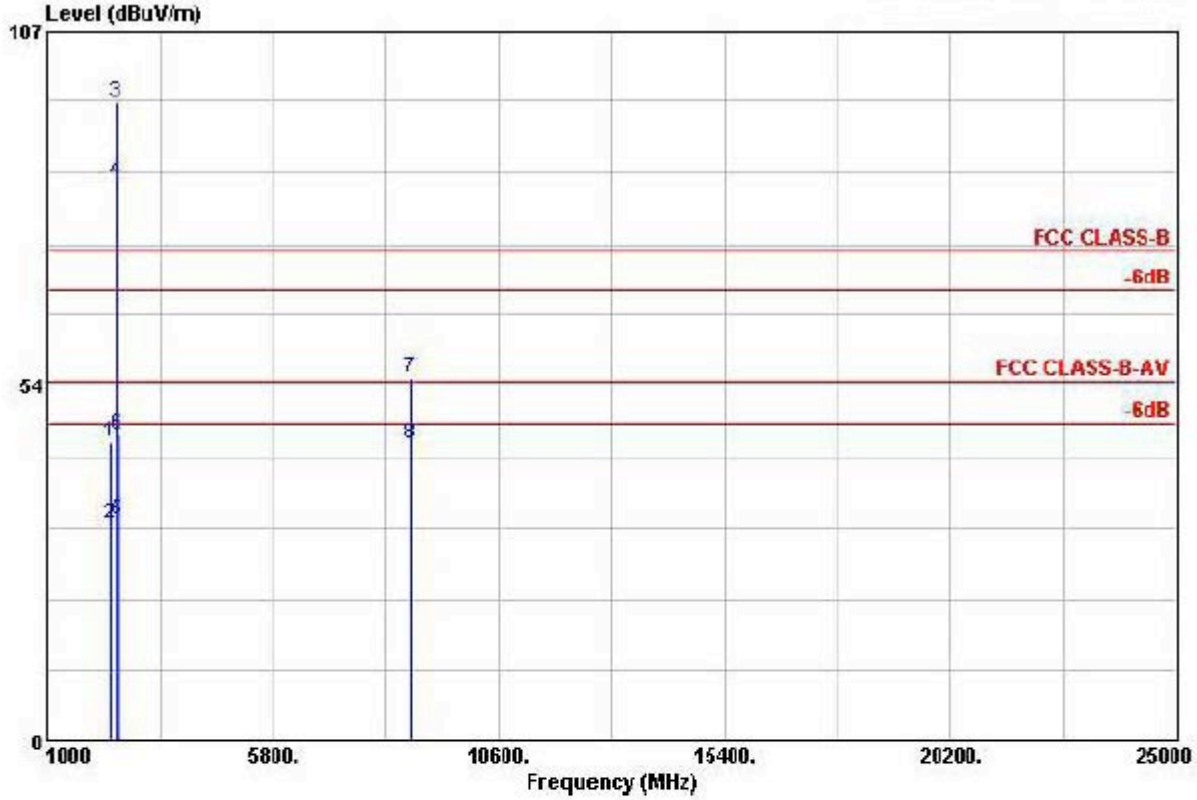


		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1		2349.140	33.08	-20.92	54.00	30.65	32.51	3.69	33.77	101	68	Average
2		2349.140	50.33	-23.67	74.00	47.90	32.51	3.69	33.77	100	0	Peak
3	@	2402.000	83.87			81.37	32.54	3.74	33.78	101	68	Average
4	X	2402.000	96.69	-----	-----	94.19	32.54	3.74	33.78	100	0	Peak
5		2492.000	33.10	-20.90	54.00	30.46	32.60	3.84	33.80	101	68	Average
6		2492.000	44.76	-29.24	74.00	42.12	32.60	3.84	33.80	100	0	Peak
7		6957.000	54.81	-19.19	74.00	44.99	36.00	6.34	32.52	100	0	Peak
8		6957.000	43.86	-10.14	54.00	34.04	36.00	6.34	32.52	100	181	Average

Remark: #3 and #4 are Fundamental Signals

Operation Mode:	channel 39(1Mbps)	Test Date:	Mar.07, 2010
Temperature:	25°C	Tested by:	Mary Liu
Humidity:	55 % RH		

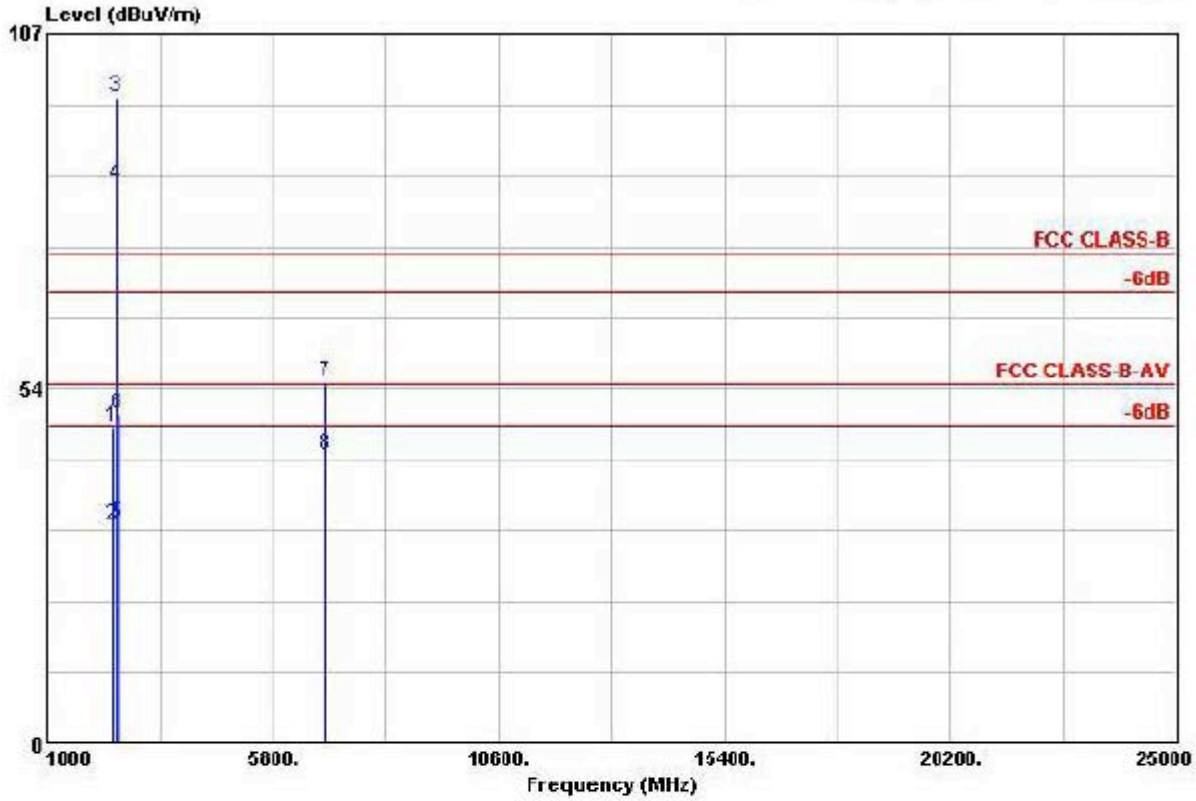
Horizontal



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2324.000	45.21	-28.79	74.00	42.82	32.50	3.66	33.77	100	0	Peak
2	2324.000	32.80	-21.20	54.00	30.41	32.50	3.66	33.77	156	98	Average
3 @	2441.000	96.07			93.50	32.57	3.79	33.79	100	0	Peak
4 @	2441.000	84.27			81.70	32.57	3.79	33.79	156	98	Average
5	2486.000	33.35	-20.65	54.00	30.72	32.59	3.84	33.80	156	98	Average
6	2486.000	46.12	-27.88	74.00	43.49	32.59	3.84	33.80	100	0	Peak
7	6721.000	54.76	-19.24	74.00	45.73	36.47	7.13	34.58	100	0	Peak
8 @	6721.000	44.70	-9.30	54.00	35.67	36.47	7.13	34.58	100	147	Average

Remark: #3 and #4 are Fundamental Signals

Vertical

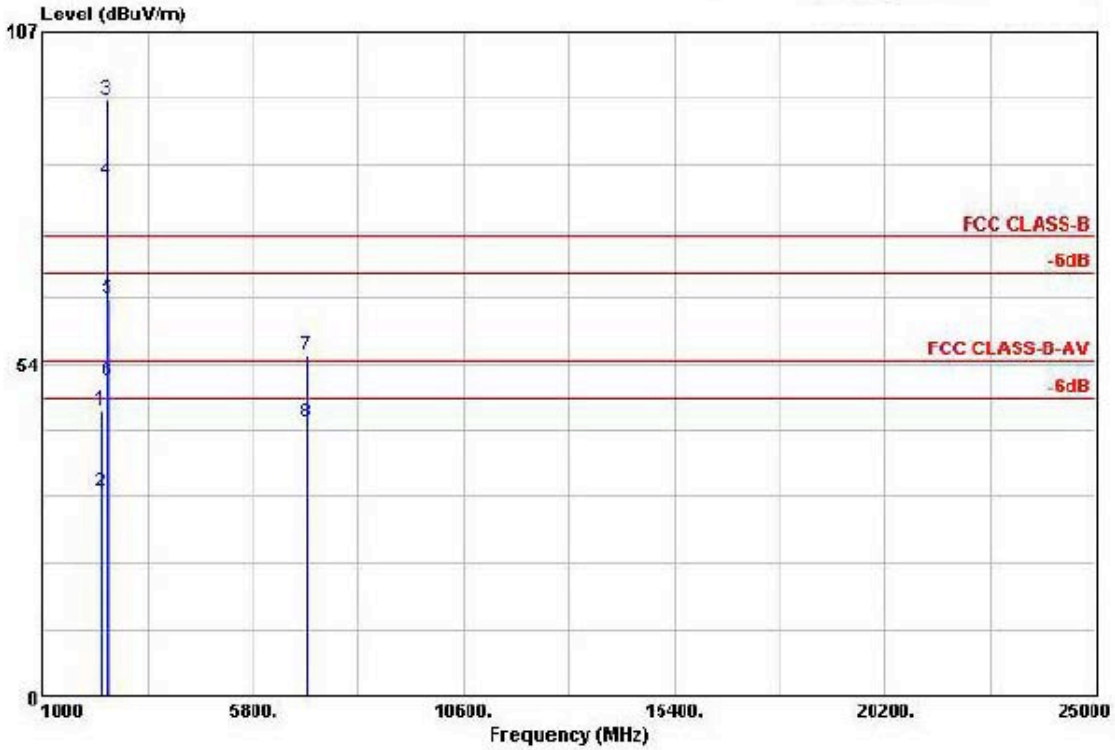


	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	2368.000	47.54	-26.46	74.00	45.04	32.54	3.74	33.78	100	0	Peak
2	2388.000	32.96	-21.04	54.00	30.46	32.54	3.74	33.78	100	308	Average
3 @	2441.000	97.40			94.83	32.57	3.79	33.79	100	0	Peak
4 @	2441.000	84.36			81.79	32.57	3.79	33.79	100	308	Average
5	2494.000	33.30	-20.70	54.00	30.66	32.60	3.84	33.80	100	308	Average
6	2494.000	49.62	-24.38	74.00	46.98	32.60	3.84	33.80	100	0	Peak
7	6906.000	54.22	-19.78	74.00	44.45	36.00	6.33	32.56	100	0	Peak
8 @	6906.000	43.45	-10.55	54.00	33.68	36.00	6.33	32.56	100	168	Average

Remark: #3 and #4 are Fundamental Signals

Operation Mode:	channel 78(1Mbps)	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Mary Liu
Humidity:	55 % RH		

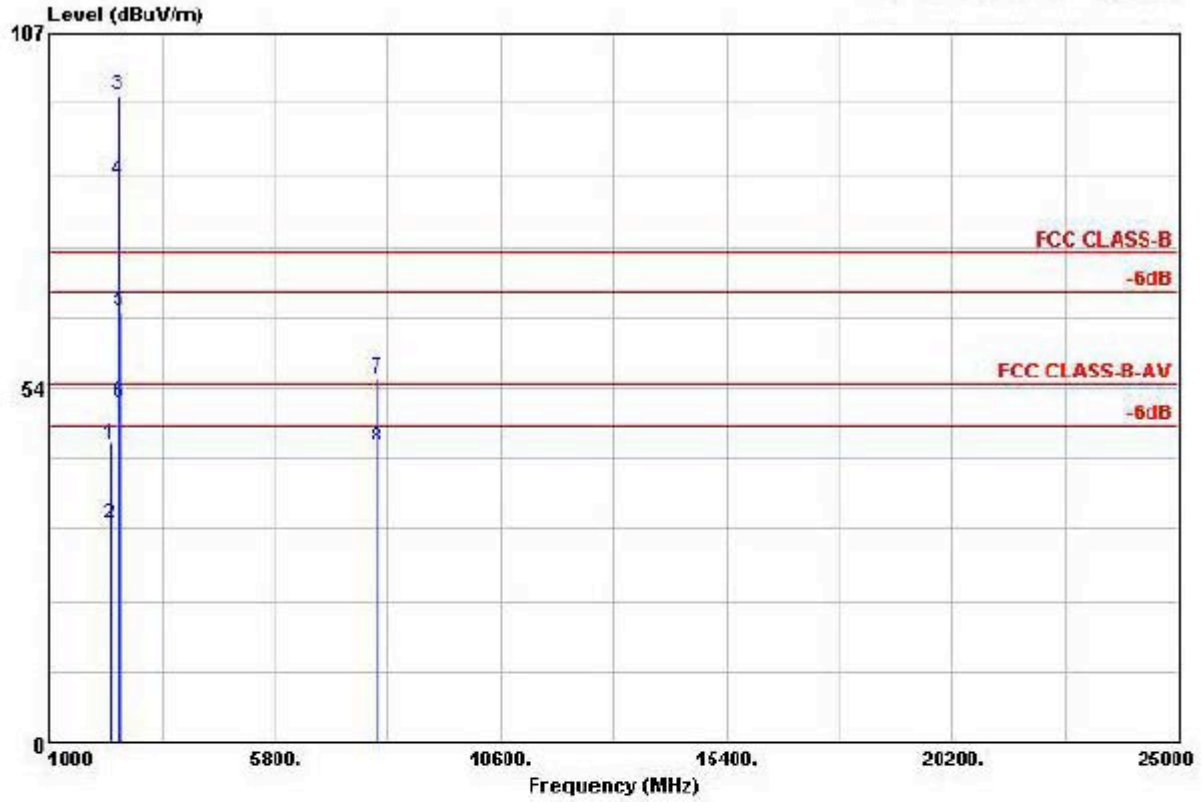
Horizontal



		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1		2340.000	46.00	-28.00	74.00	43.57	32.51	3.69	33.77	100	0	Peak
2		2340.000	32.71	-21.29	54.00	30.28	32.51	3.69	33.77	102	94	Average
3	X	2480.000	96.13			93.50	32.59	3.84	33.80	100	0	Peak
4	X	2480.000	82.79			80.16	32.59	3.84	33.80	102	94	Average
5		2483.500	63.73	-10.27	74.00	61.10	32.59	3.84	33.80	100	0	Peak
6		2483.500	50.60	-3.40	54.00	47.97	32.59	3.84	33.80	102	94	Average
7		7050.000	54.81	-19.19	74.00	45.06	36.00	6.38	32.63	100	0	Peak
8		7050.000	44.06	-9.94	54.00	34.31	36.00	6.38	32.63	100	102	Average

Remark: #3 and #4 are Fundamental Signals

Vertical



		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1		2318.000	45.00	-29.00	74.00	42.61	32.50	3.66	33.77	100	0	Peak
2		2318.000	32.80	-21.20	54.00	30.41	32.50	3.66	33.77	150	99	Average
3	X	2480.000	97.55			94.92	32.59	3.84	33.80	100	0	Peak
4	@	2480.000	84.75			82.12	32.59	3.84	33.80	150	99	Average
5		2483.500	65.00	-9.00	74.00	62.37	32.59	3.84	33.80	100	0	Peak
6	!	2483.500	51.31	-2.69	54.00	48.68	32.59	3.84	33.80	150	99	Average
7		7998.000	54.80	-19.20	74.00	45.45	36.20	6.76	33.61	100	0	Peak
8		7998.000	44.45	-9.55	54.00	35.10	36.20	6.76	33.61	100	146	Average

Remark: #3 and #4 are Fundamental Signals

10. NUMBER OF HOPPING FREQUENCY

10.1 MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer Start = 2.4GHz Stop = 2.4835GHz, span=20MHz
4. Set the Spectrum Analyzer as RBW = VBW = 100KHz

10.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2
1. Conducted Method.

10.3 MEASUREMENT EQUIPMENT USED

The Same as described in section 6.3

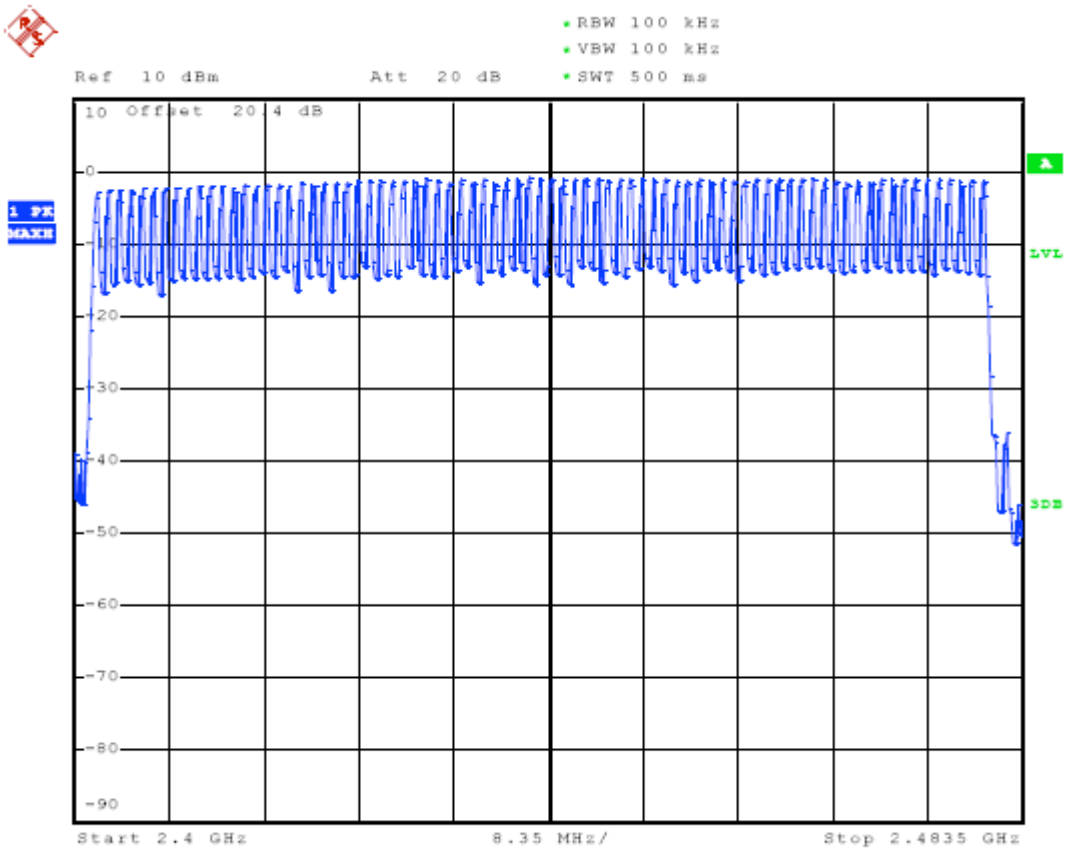
10.4 LIMITS AND MEASUREMENT RESULT:

TOTAL NO. OF HOPPING CHANNEL	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
	>=15	79	PASS

Humidity:	55 % RH	Test Date:	Dec.28, 2010
Temperature:	25°C	Tested by:	Jekey Zhang

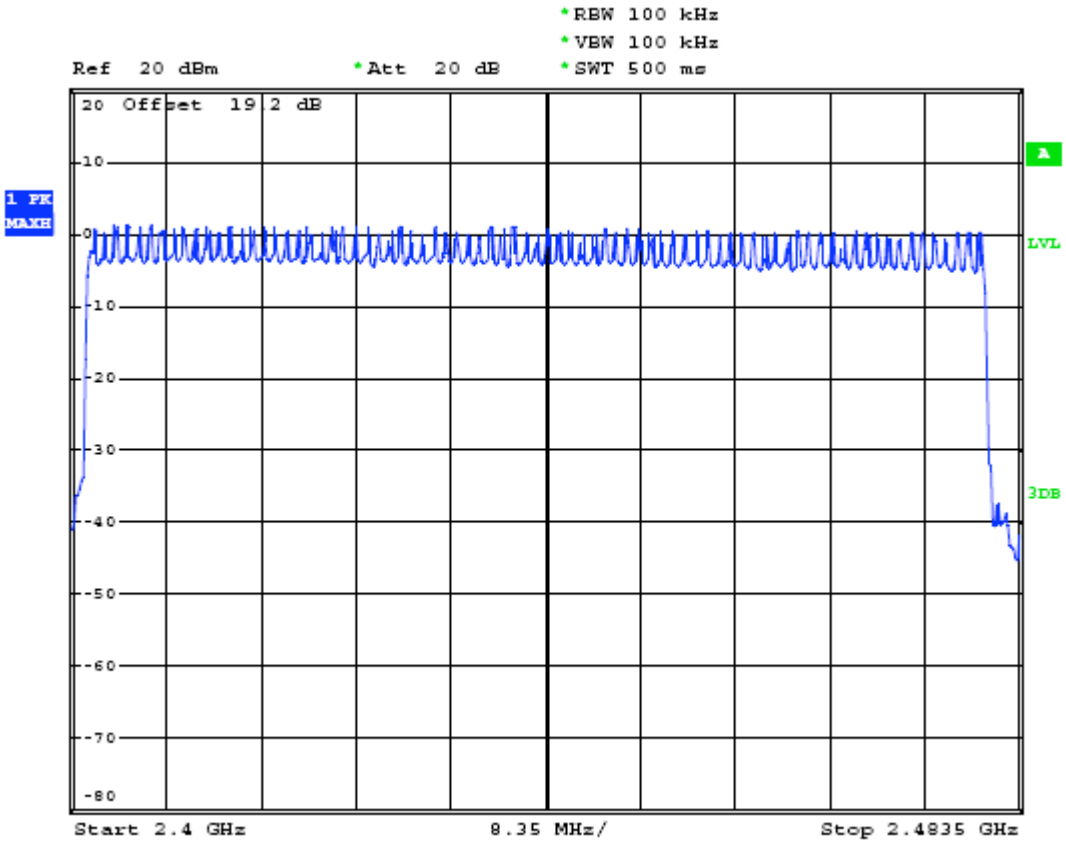
BT (1Mbps)

NUMBER OF HOPPING CHANNEL PLOT ON CHANNEL 0~78



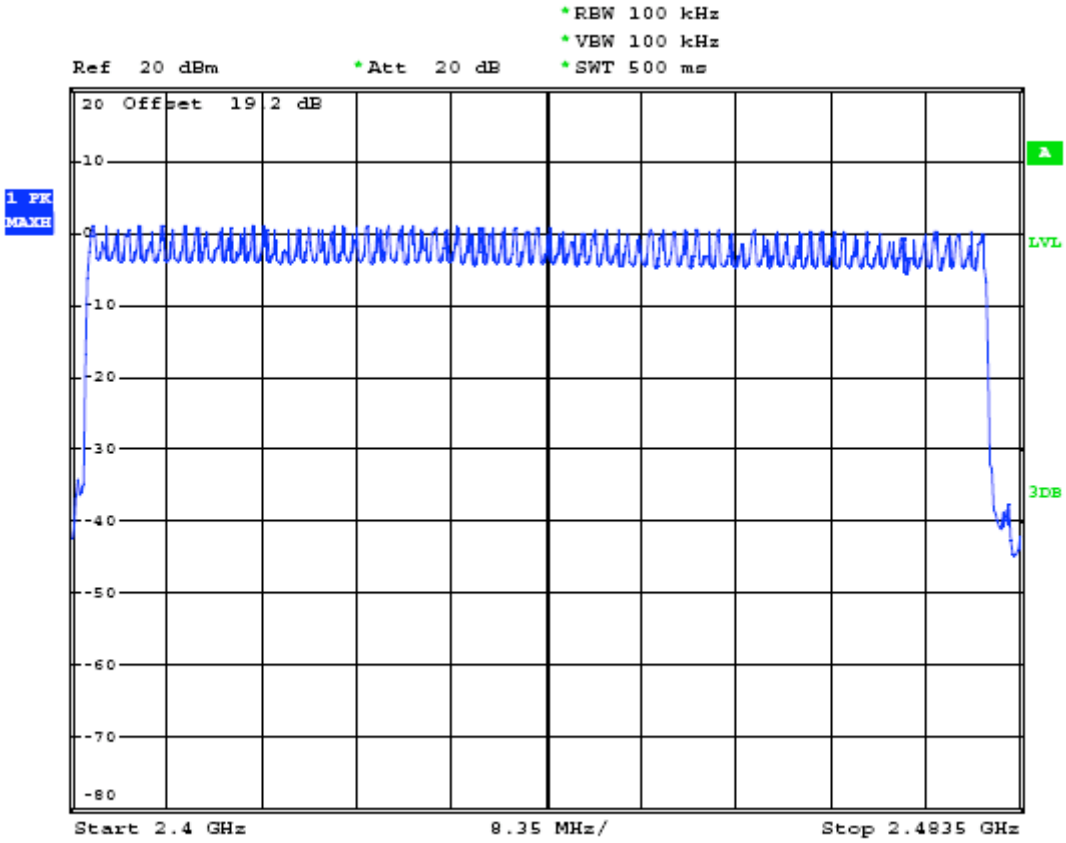
BT EDR (2Mbps)

NUMBER OF HOPPING CHANNEL PLOT ON CHANNEL 0~78



BT EDR (3Mbps)

NUMBER OF HOPPING CHANNEL PLOT ON CHANNEL 0~78



11. TIME OF OCCUPANCY (DWELL TIME)

11.1 MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
3. Set center frequency of spectrum analyzer = Operating frequency
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0 Hz,

11.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2
Conducted Method

11.3 MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

11.4 LIMITS AND MEASUREMENT RESULT

BOTTOM CHANNEL(1Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2402	370	118.40	400	Pass
DH3	2402	1627	260.32	400	Pass
DH5	2402	2870	306.13	400	Pass

MIDDLE CHANNEL(1Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2441	373.3	119.46	400	Pass
DH3	2441	1627	260.32	400	Pass
DH5	2441	2860	305.07	400	Pass

TOP CHANNEL(1Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2480	370	118.40	400	Pass
DH3	2480	1627	260.32	400	Pass
DH5	2480	2860	305.07	400	Pass

BOTTOM CHANNEL(2Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2402	373.3	119.45	400	Pass
DH3	2402	1620	259.20	400	Pass
DH5	2402	2860	305.06	400	Pass

MIDDLE CHANNEL(2Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2441	370	118.40	400	Pass
DH3	2441	1610	257.60	400	Pass
DH5	2441	2860	305.06	400	Pass

TOP CHANNEL(2Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2480	366.7	117.34	400	Pass
DH3	2480	1620	259.20	400	Pass
DH5	2480	2880	307.20	400	Pass

BOTTOM CHANNEL(3Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2402	370	118.40	400	Pass
DH3	2402	1600	256.00	400	Pass
DH5	2402	2875	306.66	400	Pass

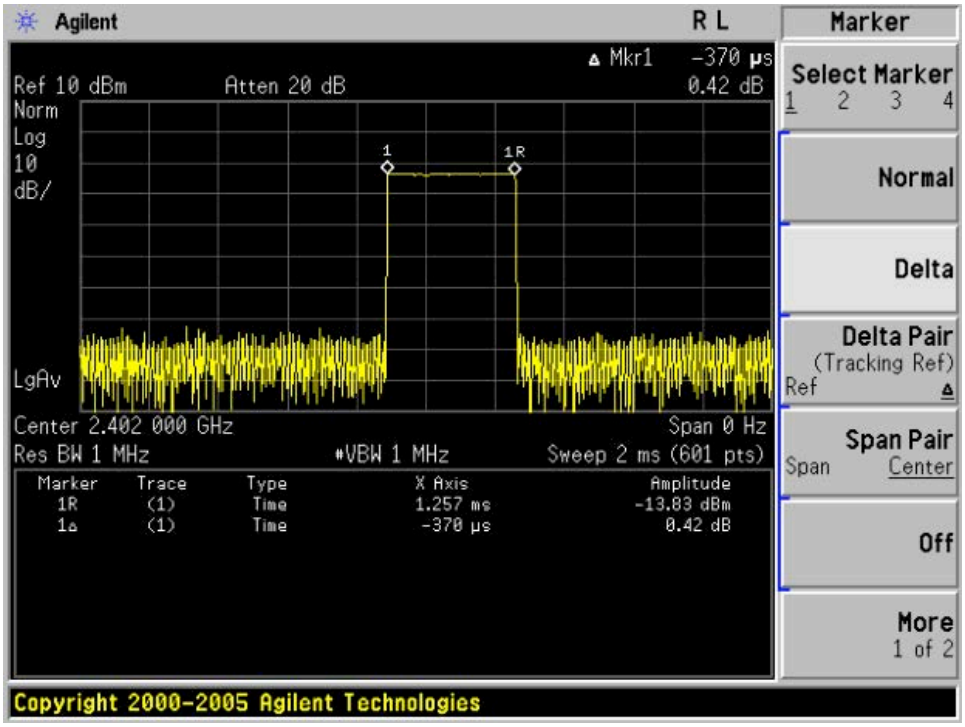
MIDDLE CHANNEL(3Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2441	368.3	117.85	400	Pass
DH3	2441	1608	257.28	400	Pass
DH5	2441	2858	304.85	400	Pass

TOP CHANNEL(3Mbps)					
Mode	Frequency	Spectrum Reading	Test Result	Limit	Pass / Fail
	(MHz)	(uS)	(mS)	(mS)	
DH1	2480	368.3	117.85	400	Pass
DH3	2480	1617	258.72	400	Pass
DH5	2480	2867	305.81	400	Pass

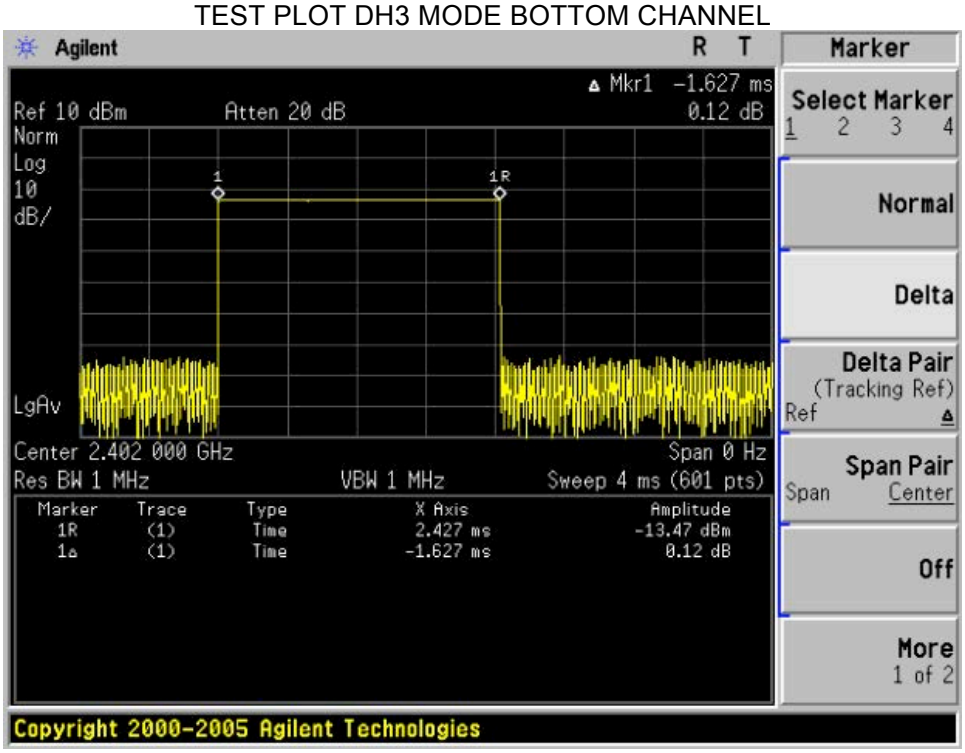
A Period Time = 79*0.4=31.6 S
DH1 Time Slot: Reading * (1600/2)*31.6/79
DH3 Time Slot: Reading * (1600/4)*31.6/79
DH5 Time Slot: Reading * (1600/6)*31.6/79

Humidity:	55 % RH	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Configurations	DH1, DH3, DH5(1Mbps)		

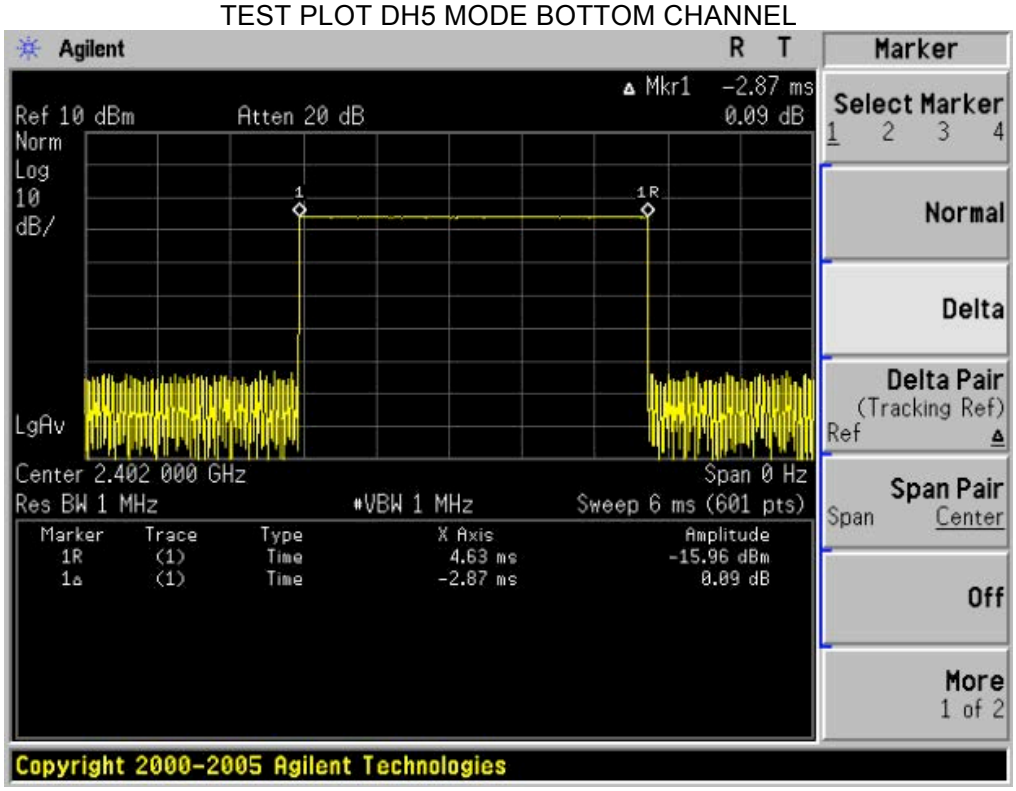
TEST PLOT DH1 MODE BOTTOM CHANNEL



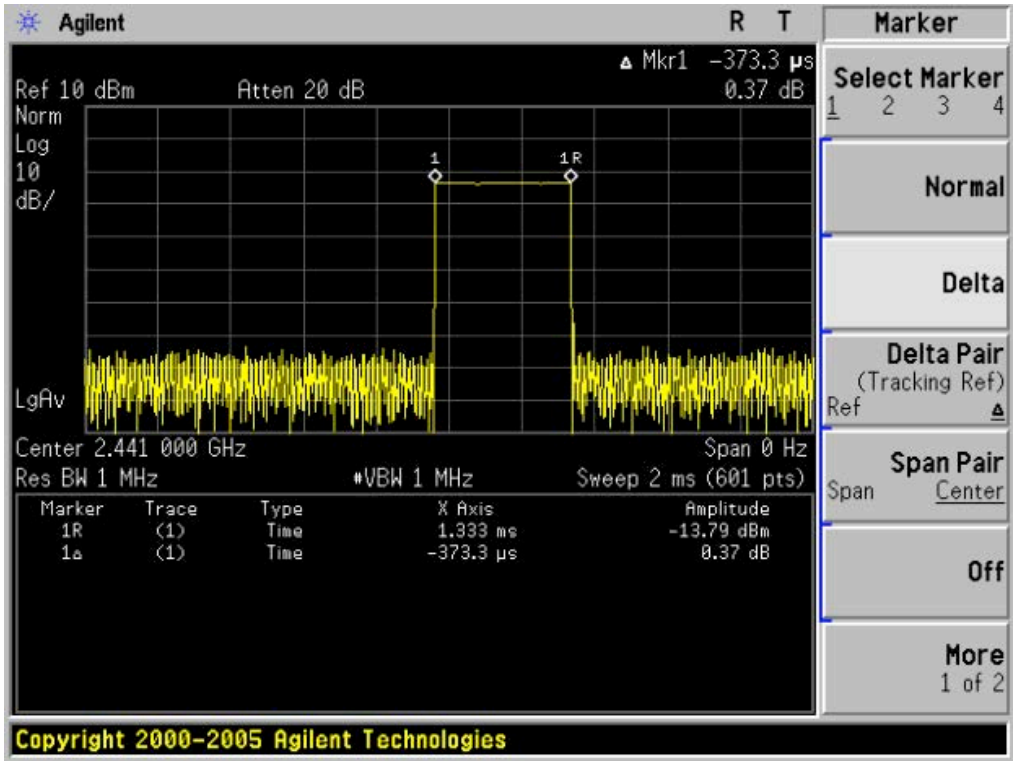
TEST PLOT DH3 MODE BOTTOM CHANNEL



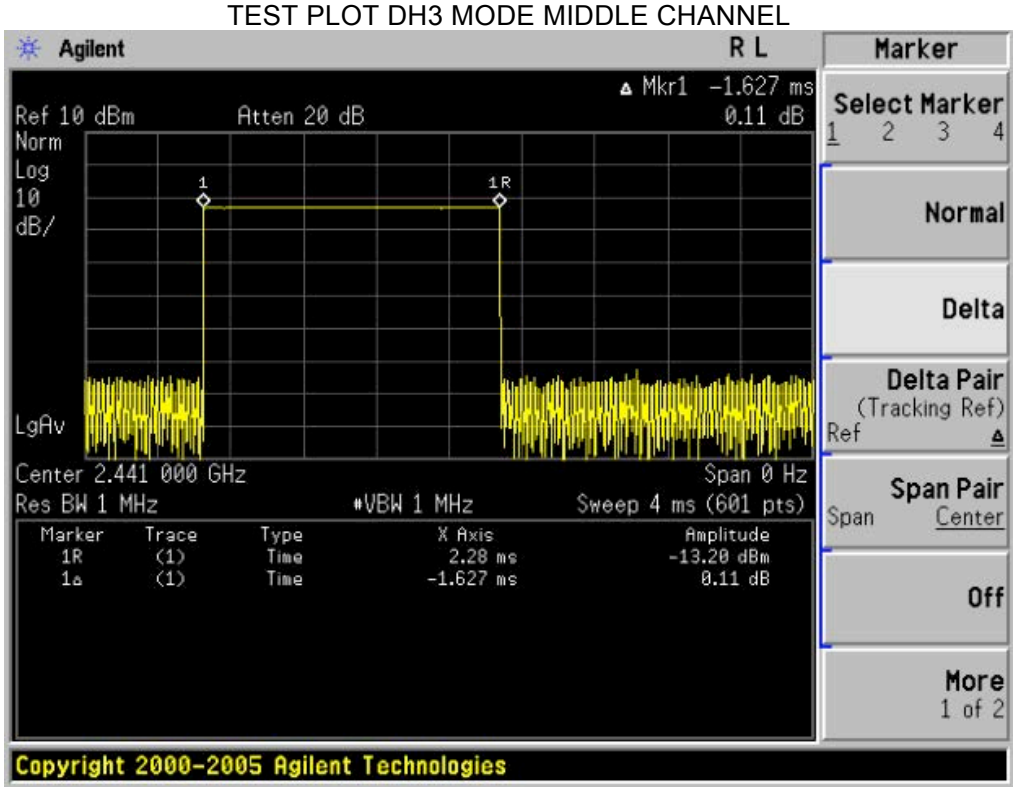
TEST PLOT DH5 MODE BOTTOM CHANNEL



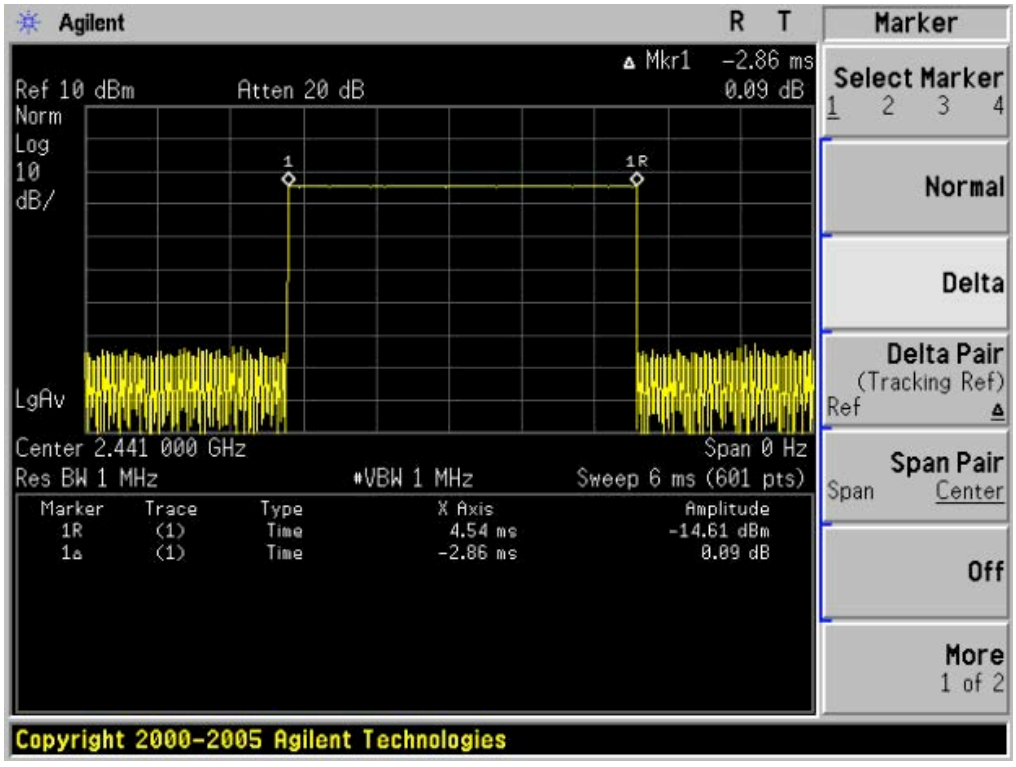
TEST PLOT DH1 MODE MIDDLE CHANNEL



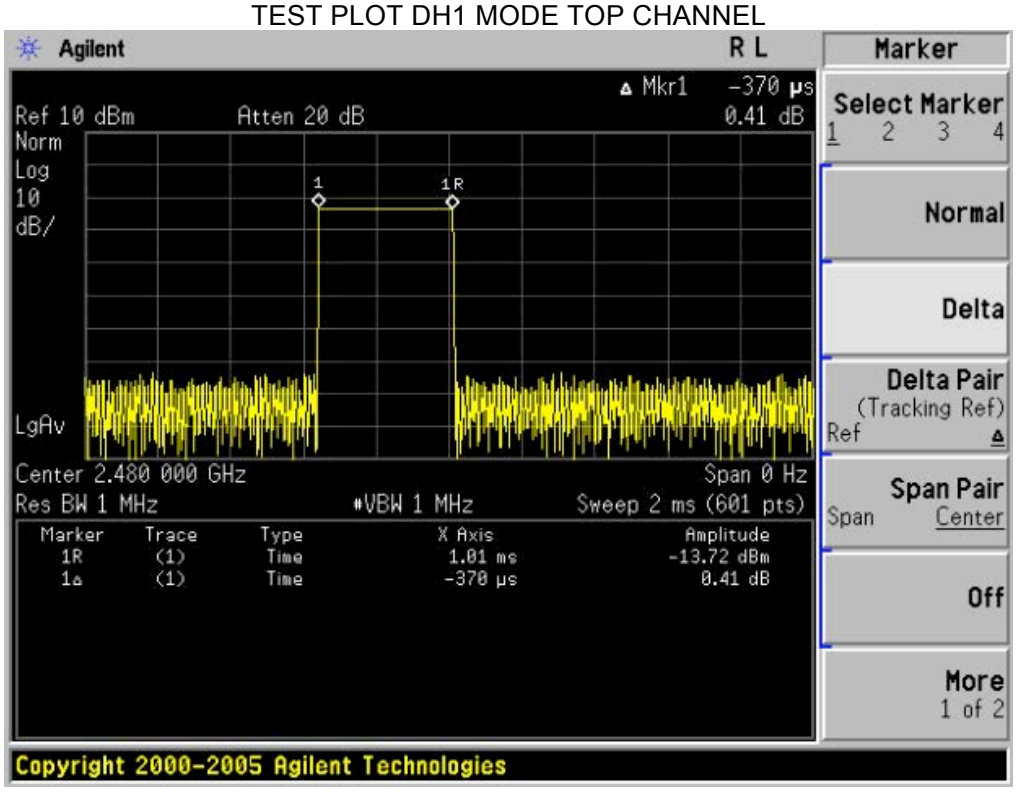
TEST PLOT DH3 MODE MIDDLE CHANNEL



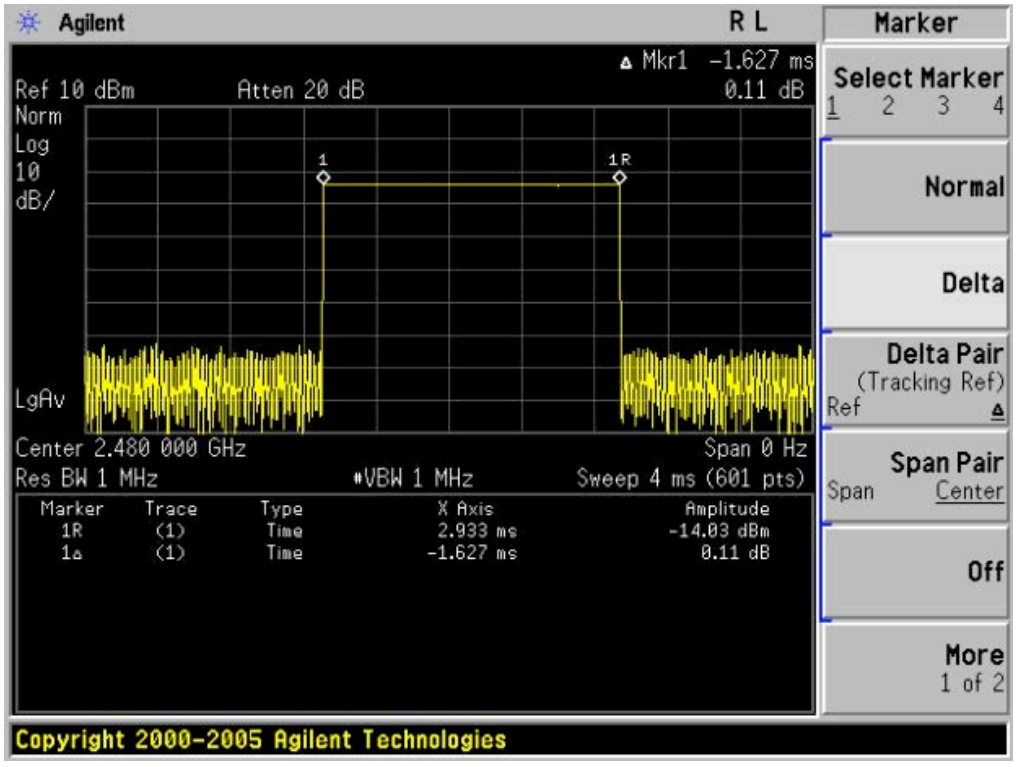
TEST PLOT DH5 MODE MIDDLE CHANNEL



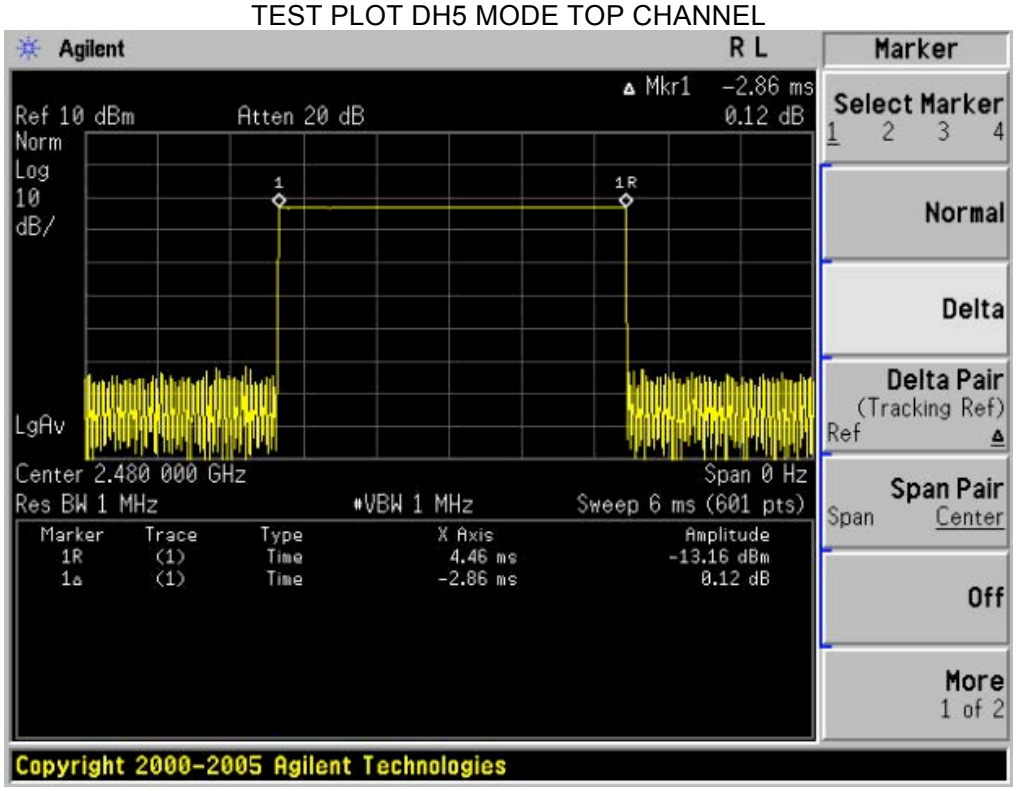
TEST PLOT DH1 MODE TOP CHANNEL



TEST PLOT DH3 MODE TOP CHANNEL



TEST PLOT DH5 MODE TOP CHANNEL



12. FREQUENCY SEPARATION

12.1 MEASUREMENT PROCEDURE

1. Place the EUT on the table and set it in transmitting mode
2. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum analyzer
3. Set center frequency of spectrum analyzer = Middele of Operating frequency
4. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 5 MHz,

12.2 TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

12.3 MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

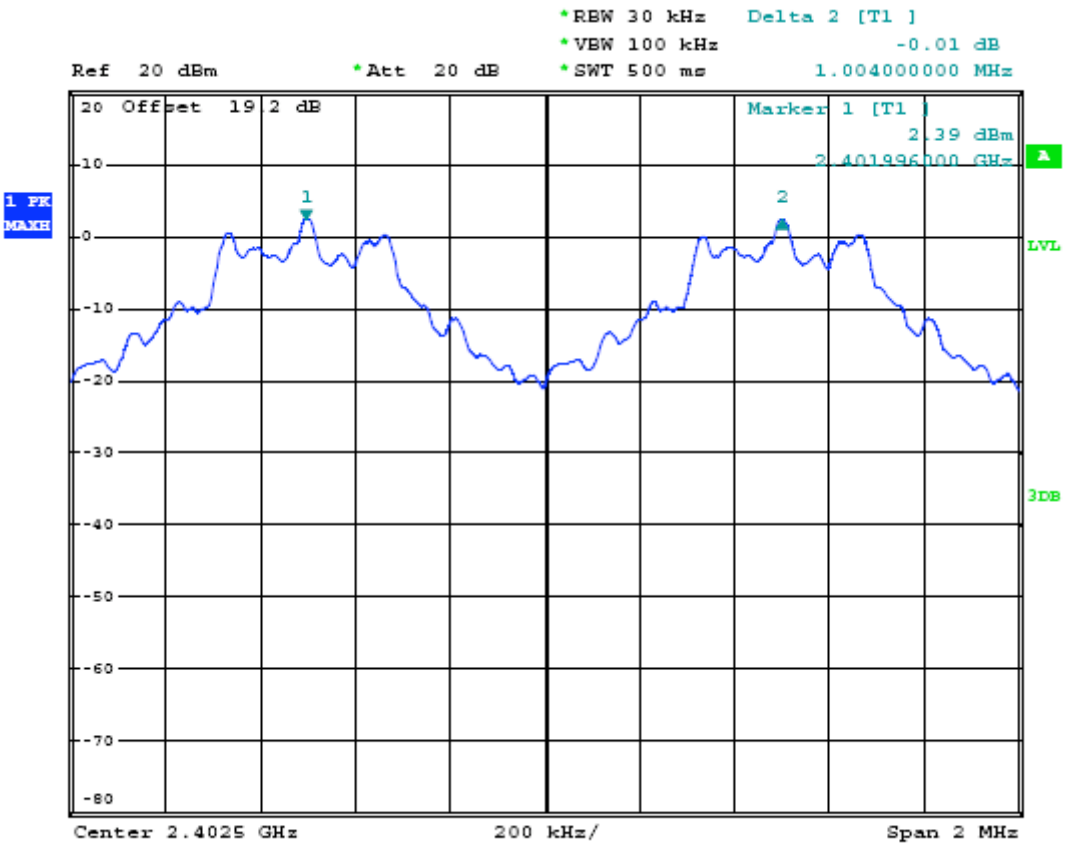
12.4 LIMITS AND MEASUREMENT RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT
	KHz	KHz	Pass
CH00-CH01	1000	>=25 KHz or 2/3 20 dB BW	
CH39-CH40	1004		
CH77-CH78	1004		

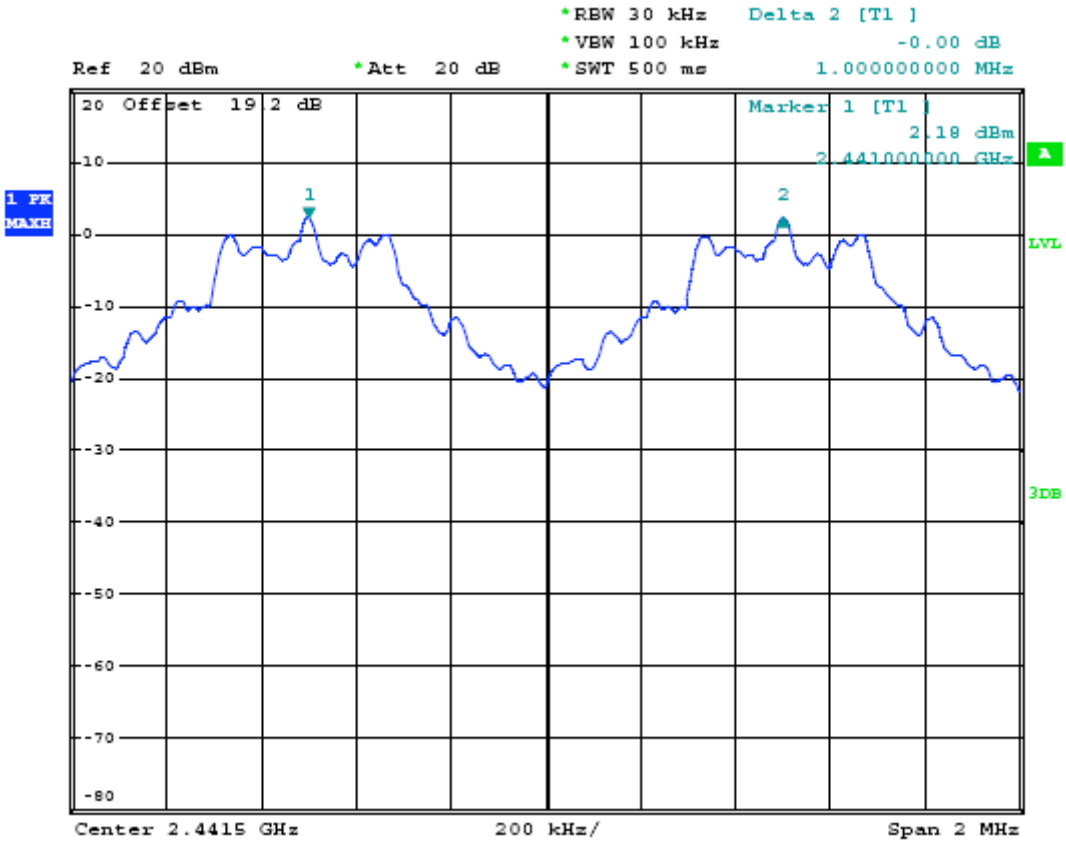
Humidity:	55 % RH	Test Date:	Mar.07, 2011
Temperature:	25°C	Tested by:	Jekey Zhang
Configurations	Channel 0-1, channel39-40, channel78-79		

BT (1Mbps)

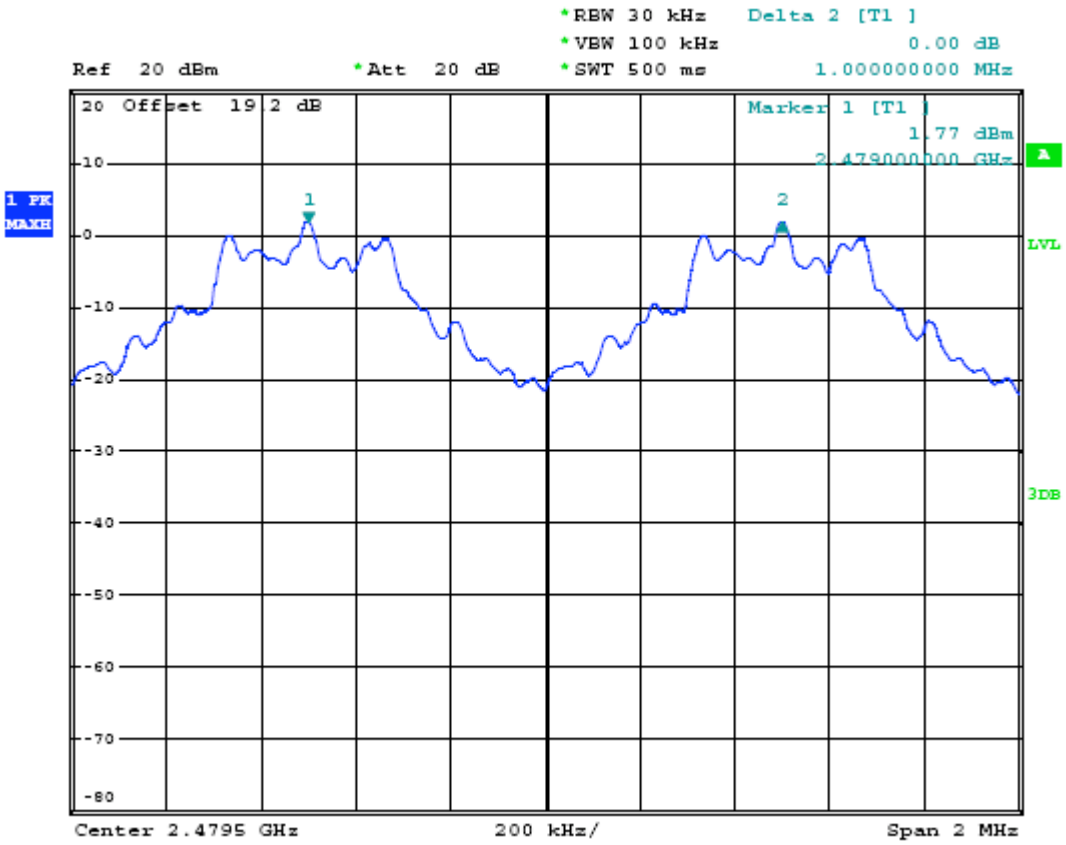
TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL0-1(1Mbps)



TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL39-40(1Mbps)

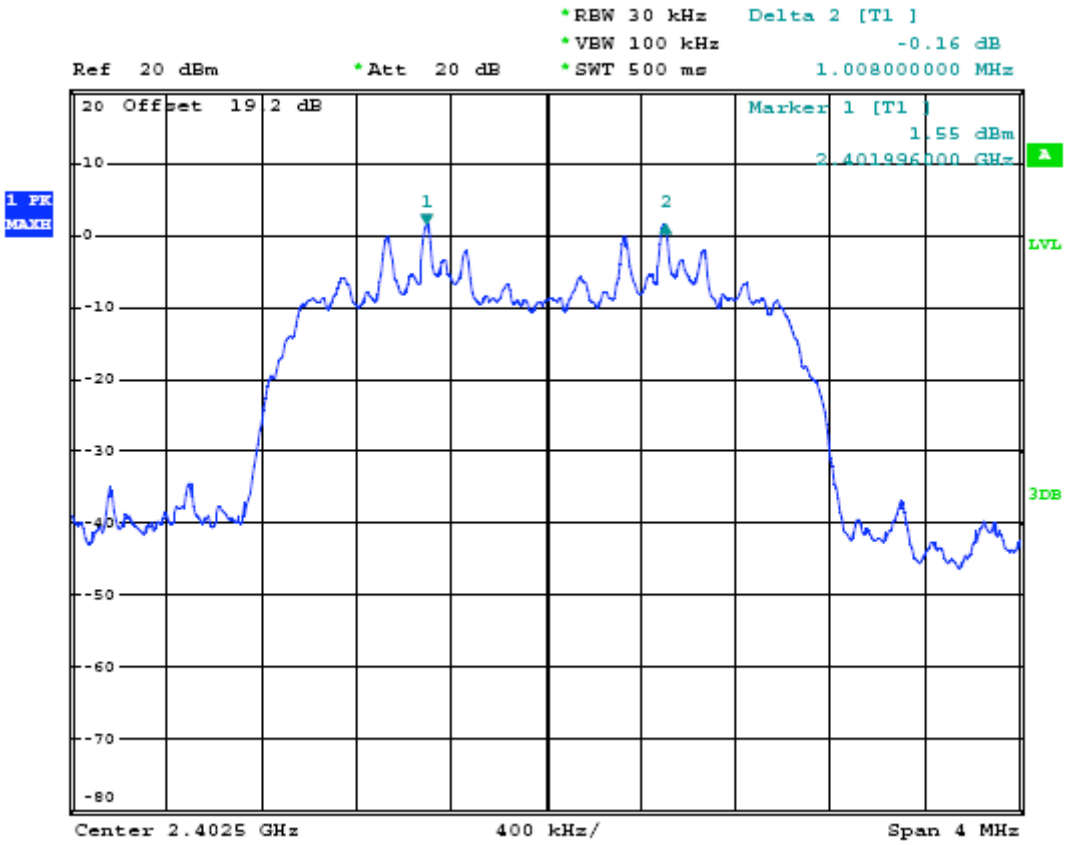


TEST PLOT FOR FREQUENCY SEPARATION -CHANNEL77-78(1Mbps)

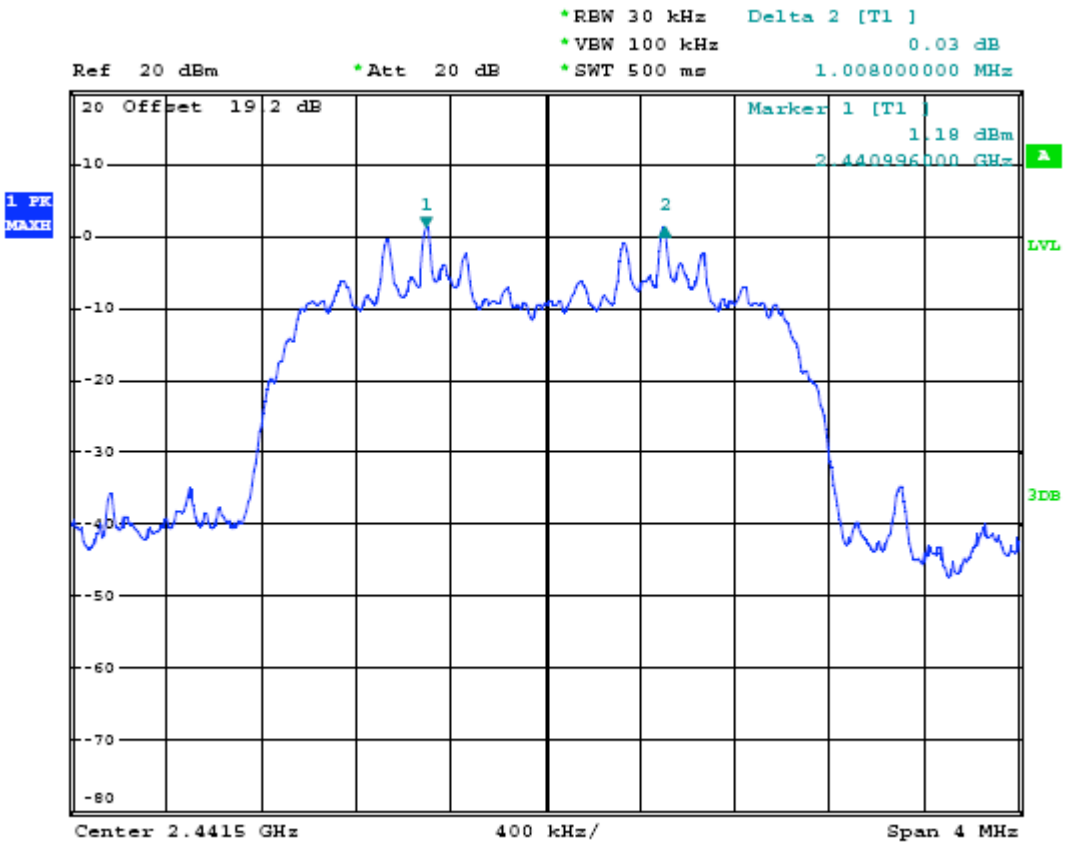


BT EDR (2Mbps)

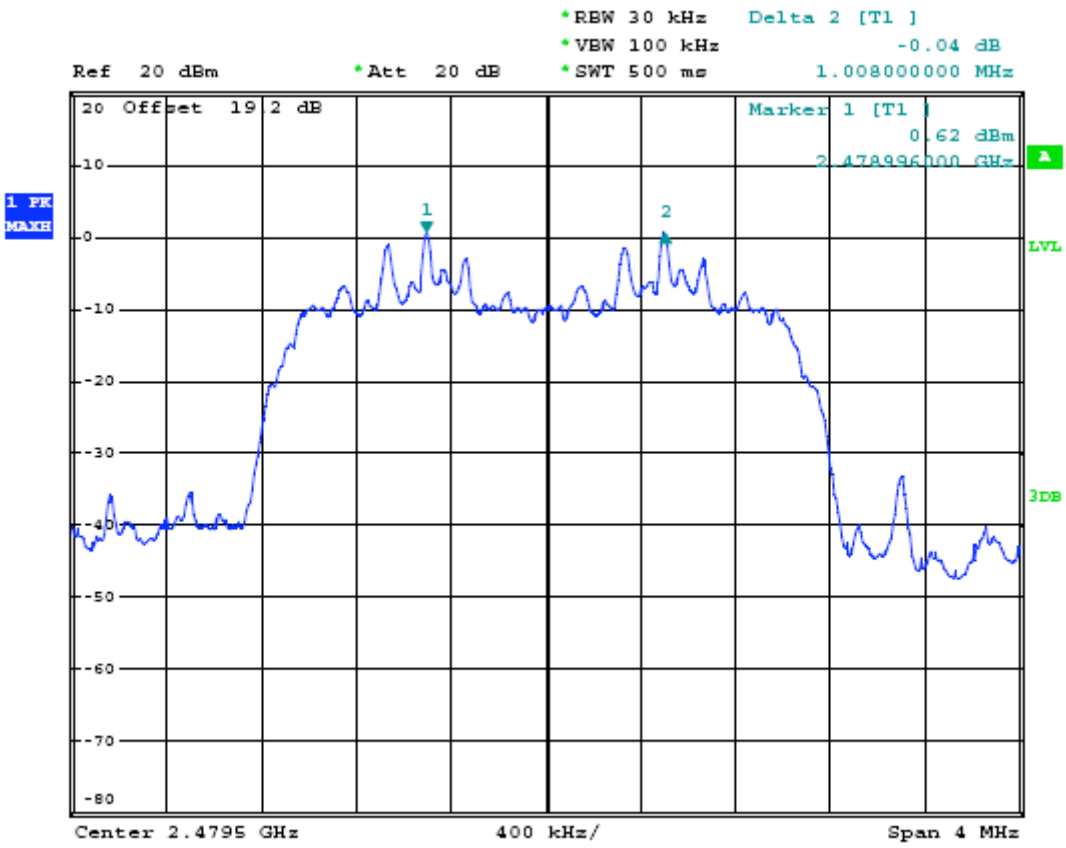
TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL0-1(2Mbps)



TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL39-40(2Mbps)

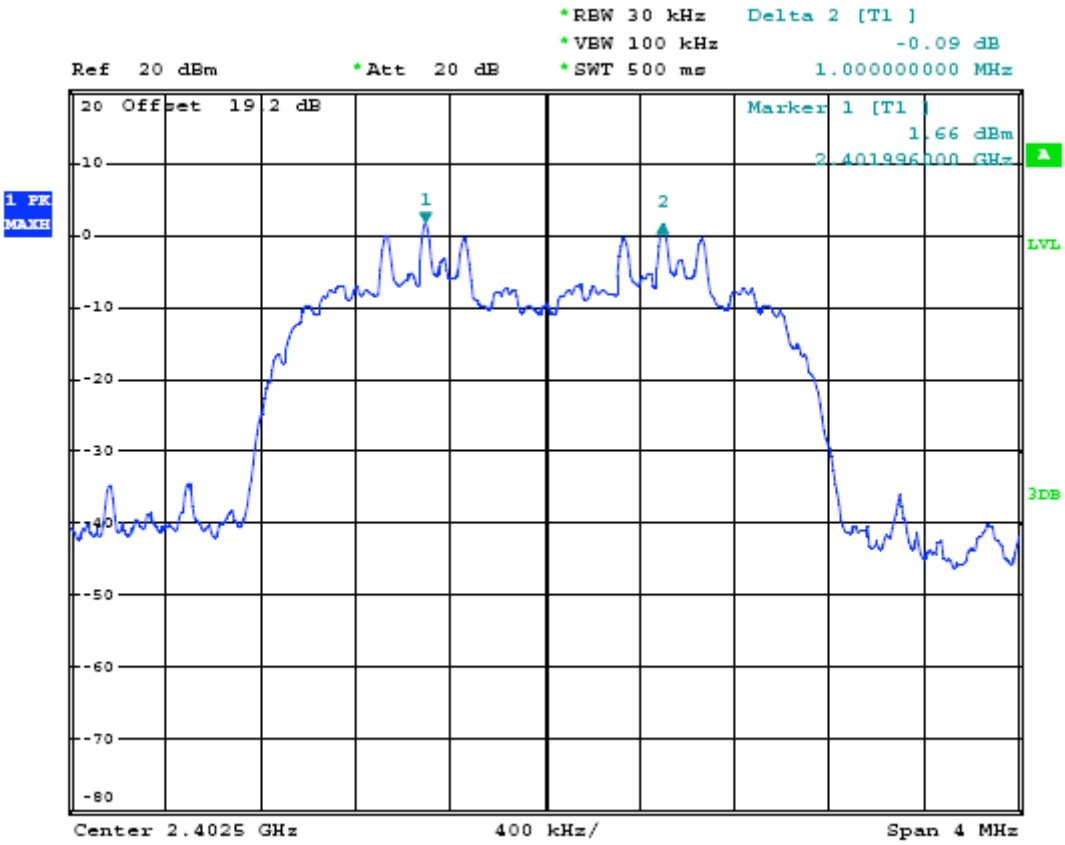


TEST PLOT FOR FREQUENCY SEPARATION -CHANNEL77-78(2Mbps)

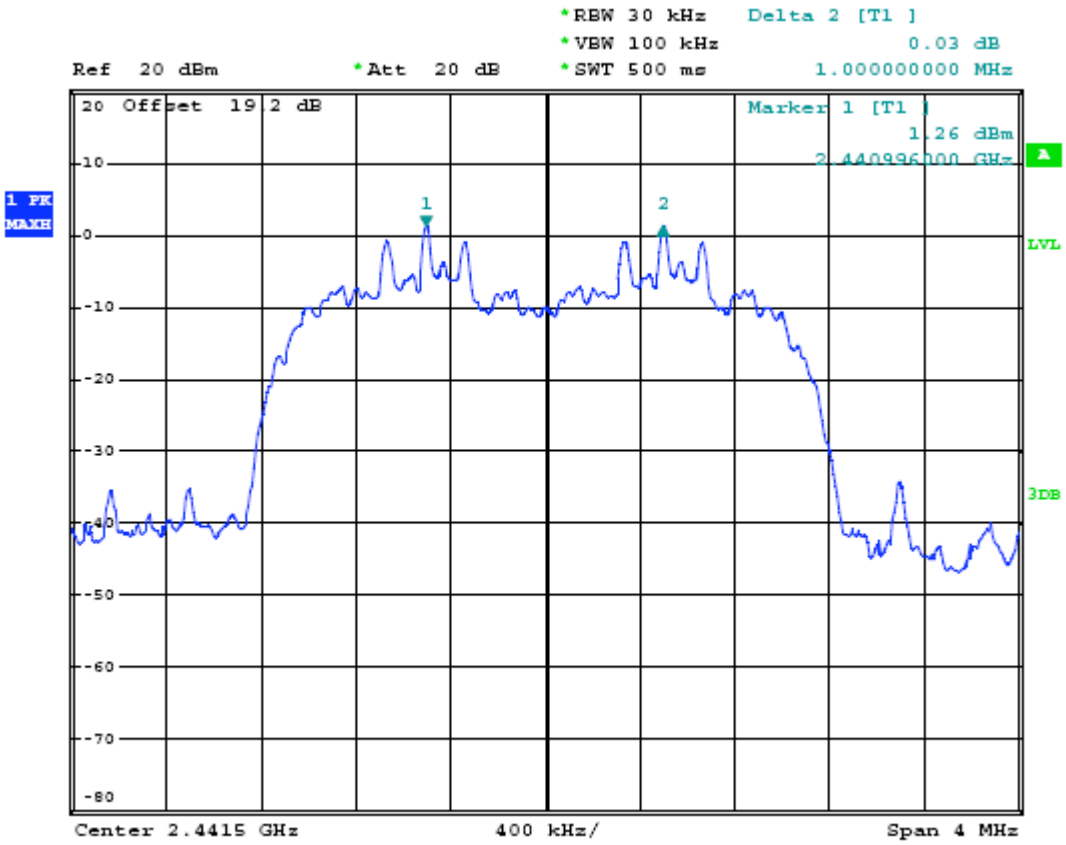


BT EDR (3Mbps)

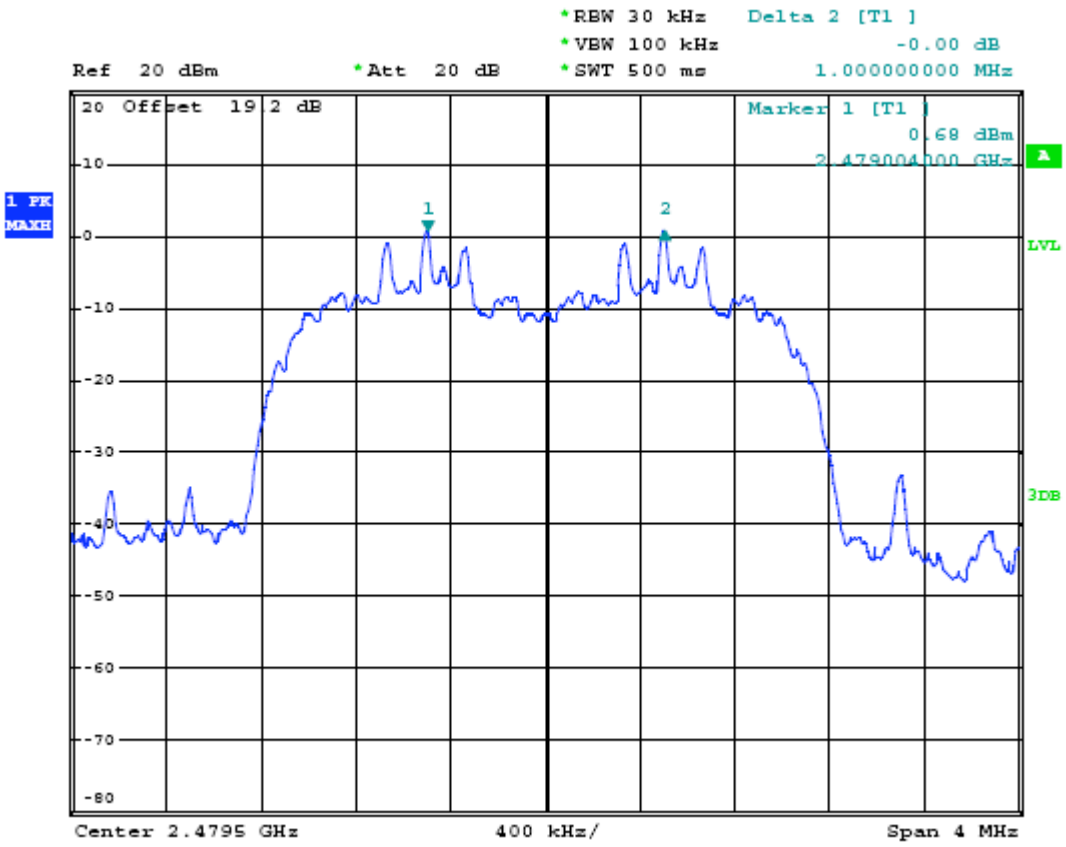
TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL0-1(3Mbps)



TEST PLOT FOR FREQUENCY SEPARATION –CHANNEL39-40(3Mbps)



TEST PLOT FOR FREQUENCY SEPARATION -CHANNEL77-78(3Mbps)



APPENDIX I
PHOTOGRAPHS OF THE EUT

TOP VIEW OF SAMPLE

OPEN VIEW OF SAMPLE

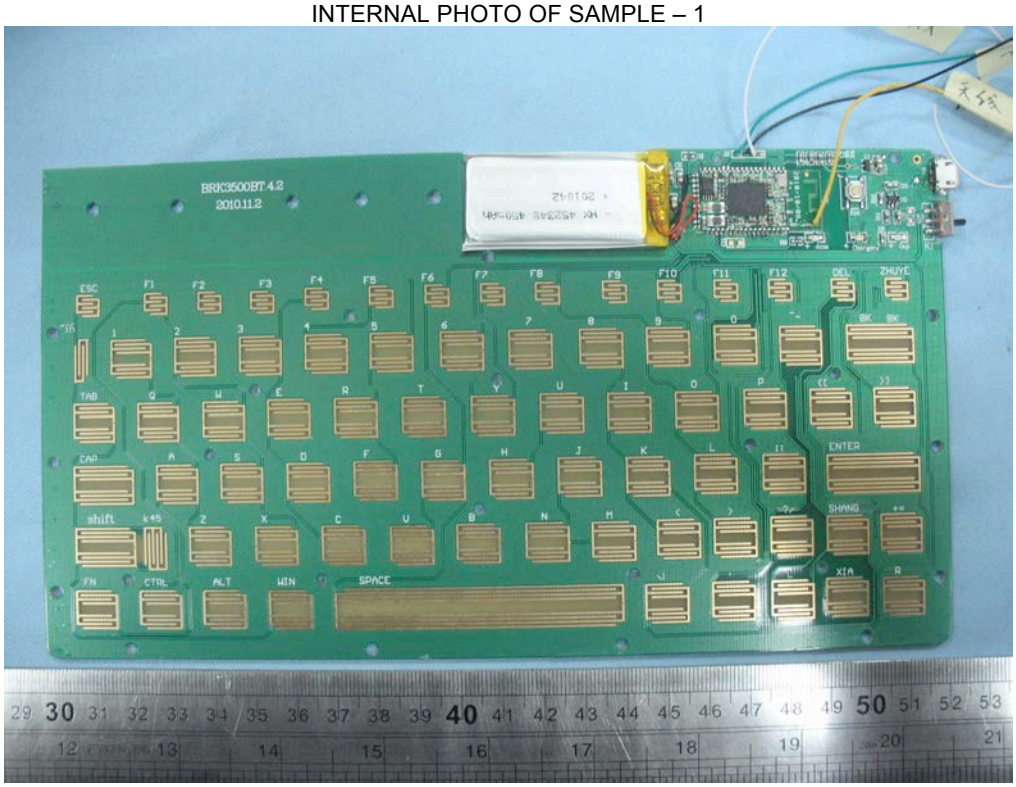
LEFT VIEW OF SAMPLE

RIGHT VIEW OF SAMPLE

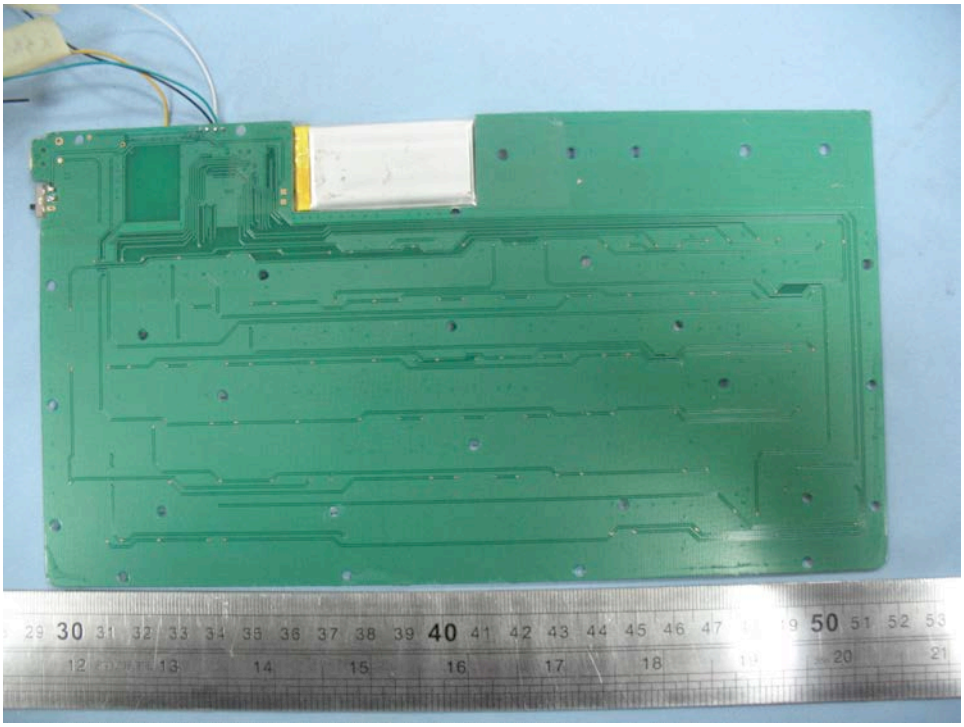
FRONT VIEW OF SAMPLE

BACK VIEW OF SAMPLE

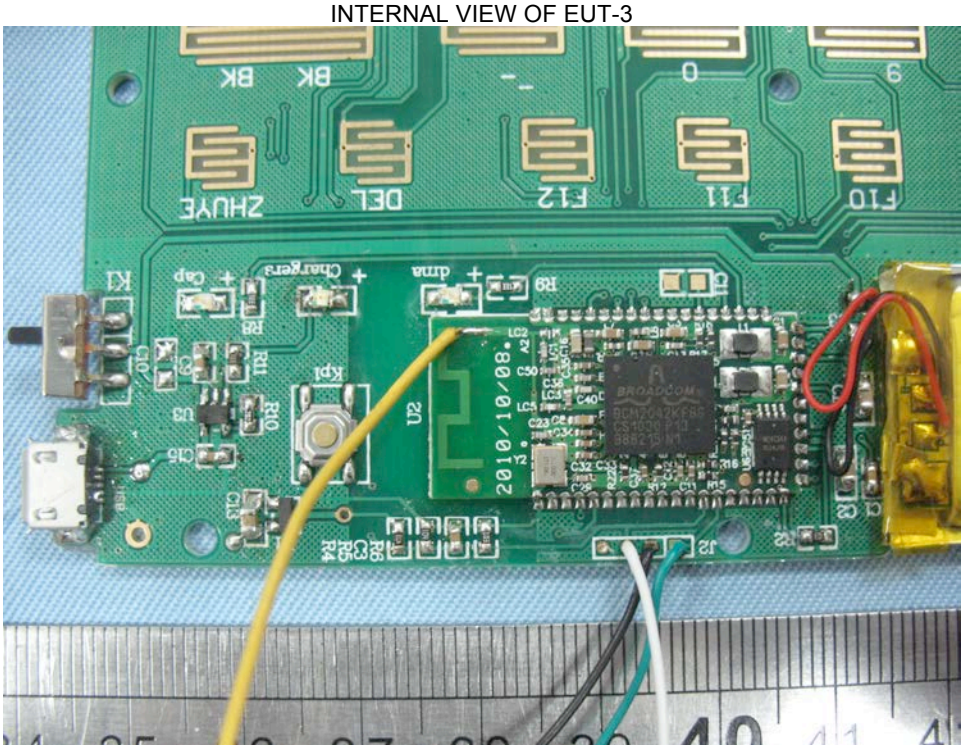
INTERNAL PHOTO OF SAMPLE – 1



INTERNAL PHOTO OF SAMPLE – 2



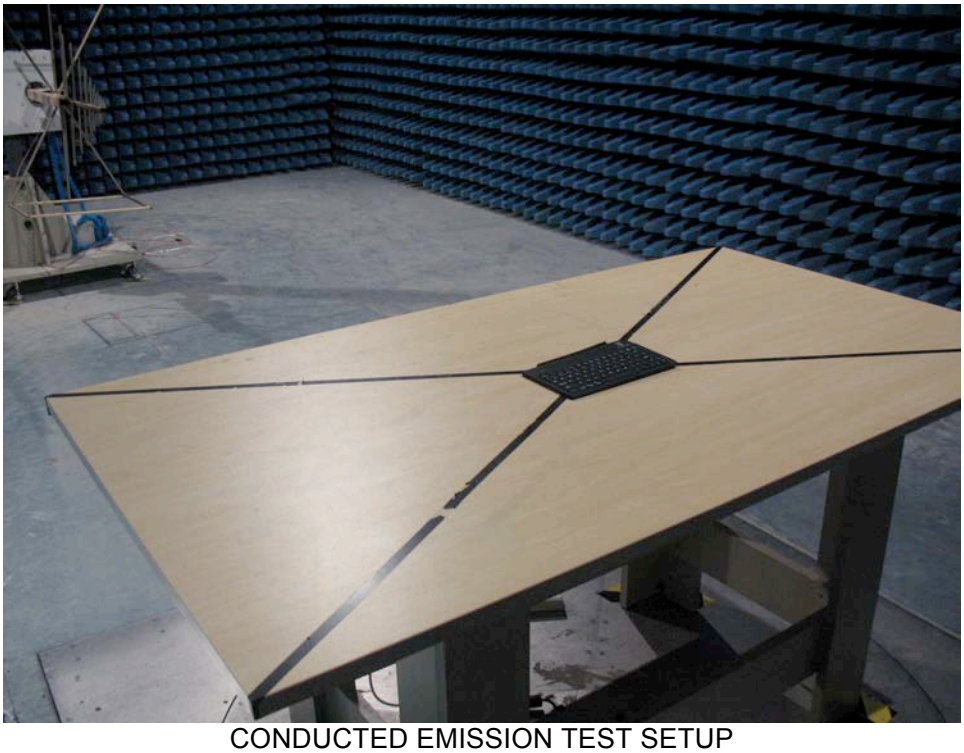
INTERNAL VIEW OF EUT-3



PPENDIX II

PHOTOGRAPHS OF THE TEST SETUP

RADIATED EMISSION TEST SETUP



CONDUCTED EMISSION TEST SETUP

----END OF REPORT----