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FCC PART 15 SUBPART C TEST REPORT

FCC Part 15.247

Report Reference No. ..... :	**CTL1309121433-WB**
Compiled by (position+printed name+signature). :	File administrators Jacky Chen
Name of the organization performing the tests (position+printed name+signature). :	Test Engineer Tracy Qi
Approved by (position+printed name+signature). :	Manager Tracy Qi
Date of issue..... :	Oct. 16, 2013
Representative Laboratory Name :	**Shenzhen CTL Electromagnetic Technology Co., Ltd.**
Address ..... :	Floor 1-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, China 518055
Test Firm ..... :	**Bontek Compliance Testing Laboratory Ltd**
Address ..... :	1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China
Applicant's name..... :	**Multilaser Industrial S/A**
Address ..... :	Av. Brigadeiro Faria Lima, 1811 - 15andar - Jardim Paulistano, Brazil
Test specification:	
Standard..... :	FCC Part 15.247: Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
Master TRF..... :	Dated 2011-01

Test item description..... :	**3G WCDMA+GSM Smart Phone**
FCC ID……..:	**2AAVQORION**
Trade Mark ..... :	Multilaser
Model/Type reference ..... :	Orion, Z600, Z606
GSM/WCDMA	
Transmit ..... :	2G:GSM 850: 824~849MHz, PCS 1900: 1850~1910MHz 3G: WCDMA Band V: 824~849MHz
Receive ..... :	2G:GSM 850: 869~894MHz, PCS 1900: 1930~1990MHz 3G: WCDMA Band V: 869~894MHz
Release Version ..... :	2G:R99 3G:UMTS FDD: Rel-7

Type of modulation	:	2G: GMSK for GSM/GPRS/EDGE
		3G: QPSK
GPRS Type	:	Class B
GPRS Class	:	Class 12
GPS		
work frequency	:	1575.42MHz
Type of modulation	:	BPSK
Bluetooth		
Work frequency	:	2402~2480MHz
Version	:	V2.1+EDR
Type of modulation	:	FHSS
Data Rate	:	1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps(8DPSK)
Wi-Fi		
Work frequency	:	802.11b/g: 2412~2462MHz
Type of modulation	:	802.11b DSSS, 802.11g: OFDM
Data Rate	:	802.11b: 1/2/5.5/11 Mbps
		802.11g: 6/9/12/18/24/36/48/54 Mbps
Antenna Gain	:	0.5 dBi for GSM850 and WCDMA Band V
		0.5 dBi for PCS1900 and WCDMA Band II
		1.0 dBi for Bluetooth and Wi-Fi
Antenna type	:	Internal
IMEI1	:	359020050080816
IMEI2	:	359020050080824
Result	:	**Positive**

TEST REPORT

Test Report No. :	CTL1309121433-WB	Oct. 16, 2013 Date of issue

Equipment under Test	:	3G WCDMA+GSM Smart Phone
Model /Type	:	Orion
Listed Models	:	Z600, Z606
Difference Description	:	Only the color and model's name are different.
Applicant	:	**Multilaser Industrial S/A**
Address	:	Av. Brigadeiro Faria Lima, 1811 - 15andar - Jardim Paulistano, Brazil
Manufacturer	:	**Shenzhen ZIVI Communication & Electronics Co., Ltd**
Address	:	Room 8A-B, Konka R&D Building, No.28, Keji 12th Road South, Nanshan District, Shenzhen, China

Test Result according to the standards on page 5:	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Contents

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1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

ANSI C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices

FCC Public Notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

ANSI C63.4-2003

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. The public notice DA 00-705 for frequency hopping spread spectrum systems shall be performed also.

2. SUMMARY

2.1. General Remarks

Date of receipt of test sample	:	Sept. 18, 2013
Testing commenced on	:	Sept. 18, 2013
Testing concluded on	:	Oct. 15, 2013

2.2. Equipment Under Test

Power supply system utilised

Power supply voltage	:	●	120V / 60 Hz	○	115V / 60Hz
		○	12 V DC	○	24 V DC
		●	Other (specified in blank below)		

DC 3.7V from battery

2.3. Short description of the Equipment under Test (EUT)

3G WCDMA+GSM Smart Phone with UMTS/GSM, Bluetooth, GPS and wifi function.
For more details, refer to the user's manual of the EUT.
Serial number: Prototype

2.4. EUT operation mode

The EUT has been tested under typical operating condition. The Applicant provides communication tools software to control the EUT for staying in continuous transmitting and receiving mode for testing. There are 79 channels of EUT, and the test carried out at the lowest channel, middle channel and highest channel .

Frequency Range:	2400-2483.5MHz
Channel number:	79 channels
Modulation type:	GFSK, π/4-DQPSK, 8-DPSK
Antenna:	internal

Test Channel	Test Frequency
Low Channel	2402 MHz
Middle Channel	2441 MHz
High Channel	2480 MHz

2.5. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

○ - supplied by the manufacturer
● - supplied by the lab

●	Notebook PC	Manufacturer :	DELL
		Model No. :	PP18L

2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

Table 2-1 Equipment Used in Tested System

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	DELL	PP18L	HF974A03	E2KWM3945ABG

2.7. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: 2AAVQORION** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.8. Modifications

No modifications were implemented to meet testing criteria.

2.9. NOTE

1. The EUT is a an Bluetooth Standard type device,The functions of the EUT listed as below:

	Test Standards	Reference Report
Radio	FCC Part 15 Subpart C (Section15.247)	CTL1309121433-WB
RF Exposure	FCC Per 47 CFR 2.1093	CTL1309121433-WB

2. The frequency bands used in this EUT are listed as follows:

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
Bluetooth	√	—	—	—

3. The EUT provides one completed transmitter and receiver.

Modulation Mode	TX Function
Bluetooth	1TX

2.10. Frequency Hopping System Requirements

Standard Applicable

According to FCC Part 15.247(a)(1), The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

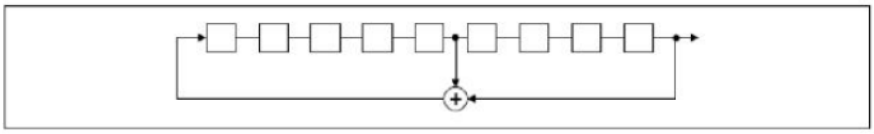
(g) Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. However, the system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this section should the transmitter be presented with a continuous data (or information) stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its transmissions over the minimum number of hopping channels specified in this section.

(h) The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

EUT Pseudorandom Frequency Hopping Sequence

The pseudorandom sequence may be generated in a nine-stage shift register whose 5^{th} and 9^{th} stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage.The sequence begins with the first ONE of 9 consecutive ONEs; i.e.the shift register is initialized with nine ones.

Number of shift register stages: 9
Length of pseudo-random sequence: 29-1=511bits
Longest sequence of zeros: 8(non-inverted signal)



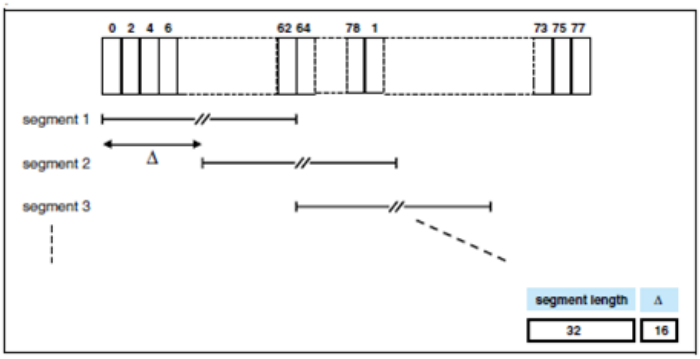
Linear Feedback Shift Register for Generation of the PRBS sequence

The frequencies allocated for the Bluetooth Module is F(MHz)=2402+1*n (0<=n<=78). The lowest, middle, highest channel numbers of the Bluetooth Module used and tested in this report are separately 0 (2402MHz), 39 (2441MHz) and 78 (2480MHz).

Each frequency used equally on the average by each transmitter.
The system receiver have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

The selection scheme chooses a segment of 32 hop frequencies spanning about 64 MHz and visits these hops in a pseudo-random order. Next, a different 32-hop segment is chosen, etc. In the page, master page response, slave page response, page scan, inquiry, inquiry response and inquiry scan hopping sequences, the same 32-hop segment is used all the time (the segment is selected by the address; different devices will have different paging segments).

When the basic channel hopping sequence is selected, the output constitutes a pseudo-random sequence that slides through the 79 hops.



Hop selection scheme in CONNECTION state.

Channels list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

The pseudorandom frequency hoping sequence sample:

42,41,66,4,78,59,55,48,54,46,52,78,41,26,24,34,39,32,51,18,25,9,12,73,70,58,54,6,66,4,32,67,60,16,3,78,76, 47,45,47,49,14,34, etc.

Frequency Hopping System

This transmitter device is frequency hopping device, and complies with FCC part 15.247 rule.

This device uses Bluetooth radio which operates in 2400-2483.5 MHz band. Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 channels (1 MHz separation; from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz. The transmitter switches hop frequencies 1,600 times per second to assure a high degree of data security. All Bluetooth devices participating in a given piconet are synchronized to the frequency-hopping channel for the piconet. The frequency hopping sequence is determined by the master's device address and the phase of the hopping sequence (the frequency to hop at a specific time) is determined by the master's internal clock. Therefore, all slaves in a piconet must know the master's device address and must synchronize their clocks with the master's clock.

Adaptive Frequency Hopping (AFH) was introduced in the Bluetooth specification to provide an effective way for a Bluetooth radio to counteract normal interference. AFH identifies "bad" channels, where either other wireless devices are interfering with the Bluetooth signal or the Bluetooth signal is interfering with another device. The AFH-enabled Bluetooth device will then communicate with other devices within its piconet to share details of any identified bad channels. The devices will then switch to alternative available "good" channels, away from the areas of interference, thus having no impact on the bandwidth used.

This device was tested with a bluetooth system receiver to check that the device maintained hopping synchronization, and the device complied with these requirements for DA 00-705 and FCC Part 15.247 rule.

2.11. Mode of Operation

CTL has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmitter-1Mbps(GFSK_DH5) DH5
Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5) 2DH5
Mode 3: Transmitter-3Mbps(8DPSK_DH5) 3DH5

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Bontek Compliance Testing Laboratory Ltd
1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East Road, Nanshan, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

IC Registration No.: 7631A

The 3m alternate test site of Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 7631A on March, 2011.

FCC-Registration No.: 338263

Bontek Compliance Testing Laboratory Ltd EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 338263, March 24, 2008.

3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the Bontek Compliance Testing Laboratory Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Bontek laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10dB	(1)
Radiated Emission	Above 1GHz	4.32dB	(1)
Conducted Disturbance	0.15~30MHz	3.20dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.5. Test Description

FCC PART 15 Subpart C		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)	20dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.247(a)(1)	Frequency Separation	PASS
FCC Part 15.247(a)(1)(iii)	Number of hopping frequency	PASS
FCC Part 15.247(a)(1)(iii)	Time of Occupancy	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

Remark: The measurement uncertainty is not included in the test result.

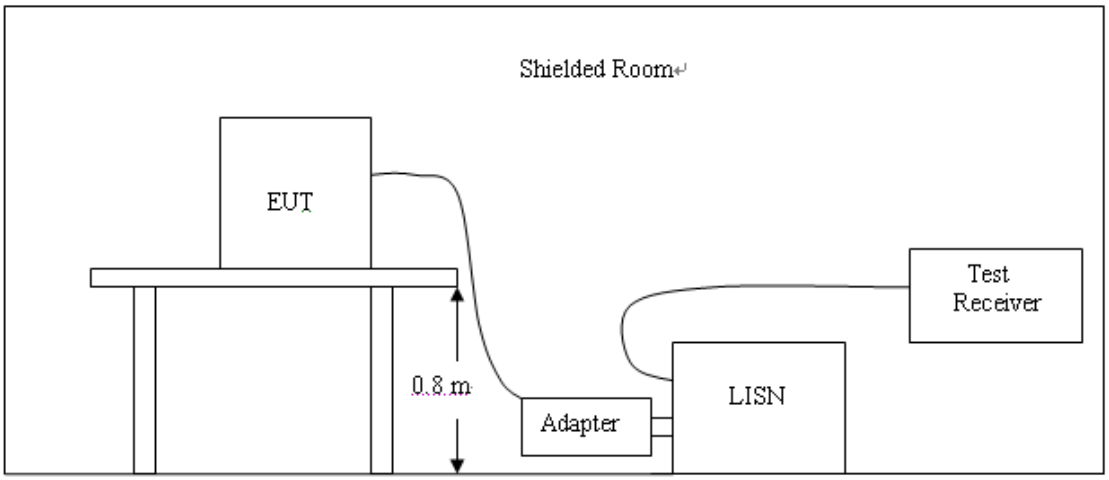
3.6. Equipments Used during the Test

Item	Test Equipment	Manufacturer	Model No.	Last Cal.	Due. Date
1	EMI Test Receiver	ROHDE & SCHWARZ	ESCI	2013/04/14	2014/04/13
2	Radio Communication Tester	ROHDE & SCHWARZ	CMU200	2013/04/14	2014/04/13
3	Dual Directional Coupler	Agilent	778D	2013/04/14	2014/04/13
4	10dB attenuator	SCHWARZBECK	MTAIMP-136	2013/04/14	2014/04/13
5	Tunable Bandreject filter	K&L	3TNF-800	2013/04/14	2014/04/13
6	Tunable Bandreject filter	K&L	5TNF-1700	2013/04/14	2014/04/13
7	High-Pass Filter	K&L	9SH10-2700/X12750-O/O	2013/04/14	2014/04/13
8	High-Pass Filter	K&L	41H10-1375/U12750-O/O	2013/04/14	2014/04/13
9	Coaxial Cable	Huber+Suhner	AC4-RF-H	2013/04/14	2014/04/13
10	AC Power Supply	IDRC	CF-500TP	2013/04/14	2014/04/13
11	DC Power Supply	IDRC	CD-035-020PR	2013/04/14	2014/04/13
12	RF Current Probe	FCC	F-33-4	2013/04/14	2014/04/13
13	Temperature /Humidity Meter	zhicheng	ZC1-2	2013/04/14	2014/04/13
14	MICROWAVE AMPLIFIER	HP	8349B	2013/04/14	2014/04/13
15	Amplifier	HP	8447D	2013/04/14	2014/04/13
16	SIGNAL GENERATOR	HP	8647A	2013/04/14	2014/04/13
17	Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2013/04/14	2014/04/13
18	Horn Antenna	Schwarzbeck	BBHA9120A	2013/04/14	2014/04/13
19	EMI Test Receiver	R&S	ESPI	2013/04/14	2014/04/13
20	Loop Antenna	ZHINAN	ZN30900A	2013/04/14	2014/04/13
21	Horn Antenna	Schwarzbeck	BBHA9120D	2013/04/14	2014/04/13
22	Horn Antenna	Schwarzbeck	BBHA9170	2013/04/14	2014/04/13
23	Spectrum Analyzer	Agilent	E4446A	2013/04/14	2014/04/13
24	Wideband Peak Power Meter	Anritsu	ML2495A	2013/04/14	2014/04/13
25	Power Sensor	Anritsu	MA2411B	2013/04/14	2014/04/13

4. TEST CONDITIONS AND RESULTS

4.1. AC Power Conducted Emission

TEST CONFIGURATION



TEST 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 C63.10-2009.
2 Support equipment, if needed, was placed as per ANSI C63.10-2009
3 All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10-2009
4 The EUT received DC5V power from the adapter, the adapter received AC120V/60Hz power 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.
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

AC Power Conducted Emission Limit

For intentional device, according to § 15.207(a) AC Power Conducted Emission Limits is as following：

Frequency (MHz)	Maximum RF Line Voltage (dBμV)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave.
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

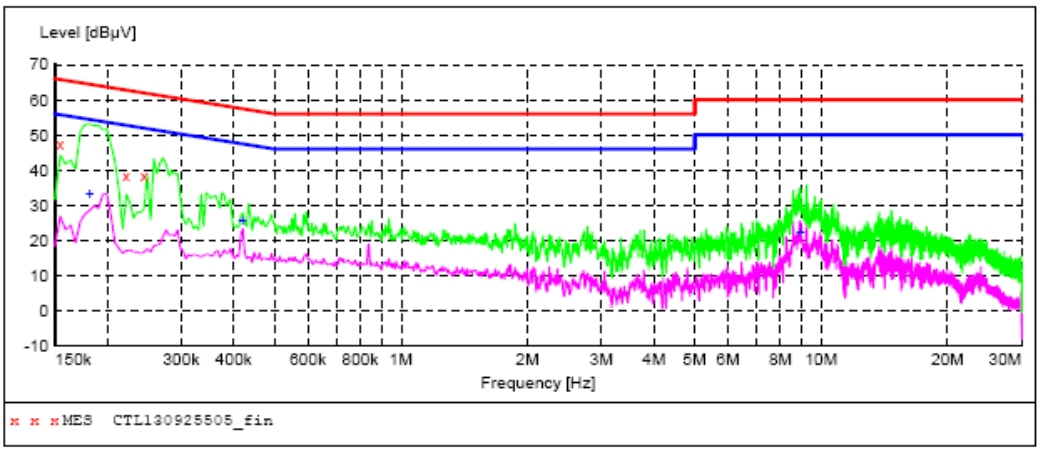
* Decreasing linearly with the logarithm of the frequency

TEST RESULTS

The 1Mbps (GFSK Modulation) is the worst case as results in the report based on the Pre-test for all modulation models.

Mode 1:

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL130925505_fin"

9/25/2013 10:49AM

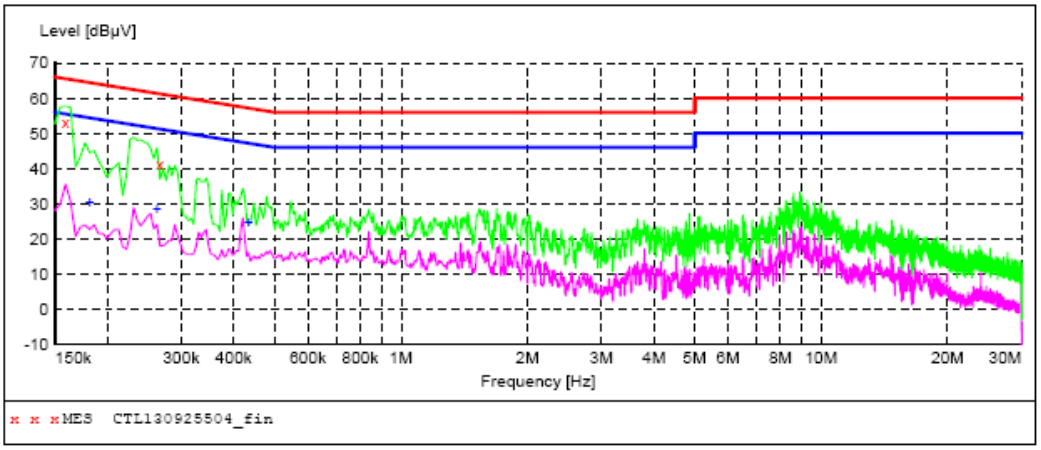
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	47.40	9.8	66	18.4	QP	N	GND
0.222000	38.20	9.8	63	24.5	QP	N	GND
0.244500	38.30	9.8	62	23.6	QP	N	GND

MEASUREMENT RESULT: "CTL130925505_fin2"

9/25/2013 10:49AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.181500	33.00	9.8	54	21.4	AV	N	GND
0.420000	25.70	9.8	47	21.7	AV	N	GND
8.925000	22.40	10.1	50	27.6	AV	N	GND

SCAN TABLE: "Voltage (9K-30M)FIN"
Short Description: 150K-30M Voltage



MEASUREMENT RESULT: "CTL130925504_fin"

9/25/2013 10:46AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.159000	52.90	9.8	66	12.6	QP	L1	GND
0.267000	41.30	9.8	61	19.9	QP	L1	GND

MEASUREMENT RESULT: "CTL130925504_fin2"

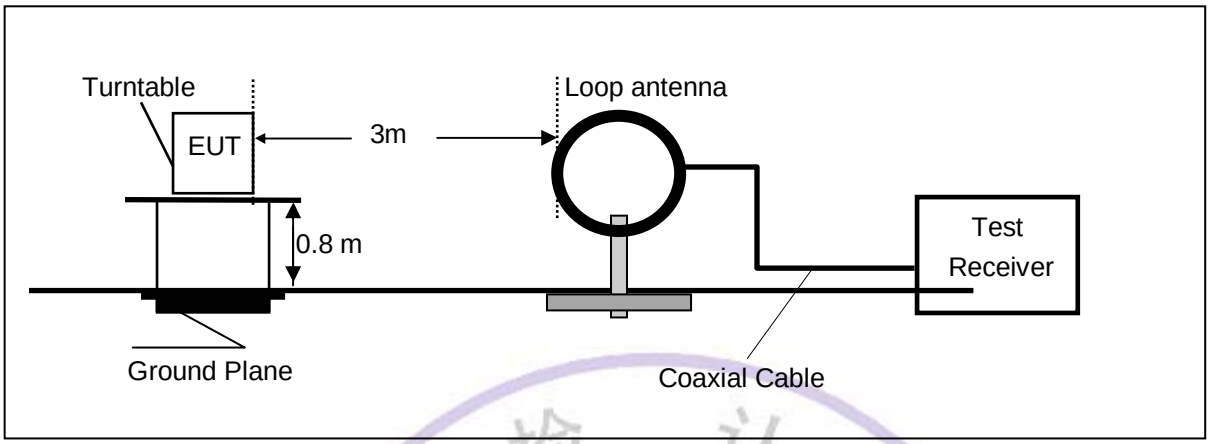
9/25/2013 10:46AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.181500	30.50	9.8	54	23.9	AV	L1	GND
0.262500	28.30	9.8	51	23.1	AV	L1	GND
0.433500	24.50	9.8	47	22.7	AV	L1	GND

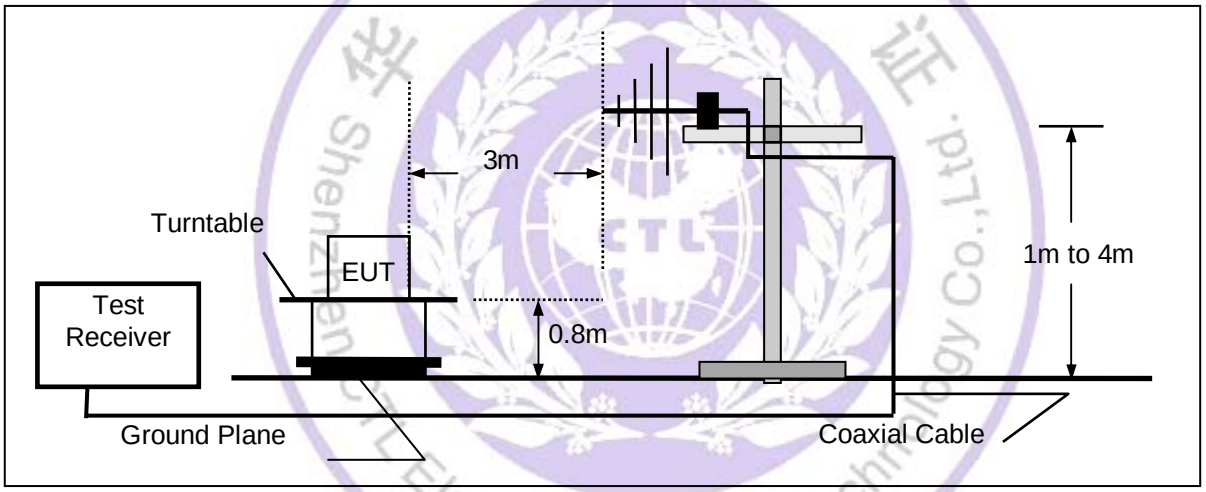
4.2. Radiated Emission

TEST CONFIGURATION

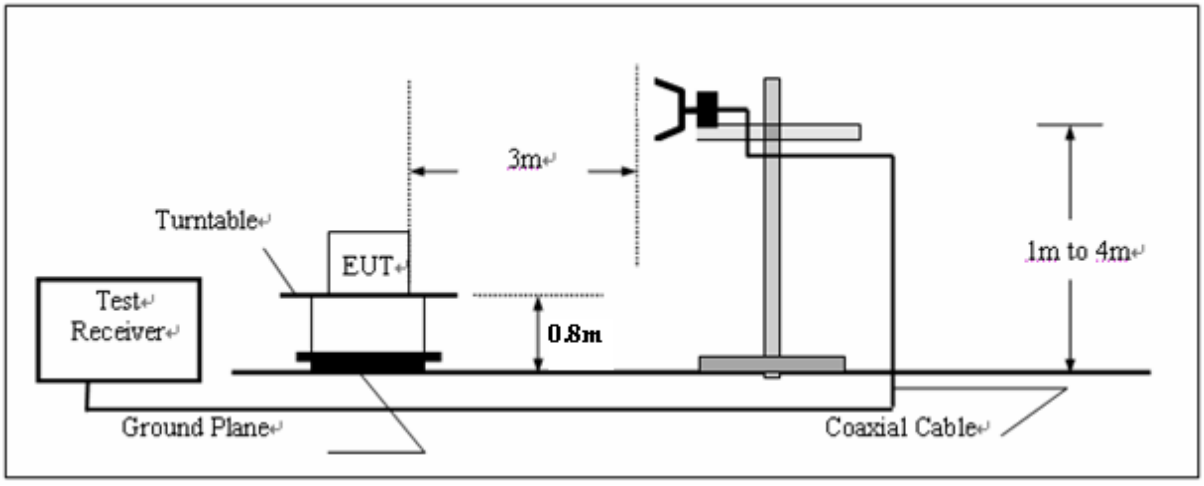
Radiated Emission Test Set-Up
Frequency range 9KHz – 30MHz



Frequency range 30MHz – 1000MHz



Frequency range above 1GHz-25GHz



TEST PROCEDURE

1 The EUT was placed on a turn table which is 0.8m above ground plane.
2 Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0℃ to 360℃ to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.
5. The fundamental frequency is 2400-2483.5MHz, So the radiation emissions frequency range were tested from 9KHz to 25GHz.

Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL – AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency (MHz)	FS (dBμV/m)	RA (dBμV/m)	AF (dB)	CL (dB)	AG (dB)	Transd (dB)
300.00	40	58.1	12.2	1.6	31.90	-18.1

Transd=AF +CL-AG

RADIATION LIMIT

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission from intentional radiators at a distance of 3 meters shall not exceed the following table. According to § 15.247(d), in any 100kHz bandwidth outside the frequency band in which the EUT is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the100kHz bandwidth within the band that contains the highest level of desired power.

Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST RESULTS

Mode 1: Transmitter-1Mbps(GFSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	2402.1	62.9	31.2	94.1	Fundamental	/	PK
	V	363.1	5.8	16.4	22.2	46	-23.8	QP
	V	498.0	5.9	19.3	25.2	46	-20.8	QP
	H	3252.5	56.1	-16.0	40.1	54(Note)	-13.9	PK
	H	4884.5	56.4	-11.7	44.7	54(Note)	-9.3	PK
	H	7206.0	48.5	-3.5	45.0	54(Note)	-9.0	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
39	H	2440.9	61.4	31.2	92.6	Fundamental	/	PK
	V	468.2	6.2	18.9	25.1	46	-20.9	QP
	V	547.6	5.0	20.6	25.6	46	-20.4	QP
	H	3252.5	57.1	-16.0	41.1	54(Note)	-12.9	PK
	H	4884.5	56.3	-11.7	44.6	54(Note)	-9.4	PK
	H	7323.0	46.5	-3.0	43.5	54(Note)	-10.5	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
78	H	2480.0	60.7	31.2	91.9	Fundamental	/	PK
	V	302.9	5.1	14.7	19.8	46	-26.2	QP
	V	454.0	5.9	18.4	24.3	46	-21.7	QP
	H	3303.5	56.2	-16.2	40.0	54(Note)	-14.0	PK
	H	4961.0	55.2	-11.4	43.8	54(Note)	-10.2	PK
	H	7440.0	47.4	-2.6	44.8	54(Note)	-9.2	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	2402.1	64.1	31.2	95.3	Fundamental	/	PK
	V	363.1	5.3	16.4	21.7	46	-24.3	QP
	V	498.0	5.4	19.3	24.7	46	-21.3	QP
	H	3201.5	56.6	-15.9	40.7	54(Note)	-13.3	PK
	H	4808.0	56.2	-11.9	44.3	54(Note)	-9.7	PK
	H	7206.0	48.8	-3.5	45.3	54(Note)	-8.7	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
39	H	2441.0	62.8	31.2	94.0	Fundamental	/	PK
	V	468.2	6.3	18.9	25.2	46	-20.8	QP
	V	614.4	6.5	21.2	27.7	46	-18.3	QP
	H	3252.5	57.9	-16.0	41.9	54(Note)	-12.1	PK
	H	4884.5	56.8	-11.7	45.1	54(Note)	-8.9	PK
	H	7323.0	47.5	-3.0	44.5	54(Note)	-9.5	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
78	H	2480.0	61.9	31.2	93.1	Fundamental	/	PK
	V	320.2	4.4	15.3	19.7	46	-26.3	QP
	V	454.0	5.8	18.4	24.2	46	-21.8	QP
	H	3303.5	55.8	-16.2	39.6	54(Note)	-14.4	PK
	H	4961.0	56.3	-11.4	44.9	54(Note)	-9.1	PK
	H	7440.0	48.4	-2.6	45.8	54(Note)	-8.2	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK

Note: 1. Measure Level = Reading Level + Factor.

2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 3: Transmitter-3Mbps(8DPSK_DH5)

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
0	H	2401.9	64.2	31.2	95.4	Fundamental	/	PK
	V	571.5	6.8	20.6	27.4	46	-18.6	QP
	V	747.8	3.7	22.5	26.2	46	-19.8	QP
	H	3201.5	56.7	-15.9	40.8	54(Note)	-13.2	PK
	H	4808.0	57.4	-11.9	45.5	54(Note)	-8.5	PK
	H	7206.0	48.0	-3.5	44.5	54(Note)	-9.5	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
39	H	2441.0	63.7	31.2	94.9	Fundamental	/	PK
	V	614.4	6.2	21.2	27.4	46	-18.6	QP
	V	730.9	5.7	22.4	28.1	46	-17.9	QP
	H	3252.5	57.0	-16.0	41.0	54(Note)	-13.0	PK
	H	4884.5	56.9	-11.7	45.2	54(Note)	-8.8	PK
	H	7323.0	46.9	-3.0	43.9	54(Note)	-10.1	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK
78	H	2480.0	62.8	31.2	94.0	Fundamental	/	PK
	V	320.2	4.7	15.3	20.0	46	-26.0	QP
	V	548.2	5.3	20.6	25.9	46	-20.1	QP
	H	3303.5	56.8	-16.2	40.6	54(Note)	-13.4	PK
	H	4961.0	57.1	-11.4	45.7	54(Note)	-8.3	PK
	H	7440.0	48.8	-2.6	46.2	54(Note)	-7.8	PK
	H	24000.0	59.1	-8.9	50.2	54(Note)	-3.8	PK

Note: 1. Measure Level = Reading Level + Factor.

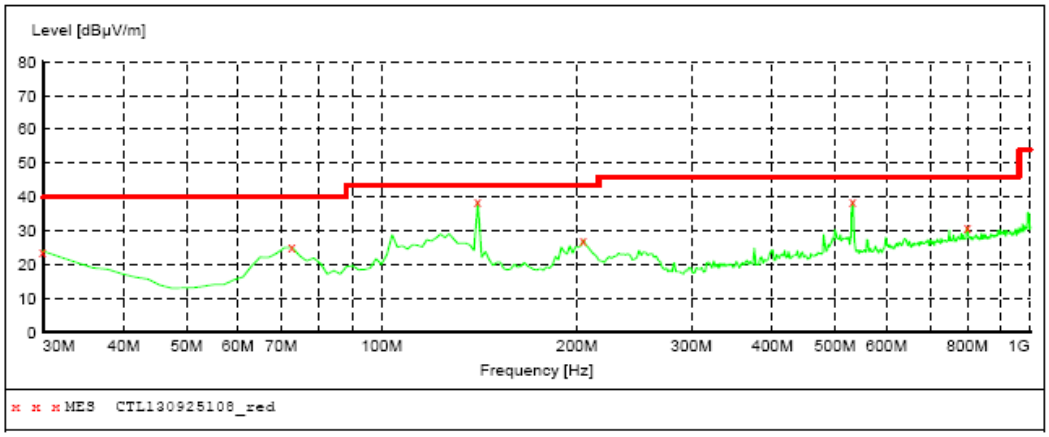
2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

The worst case of Radiated Emission below 1GHz:

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



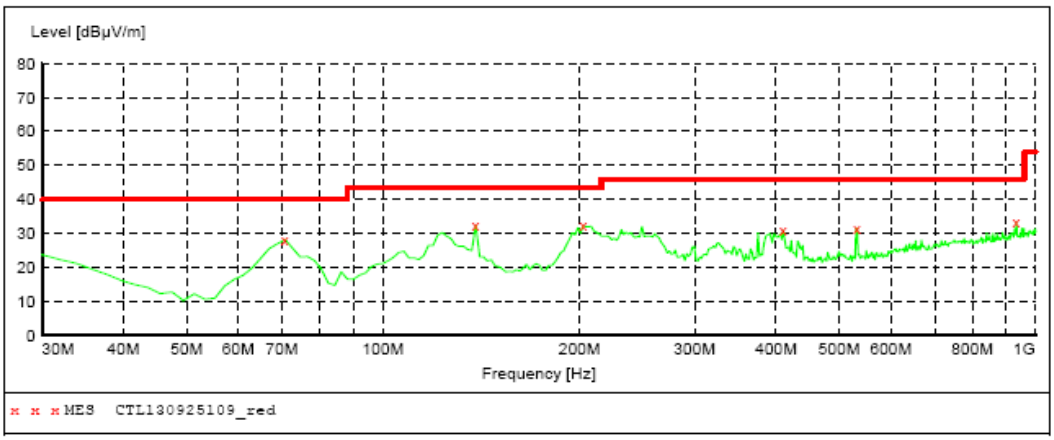
MEASUREMENT RESULT: "CTL130925108_red"

9/25/2013 11:26AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
30.000000	24.00	21.1	40.0	16.0	---	0.0	0.00	VERTICAL
72.680000	25.10	8.5	40.0	14.9	---	0.0	0.00	VERTICAL
140.580000	38.60	14.6	43.5	4.9	---	0.0	0.00	VERTICAL
204.600000	27.40	14.4	43.5	16.1	---	0.0	0.00	VERTICAL
532.460000	38.60	20.6	46.0	7.4	---	0.0	0.00	VERTICAL
800.180000	30.90	24.8	46.0	15.1	---	0.0	0.00	VERTICAL

SWEEP TABLE: "test (30M-1G)"

Short Description:			Field Strength		
Start Frequency	Stop Frequency	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	MaxPeak	300.0 ms	120 kHz	JB1



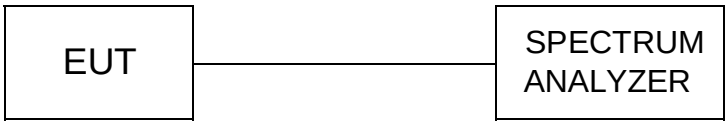
MEASUREMENT RESULT: "CTL130925109_red"

9/25/2013 11:28AM

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
70.740000	28.20	8.4	40.0	11.8	---	0.0	0.00	HORIZONTAL
138.640000	32.50	14.7	43.5	11.0	---	0.0	0.00	HORIZONTAL
202.660000	32.30	14.4	43.5	11.2	---	0.0	0.00	HORIZONTAL
410.240000	30.90	18.5	46.0	15.1	---	0.0	0.00	HORIZONTAL
532.460000	31.50	20.6	46.0	14.5	---	0.0	0.00	HORIZONTAL
934.040000	33.40	26.4	46.0	12.6	---	0.0	0.00	HORIZONTAL

4.3. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to ANSI C63.10: 2009.
Use the following spectrum analyzer settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW ＞ the 20 dB bandwidth of the emission being measured.
VBW ≧ RBW, Sweep = auto, Detector function = peak, Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don’t forget added the external attenuation and cable loss).

LIMIT

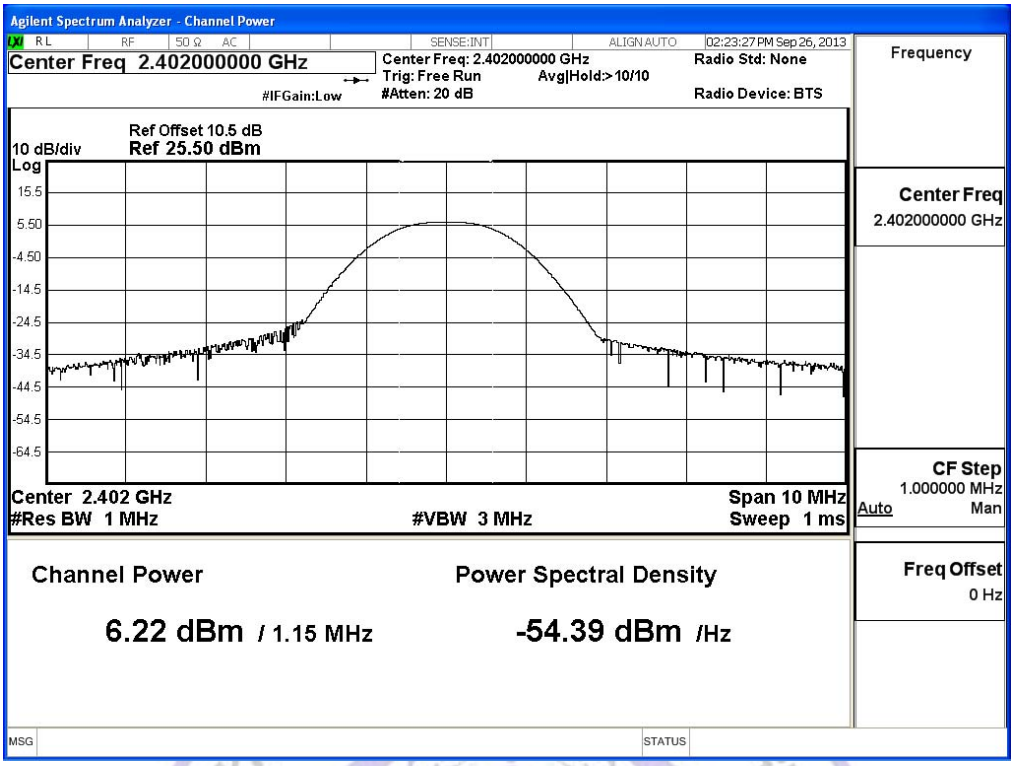
The Maximum Peak Output Power Measurement limit is 30dBm.

TEST RESULTS

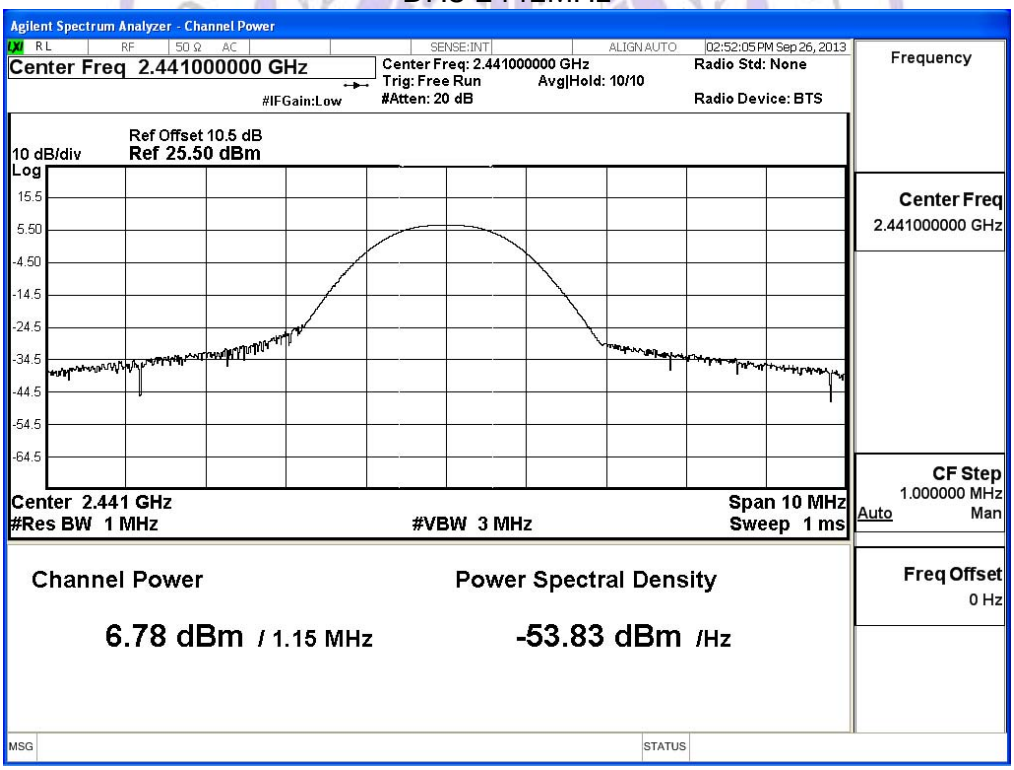
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Output
Test Mode	:	Mode 1: Transmitter-1Mbps(GFSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	6.22	30.00	Pass
39	2441	6.78	30.00	Pass
78	2480	6.80	30.00	Pass

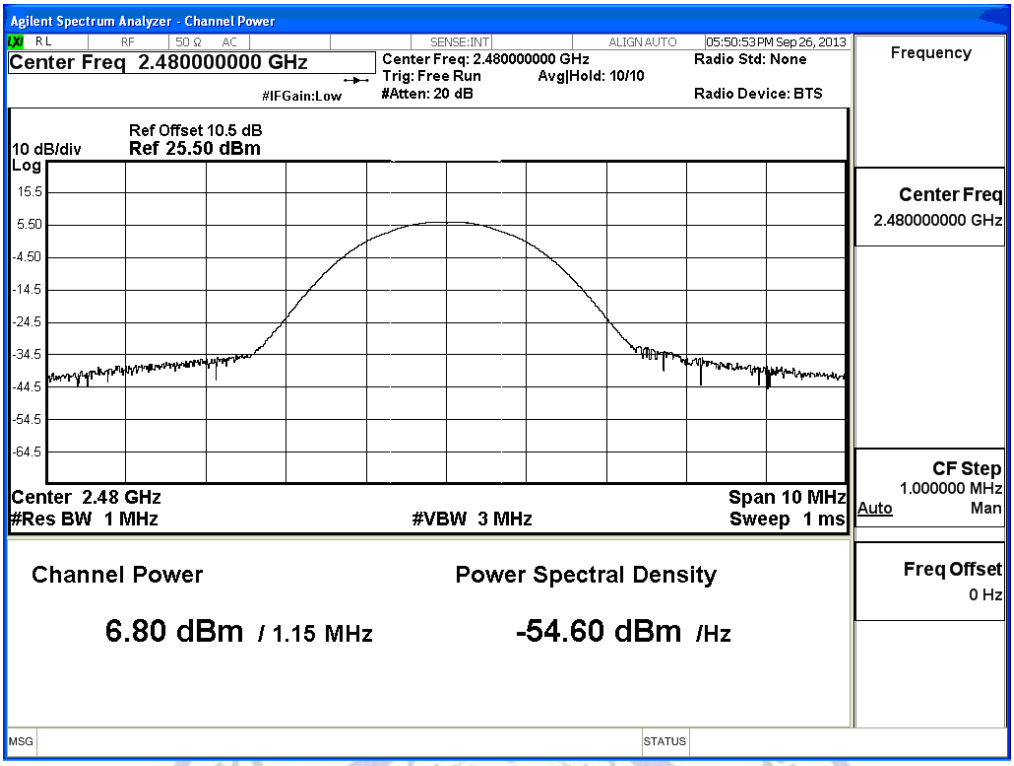
DH5 2402MHz



DH5 2441MHz



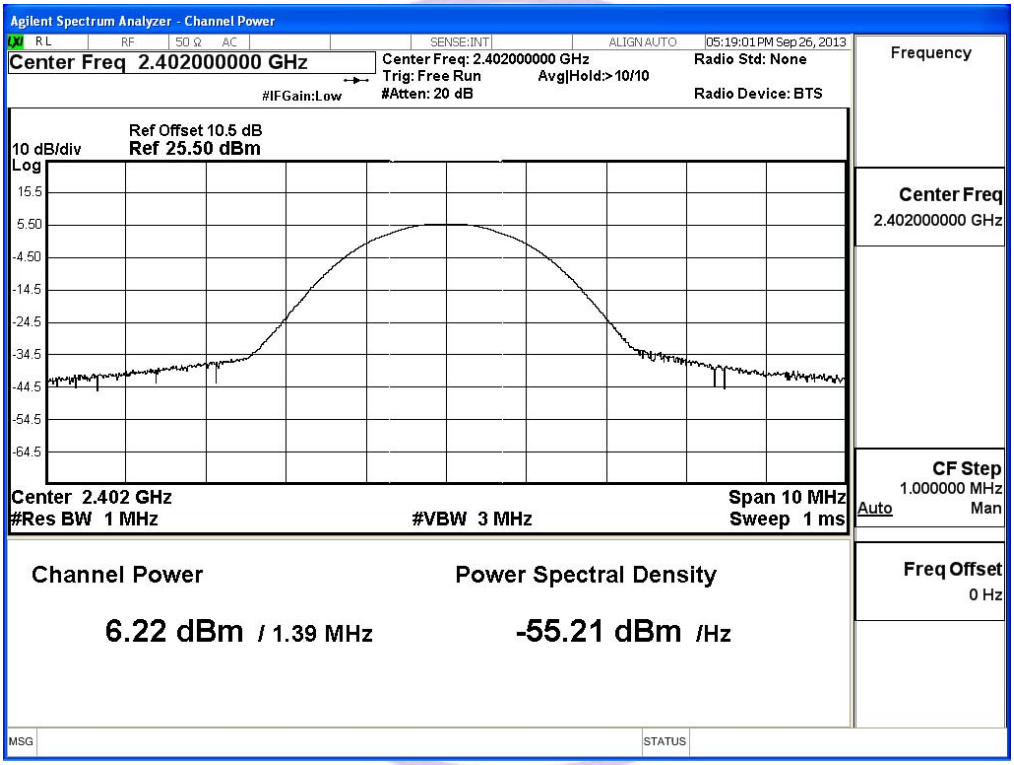
DH5 2480MHz



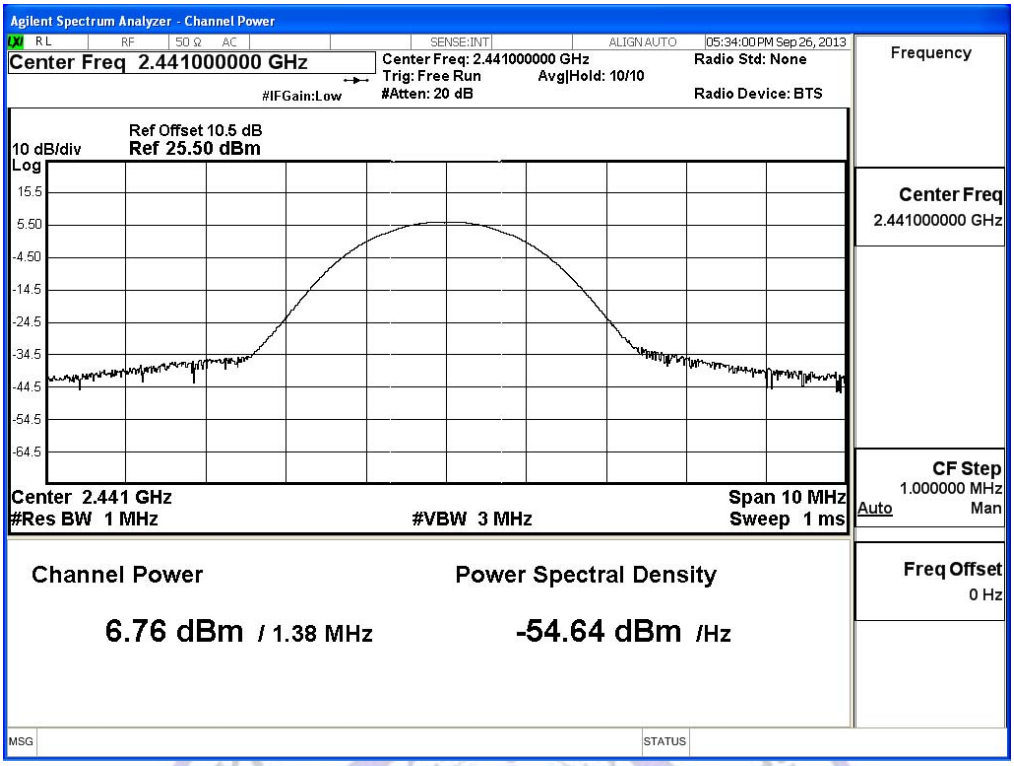
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Output
Test Mode	:	Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	6.22	30.00	Pass
39	2441	6.76	30.00	Pass
78	2480	6.80	30.00	Pass

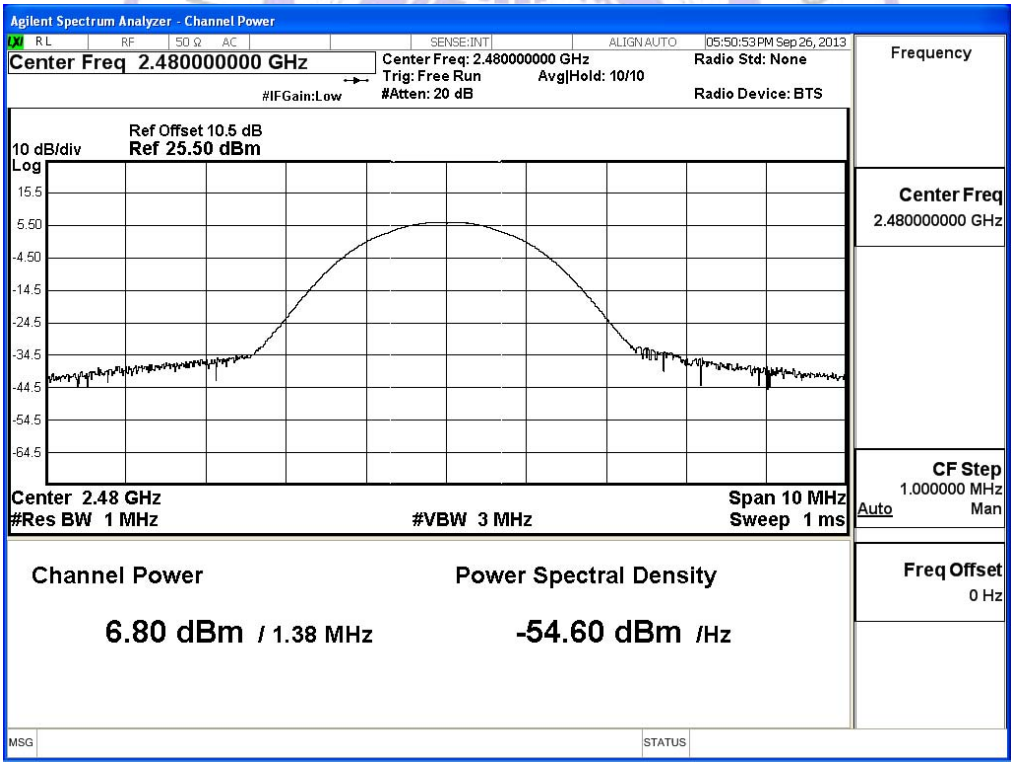
2DH5 2402MHz



2DH5 2441MHz



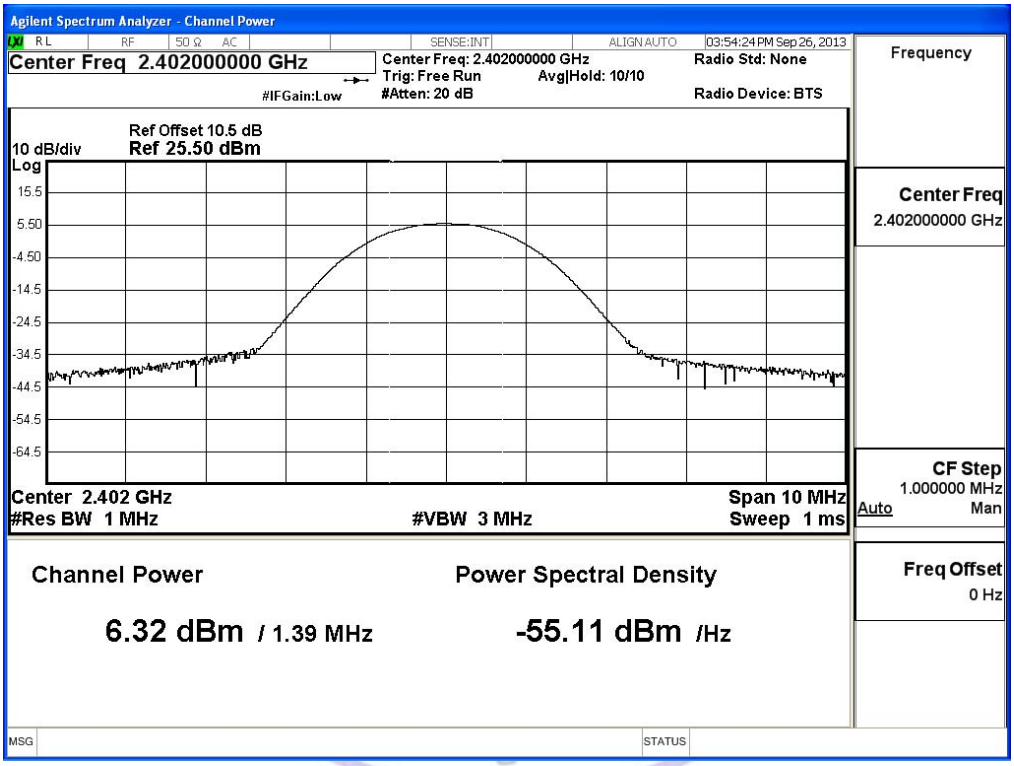
2DH5 2480MHz



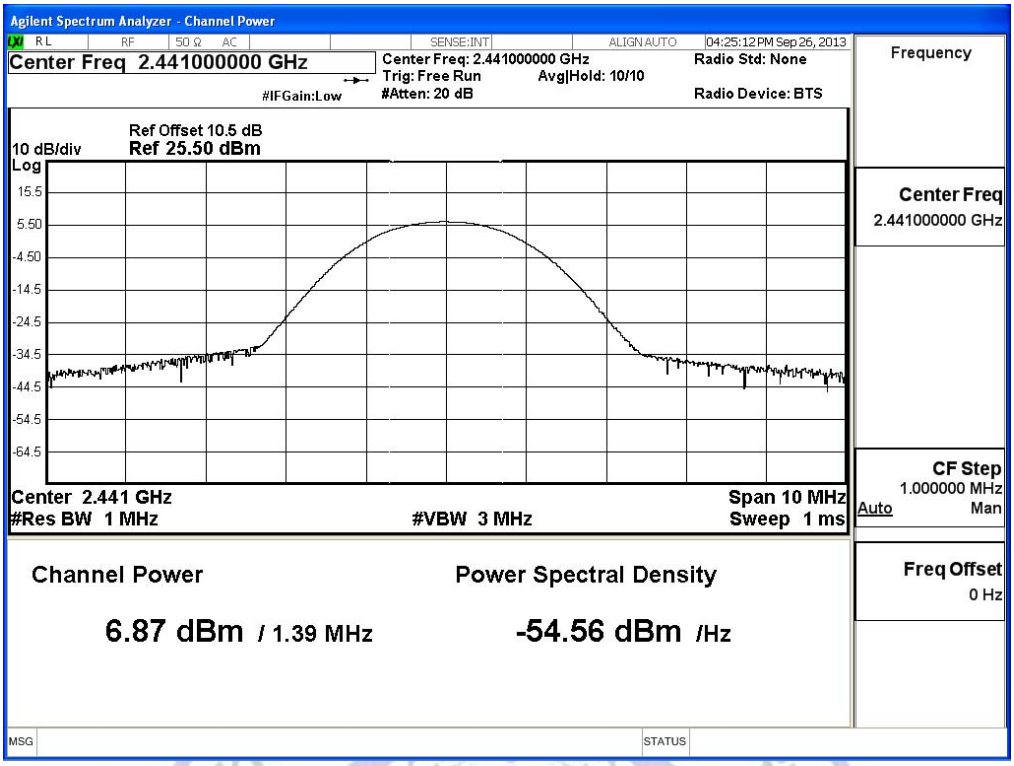
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Output
Test Mode	:	Mode 3: Transmitter-3Mbps(8DPSK_DH5)

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
0	2402	6.32	30.00	Pass
39	2441	6.87	30.00	Pass
78	2480	6.90	30.00	Pass

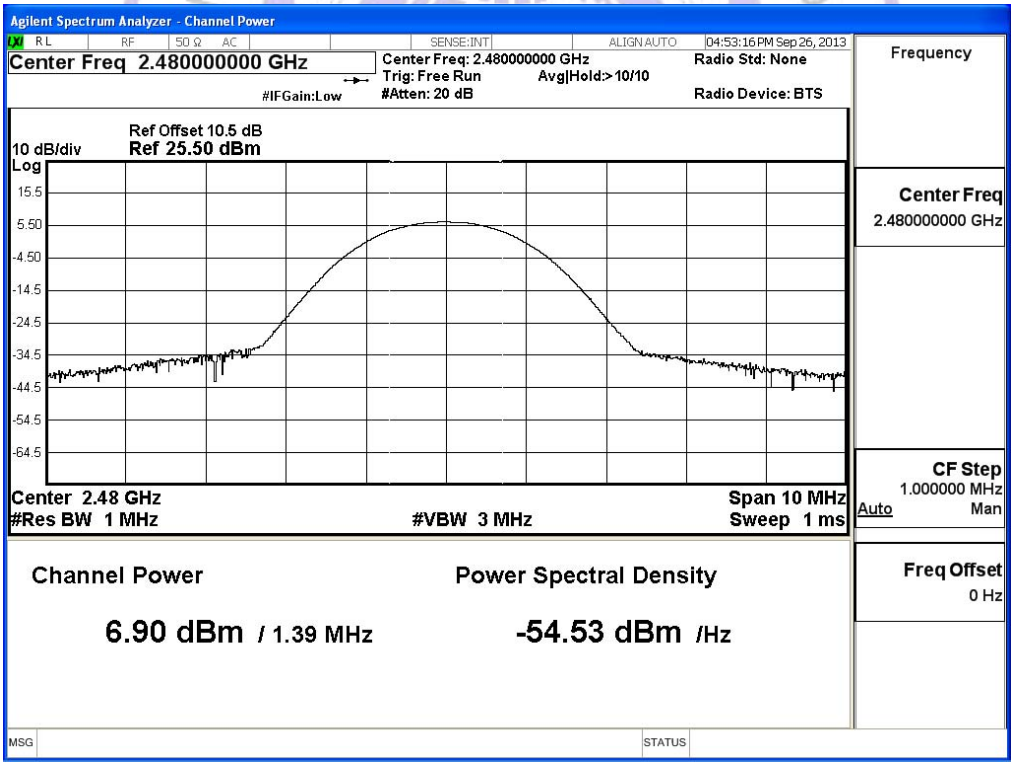
3DH5 2402MHz



3DH5 2441MHz

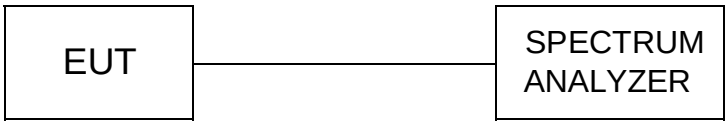


3DH5 2480MHz



4.4. 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

According to ANSI C63.10: 2009.
Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
RBW ≧ 1% of the 20dB bandwidth, VBW ≧ RBW, Sweep = auto, Detector function = peak, Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.
Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

LIMIT

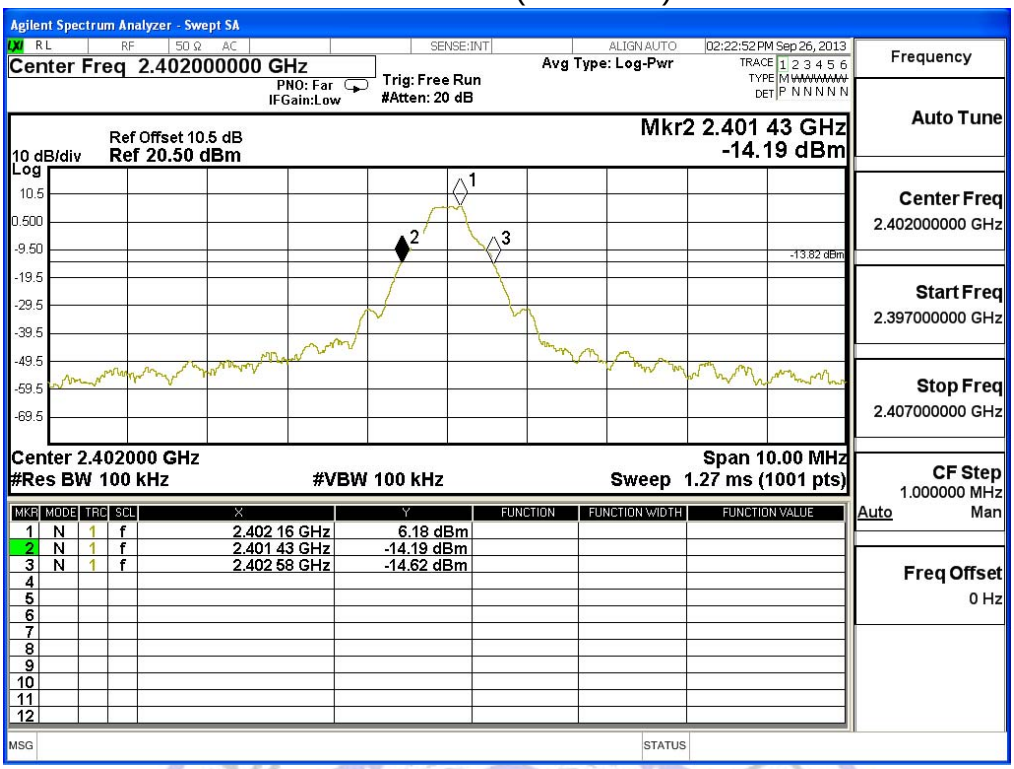
For frequency hopping systems operating in the 2400MHz-2483.5MHz no limit for 20dB bandwith.

TEST RESULTS

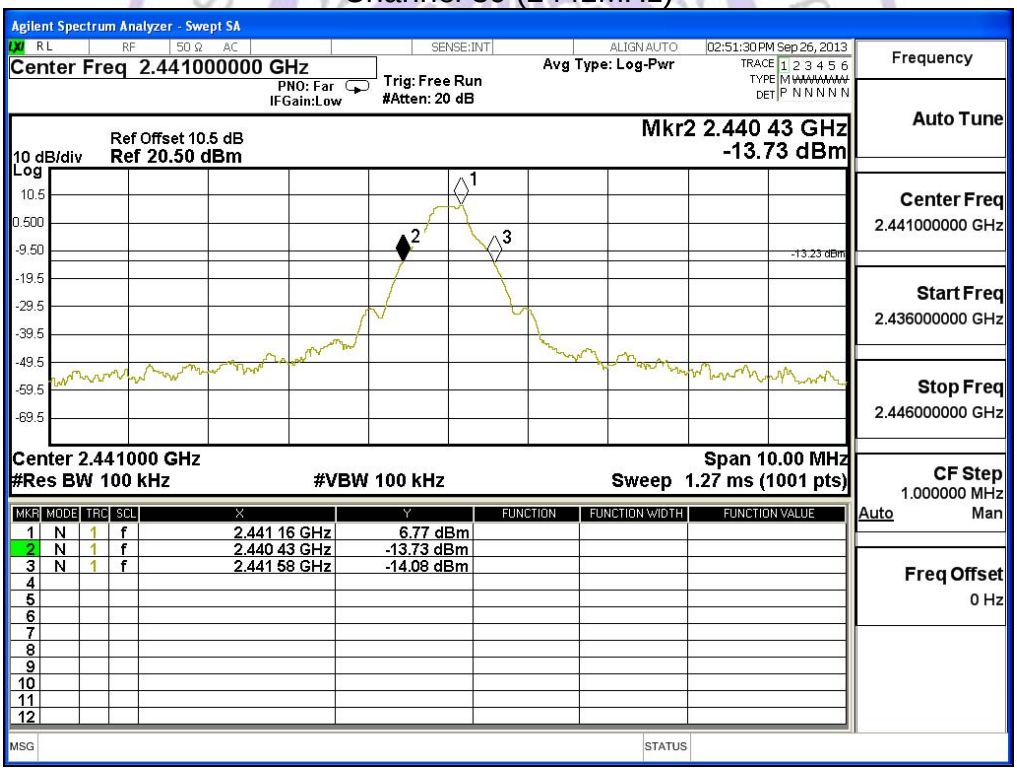
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmitter-1Mbps(GFSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)
00	2402	1150
39	2441	1150
78	2480	1150

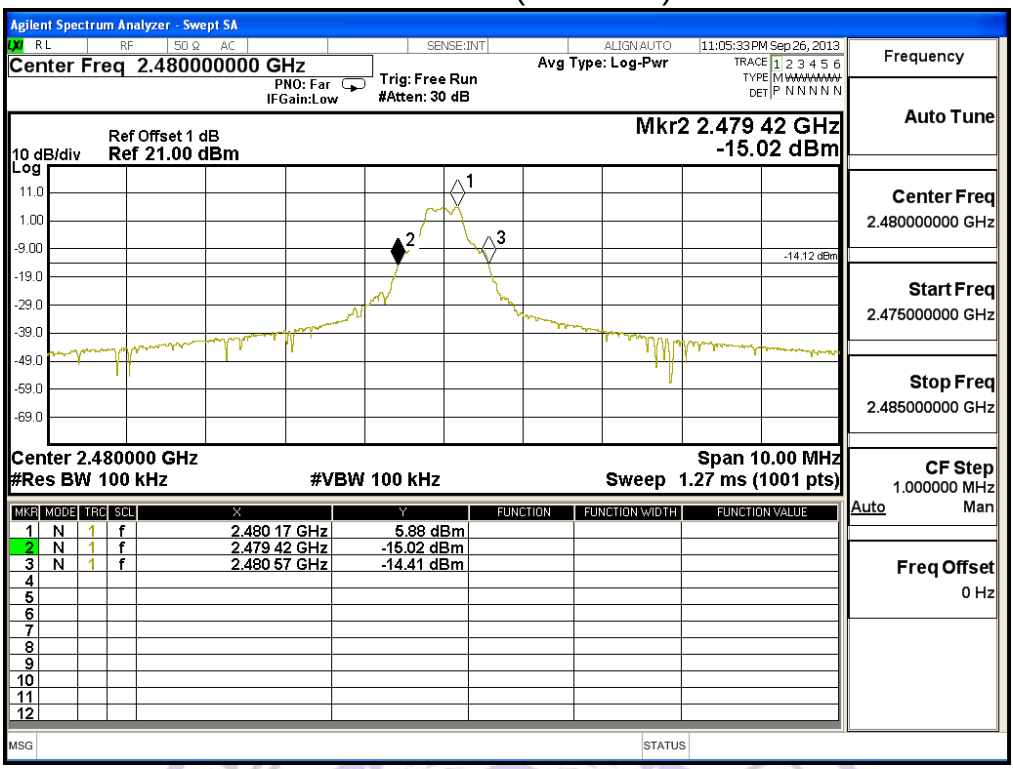
Channel 00 (2402MHz)



Channel 39 (2441MHz)



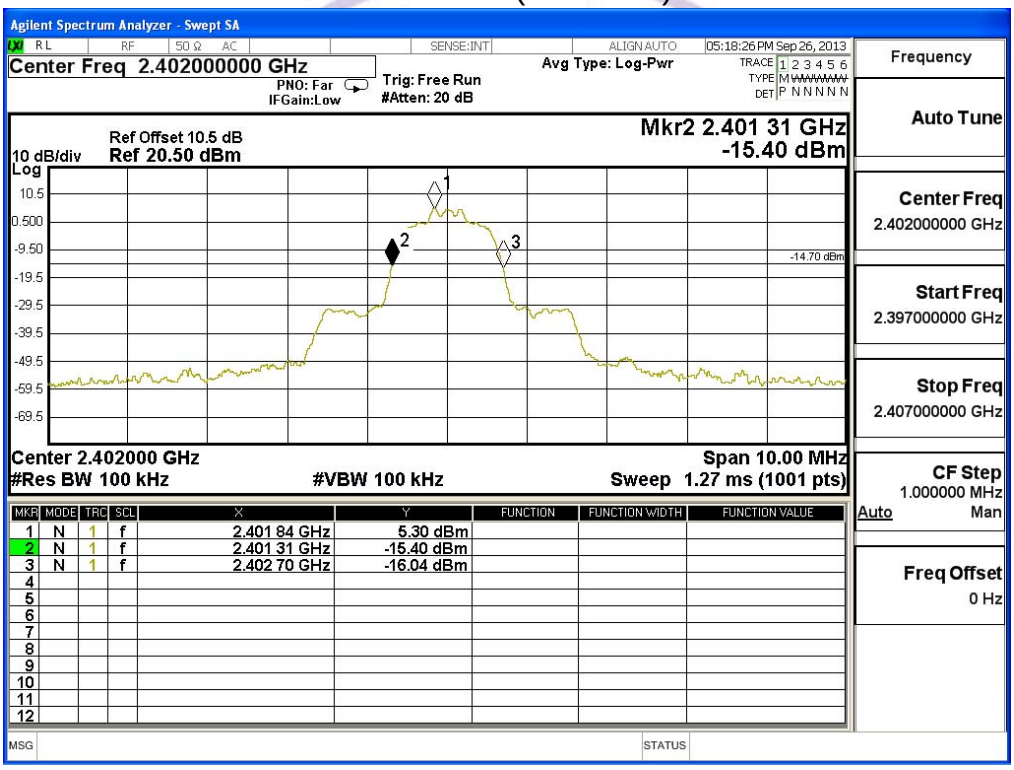
Channel 78 (2480MHz)



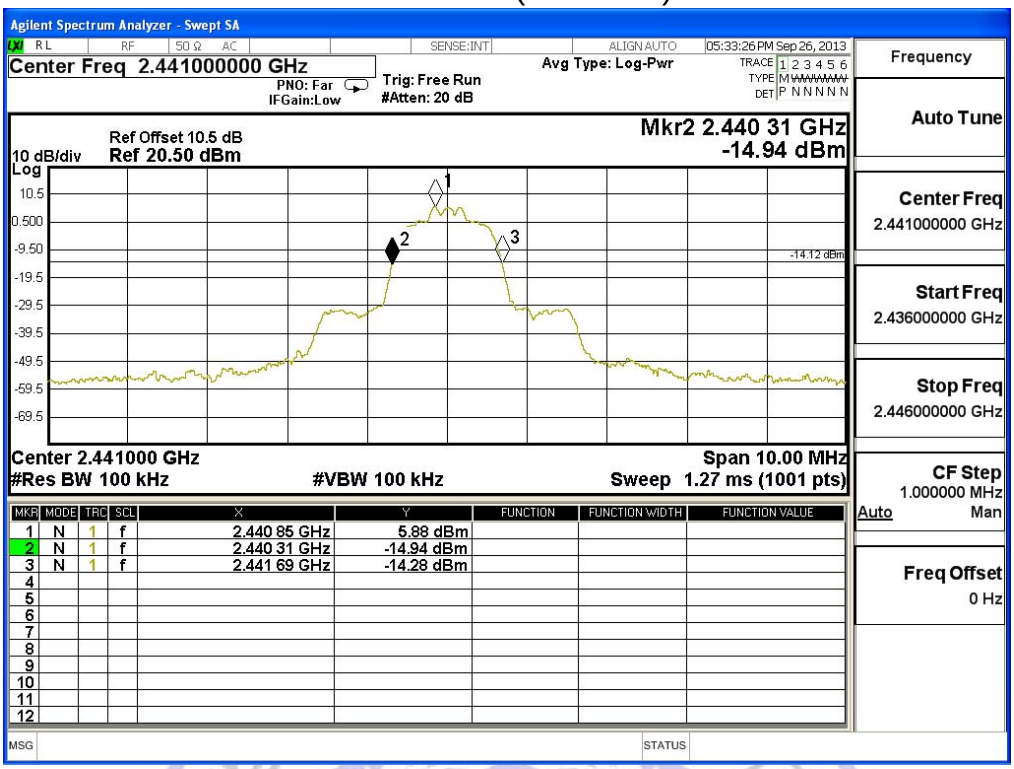
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)
00	2402	1390
39	2441	1380
78	2480	1380

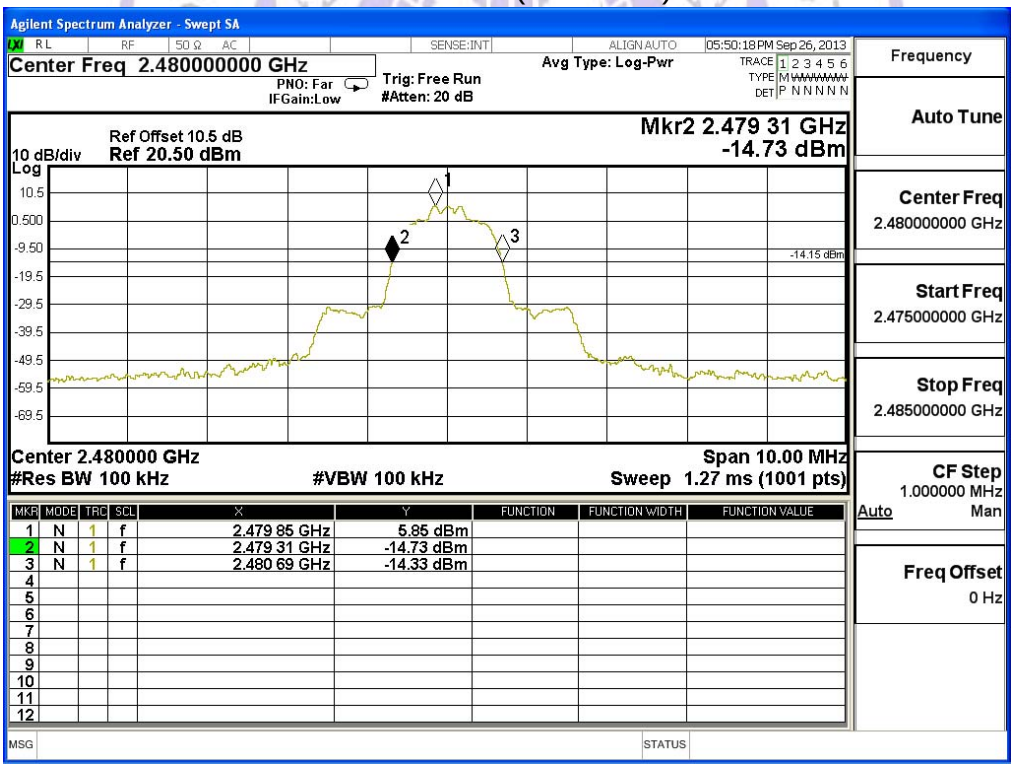
Channel 00 (2402MHz)



Channel 39 (2441MHz)



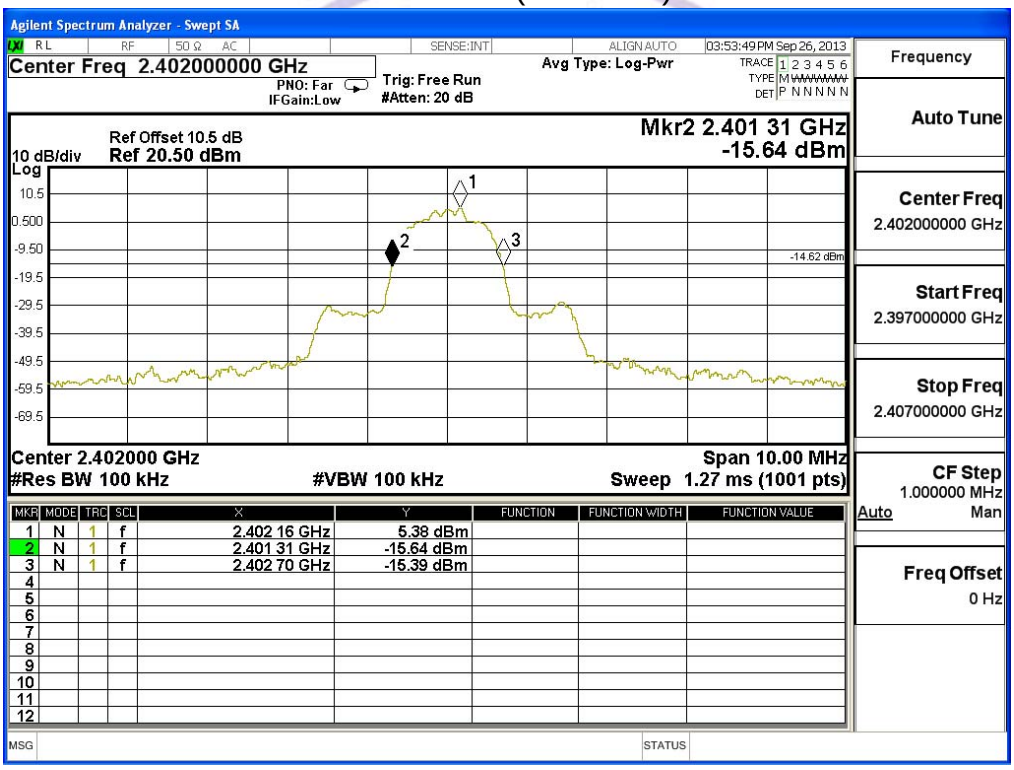
Channel 78 (2480MHz)



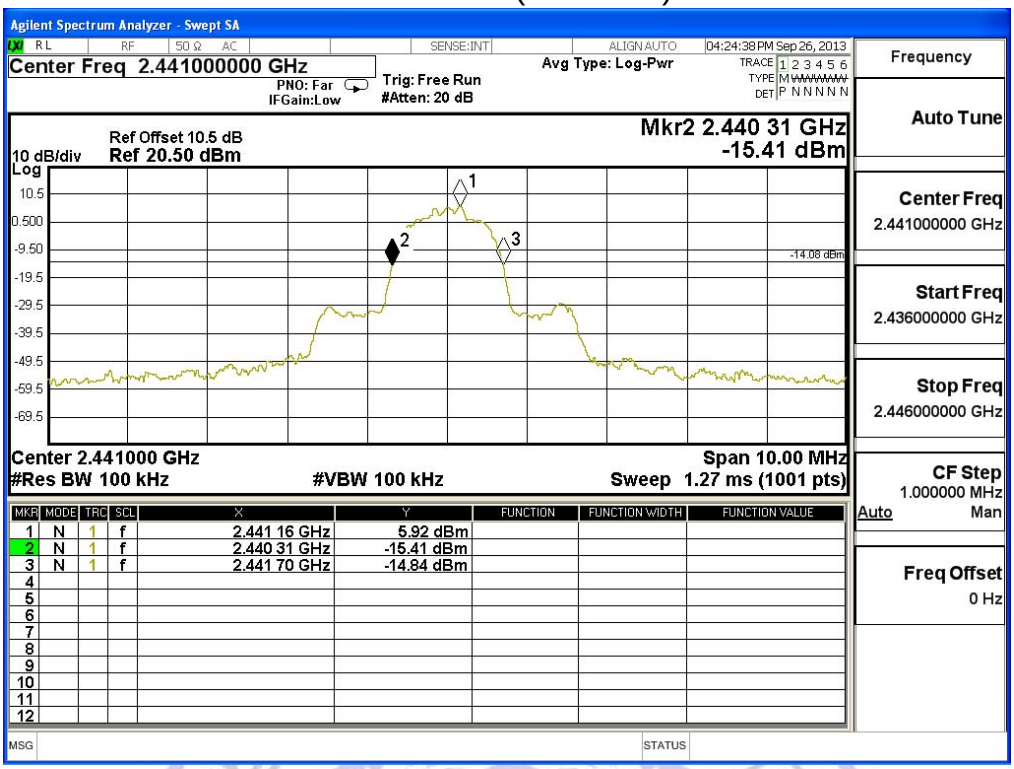
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 3: Transmitter-3Mbps(8DPSK_DH5)

Channel No.	Frequency (MHz)	20dB Bandwidth (kHz)
00	2402	1390
39	2441	1390
78	2480	1390

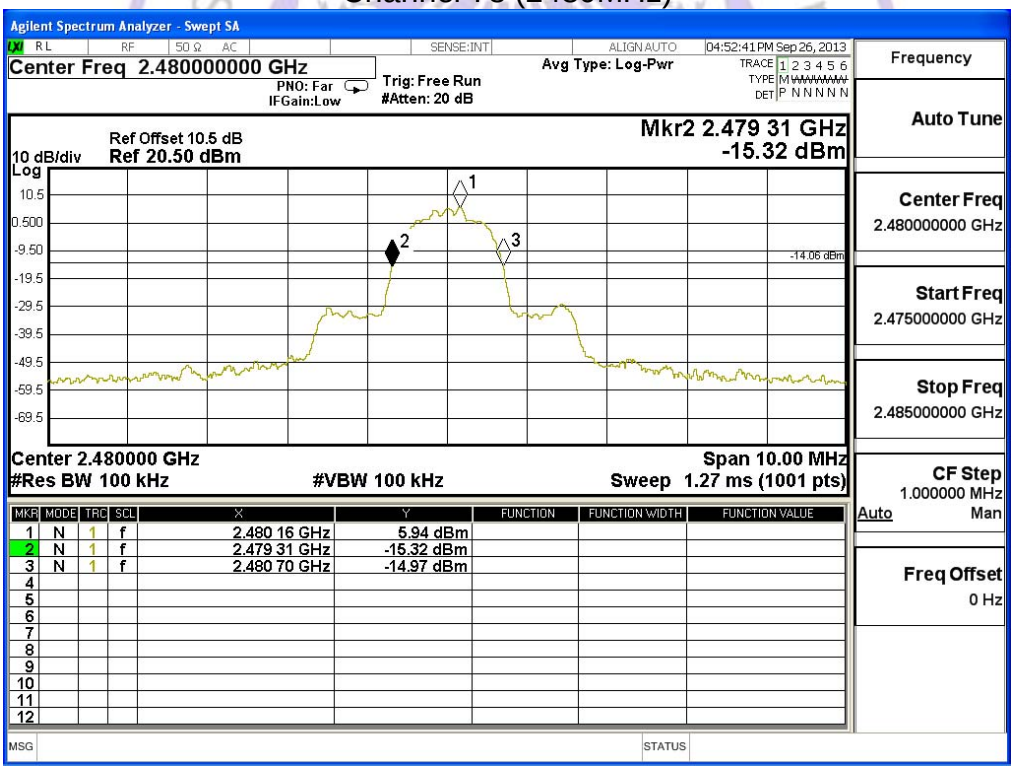
Channel 00 (2402MHz)



Channel 39 (2441MHz)



Channel 78 (2480MHz)



4.5. Band Edge

Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated 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) (see §15.205(c)).

TEST PROCEDURE

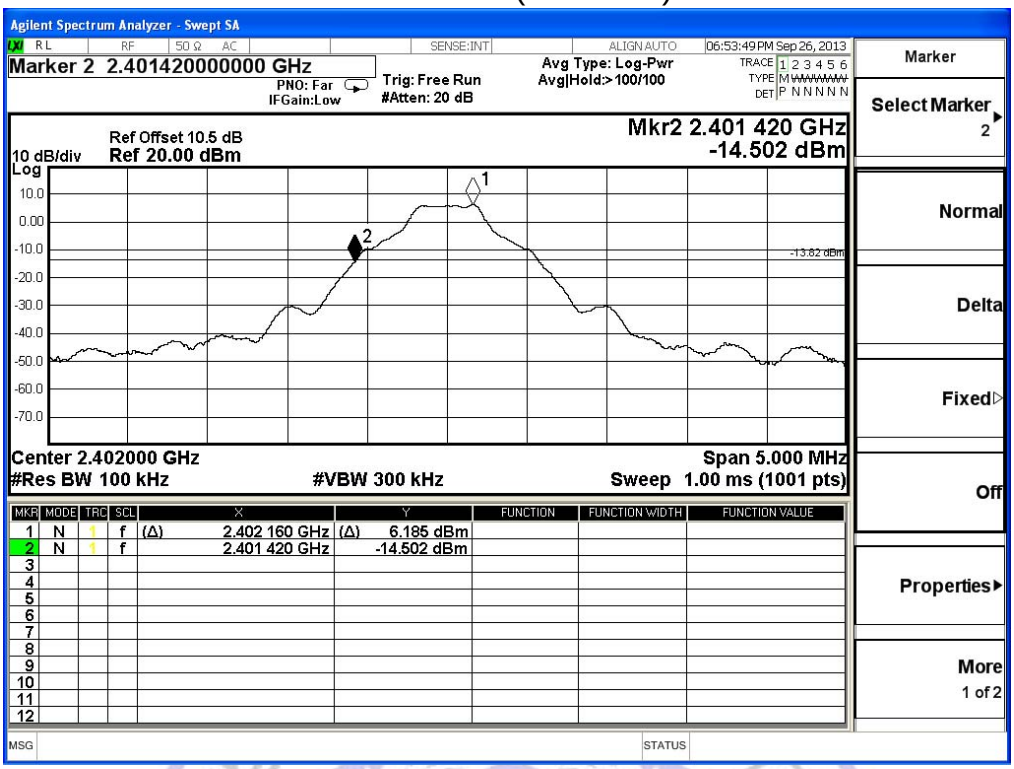
According to ANSI C63.10: 2009.
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation.
RBW ≧ 1% of the span
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section.
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

TEST RESULTS

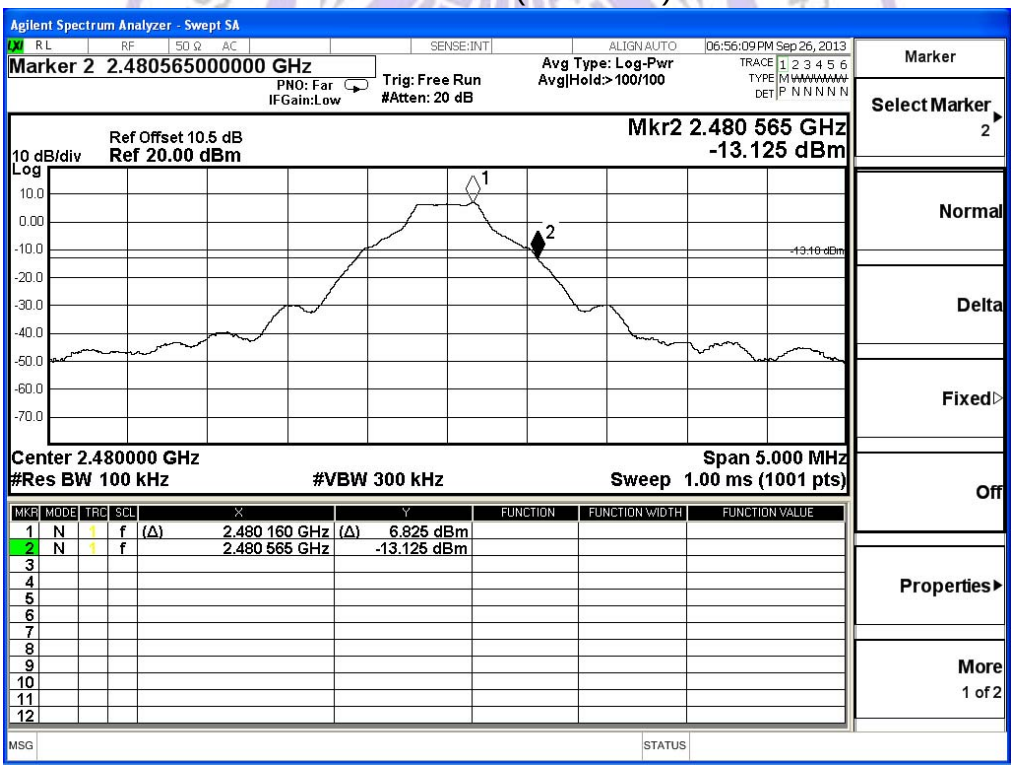
Conducted Test:

Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 1: Transmitter-1Mbps(GFSK_DH5)

Channel 00 (2402MHz)

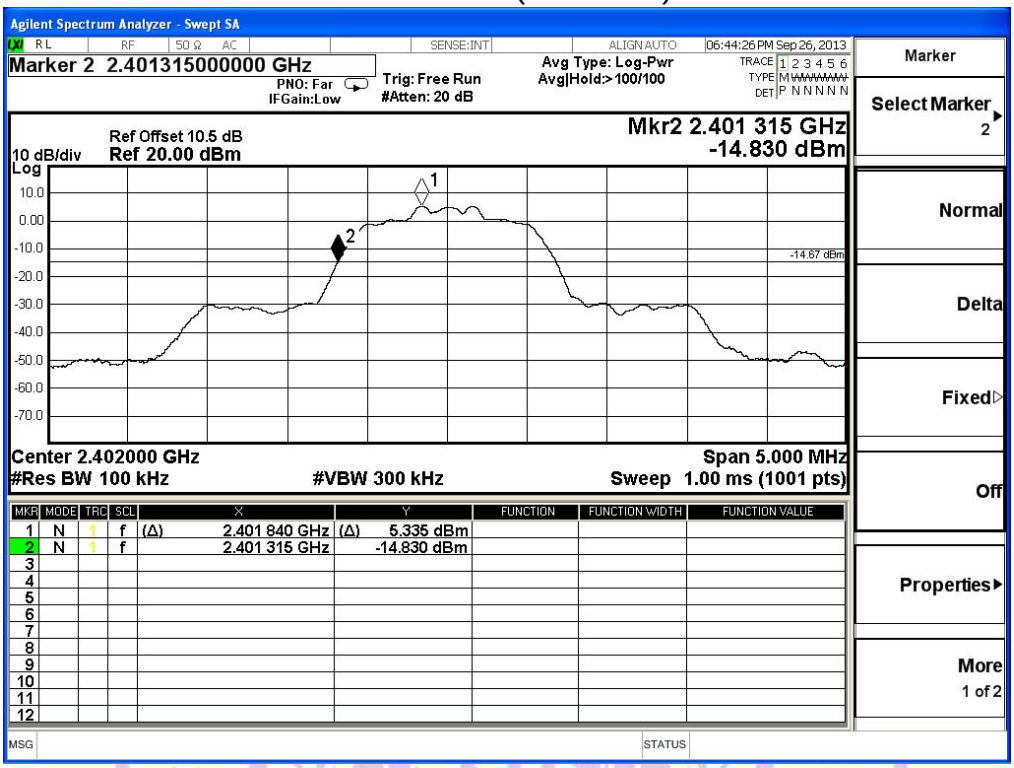


Channel 78 (2480MHz)

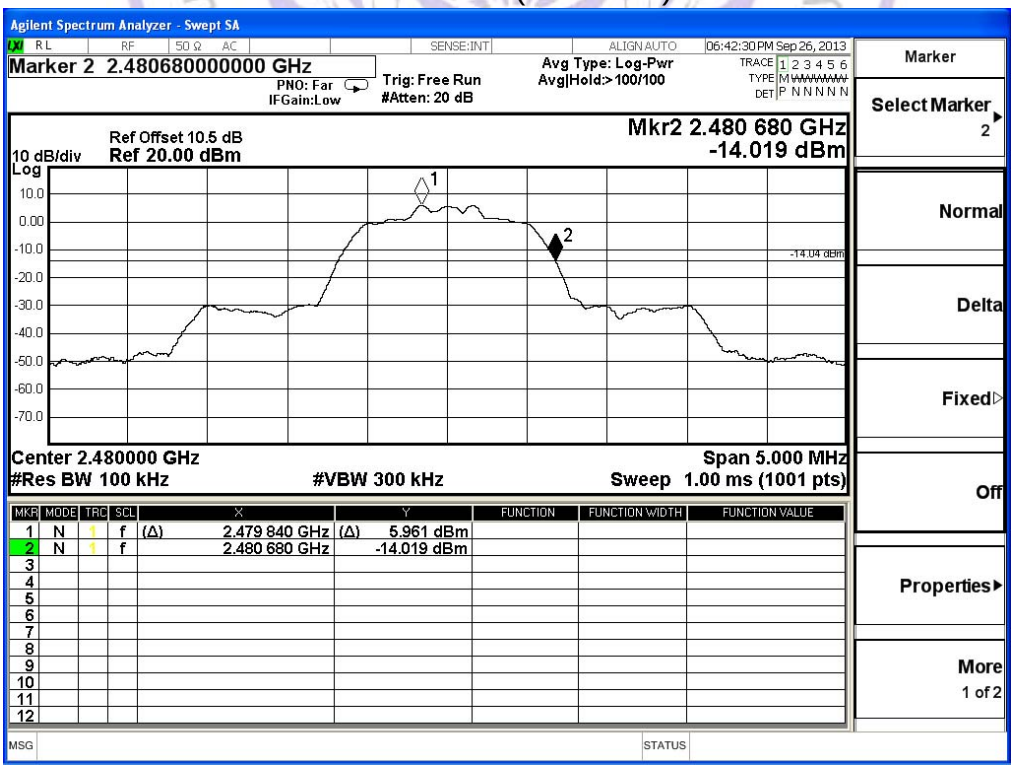


Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5)

Channel 00 (2402MHz)

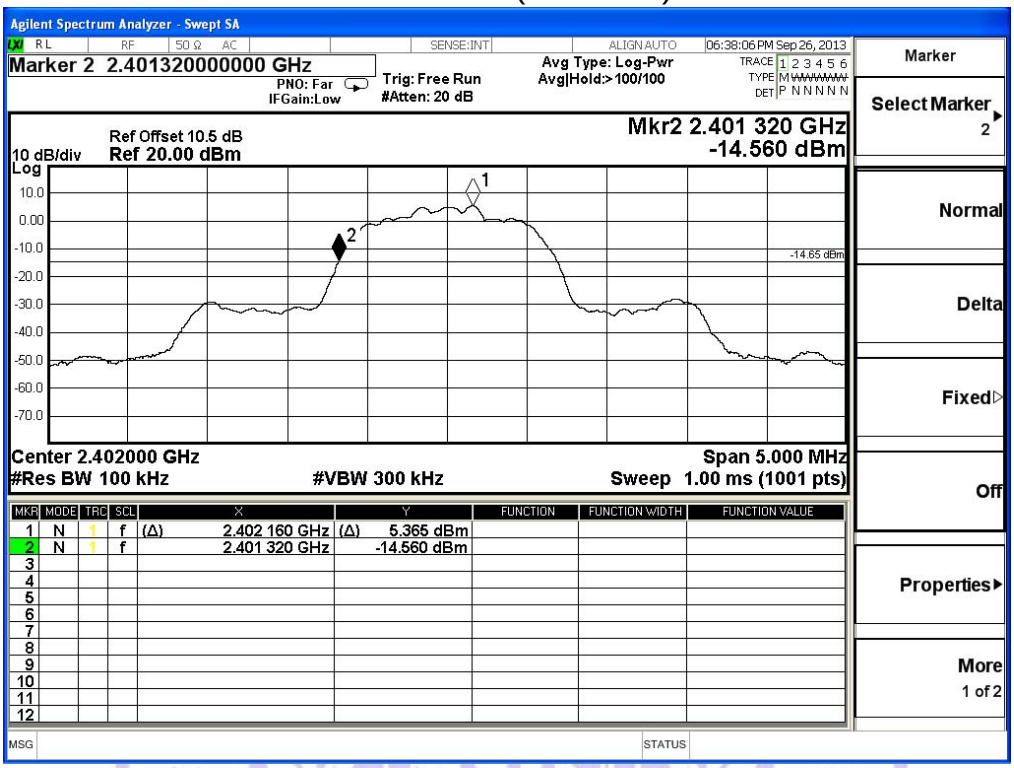


Channel 78 (2480MHz)

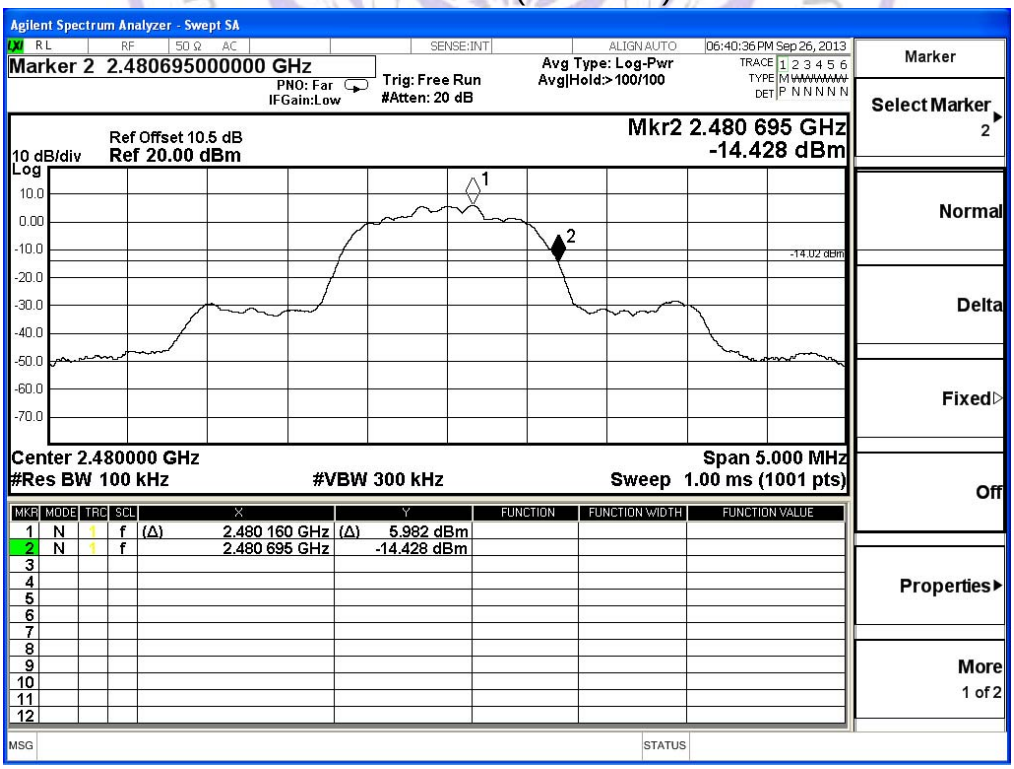


Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 3: Transmitter-3Mbps(8DPSK_DH5)

Channel 00 (2402MHz)

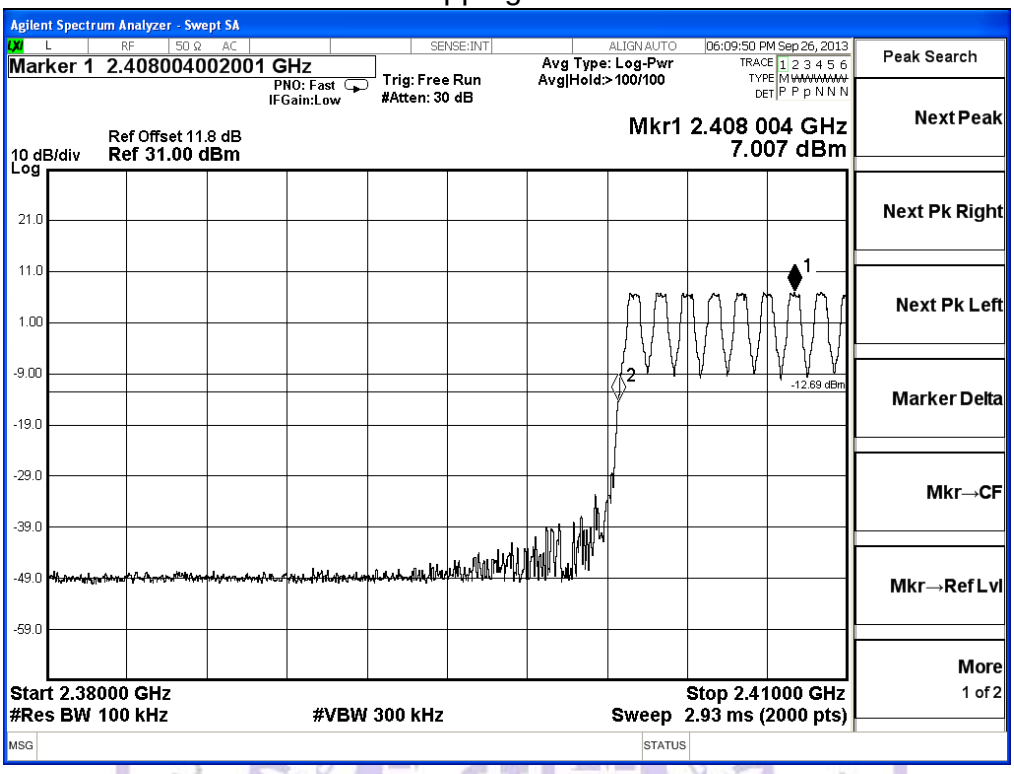


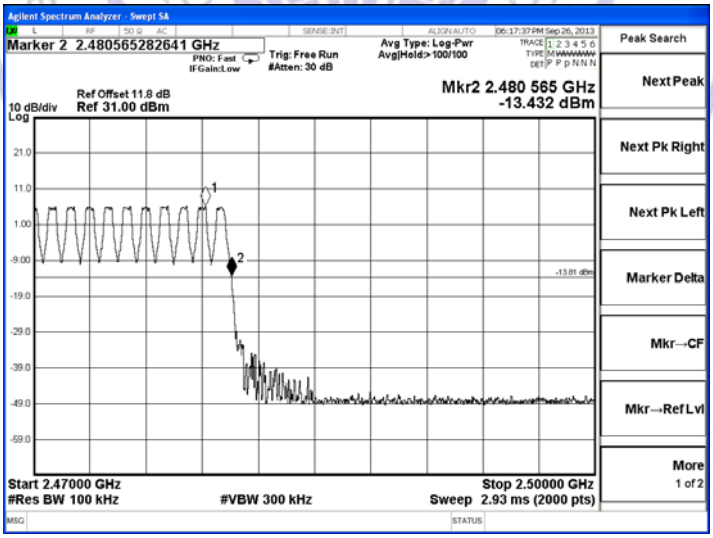
Channel 78 (2480MHz)



Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Band-edge Compliance of RF Conducted Emissions
Test Mode	:	Mode 1: Transmitter-1Mbps(GFSK_DH5)

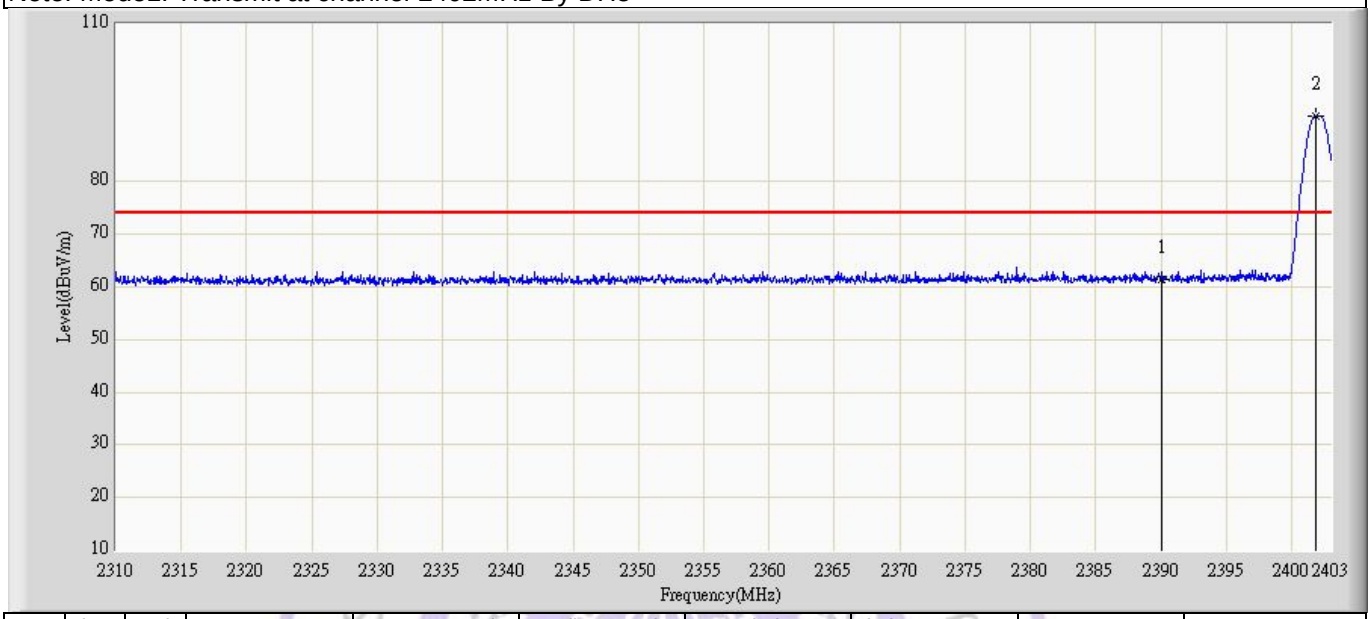
Hopping Mode





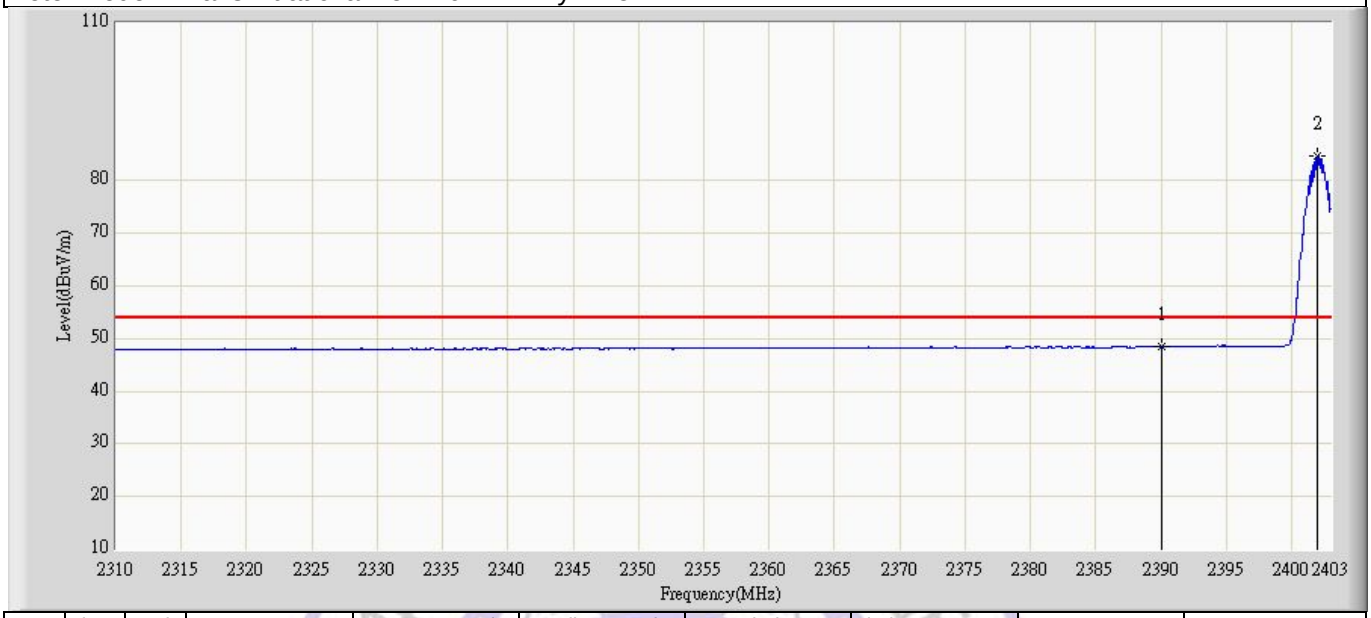
Radiated Test:

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz By DH5	



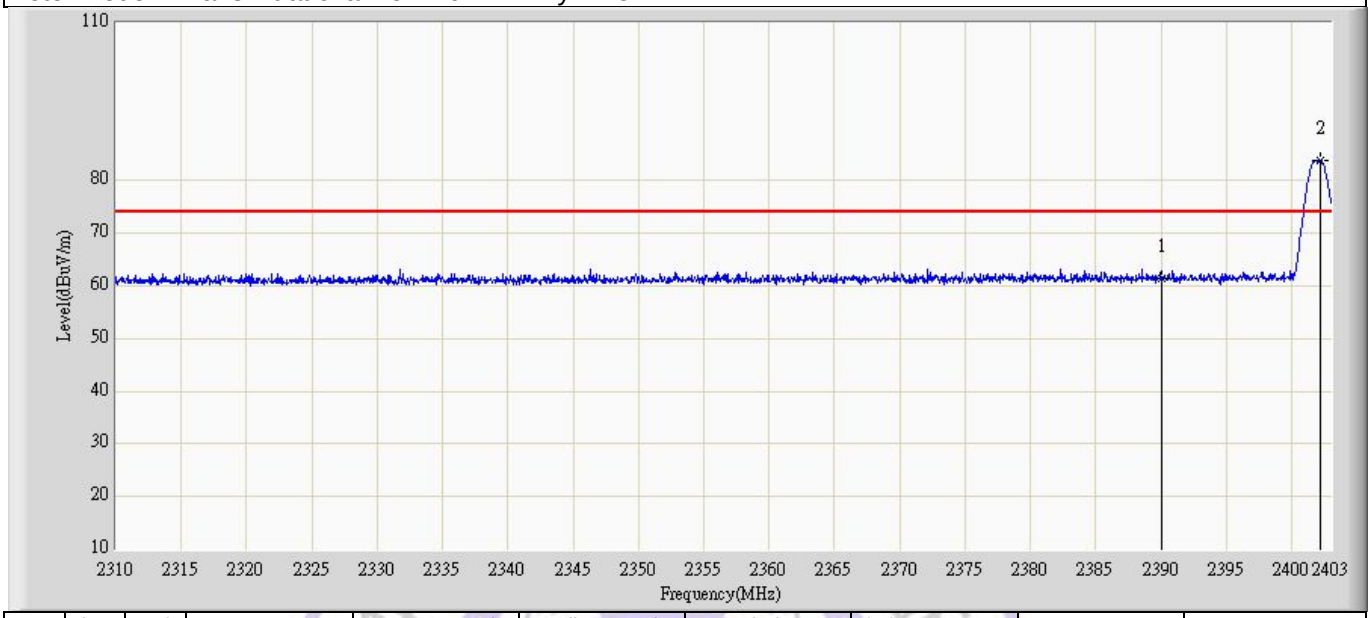
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	61.312	30.127	-12.688	74.000	31.185	PK
2		*	2401.791	92.573	61.391	N/A	N/A	31.181	PK

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:43
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz By DH5	



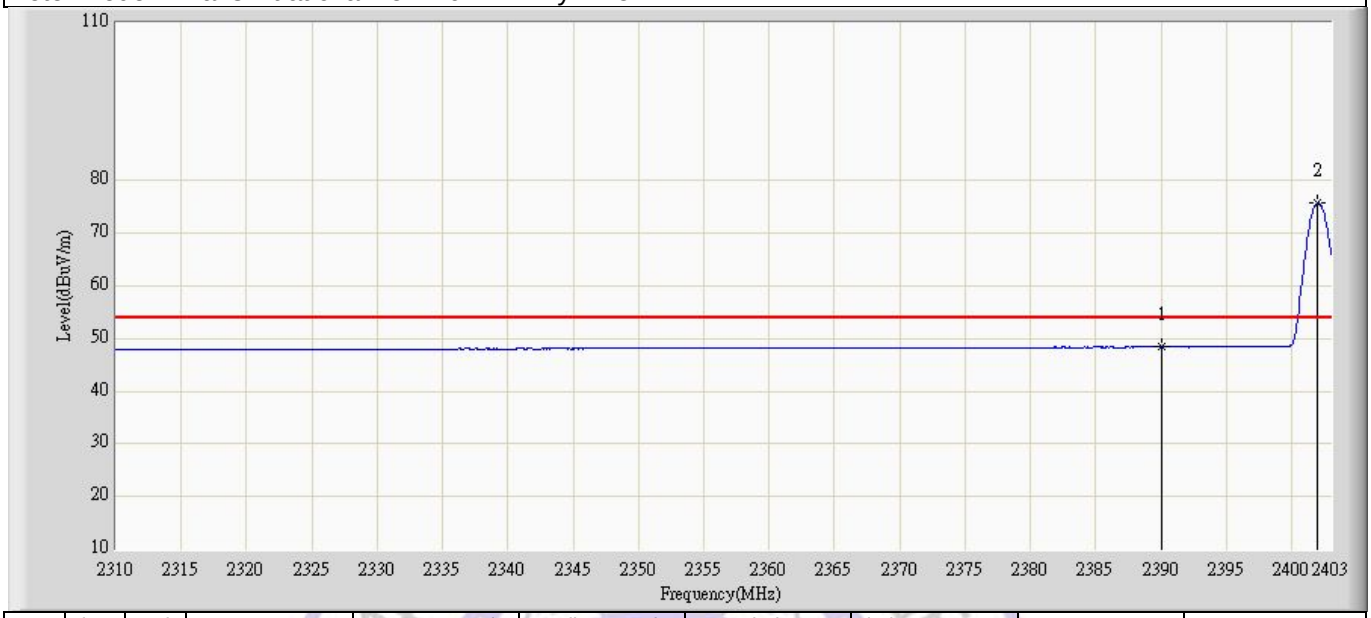
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	48.408	17.223	-5.592	54.000	31.185	AV
2		*	2401.977	84.720	53.538	N/A	N/A	31.181	AV

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:44
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz By DH5	



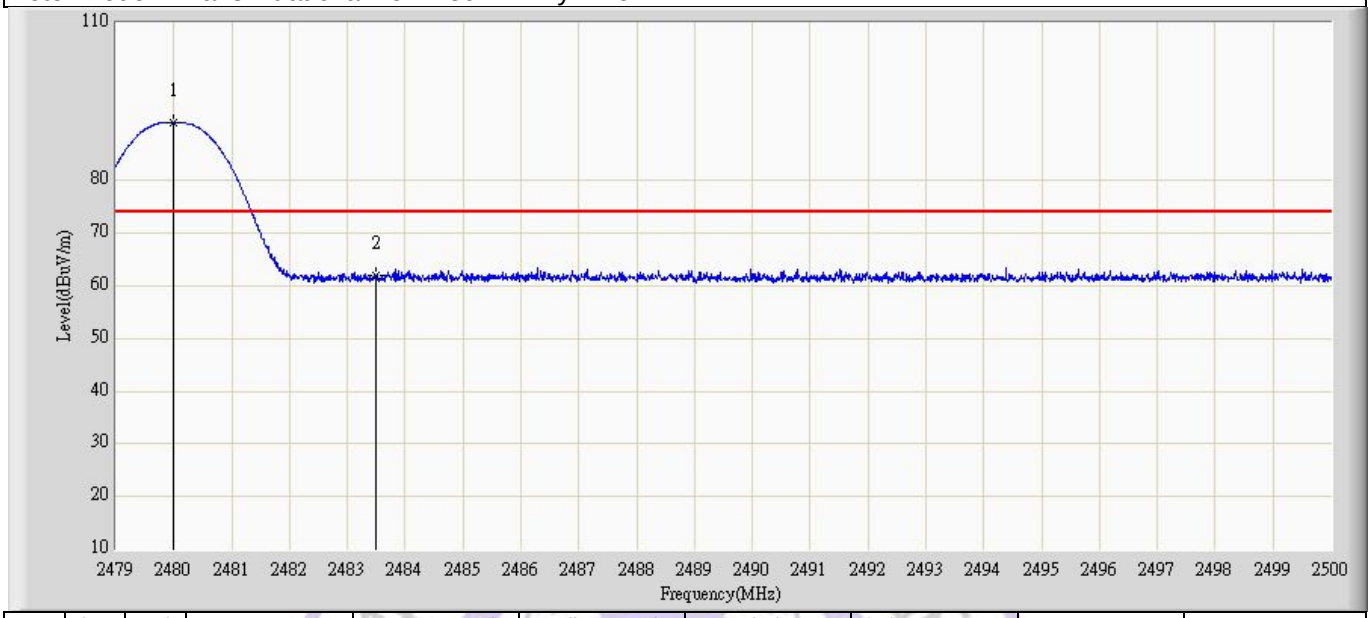
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	61.294	30.109	-12.706	74.000	31.185	PK
2		*	2402.209	83.821	52.639	N/A	N/A	31.181	PK

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:47
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2402MHz By DH5	



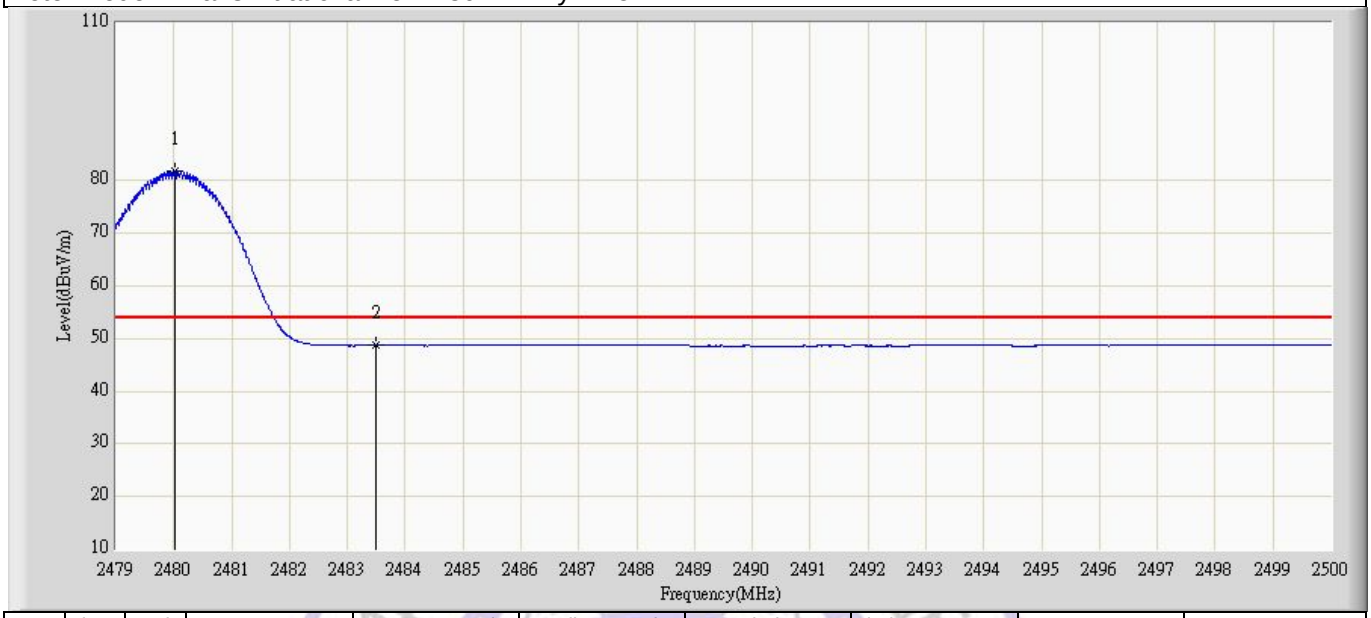
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	48.367	17.182	-5.633	54.000	31.185	AV
2		*	2401.977	75.719	44.537	N/A	N/A	31.181	AV

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:49
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz By DH5	



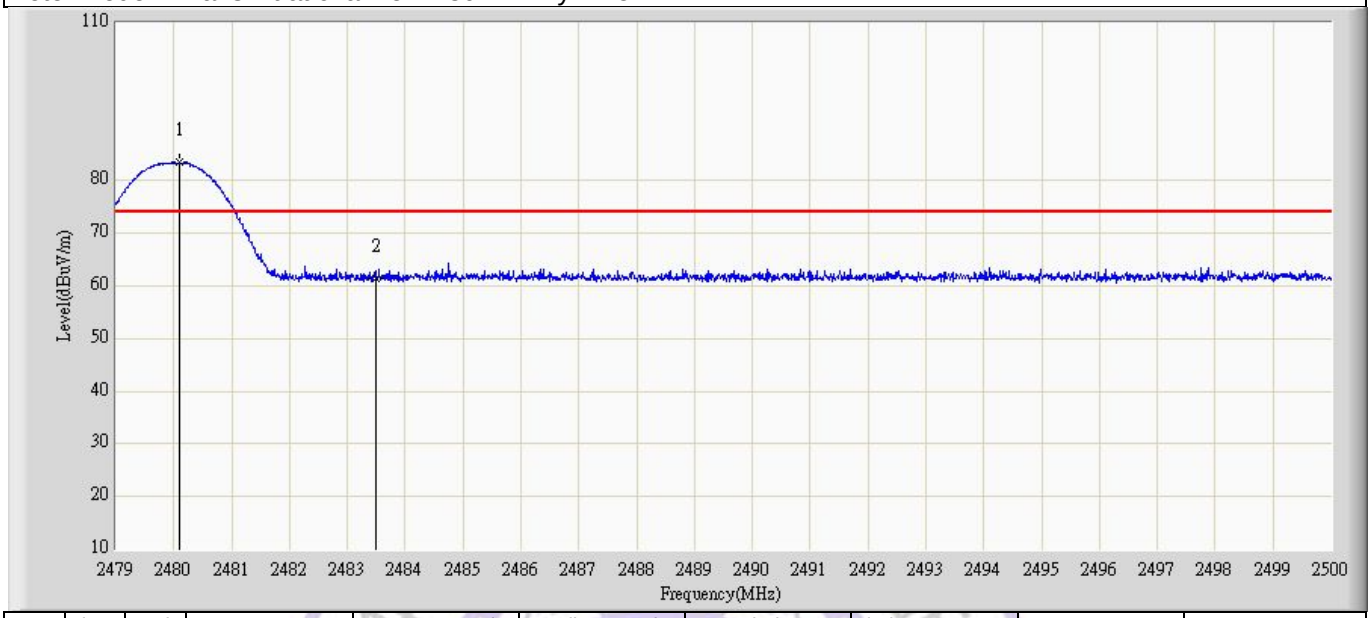
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2479.998	91.001	59.794	N/A	N/A	31.206	PK
2			2483.500	61.896	30.687	-12.104	74.000	31.209	PK

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz By DH5	



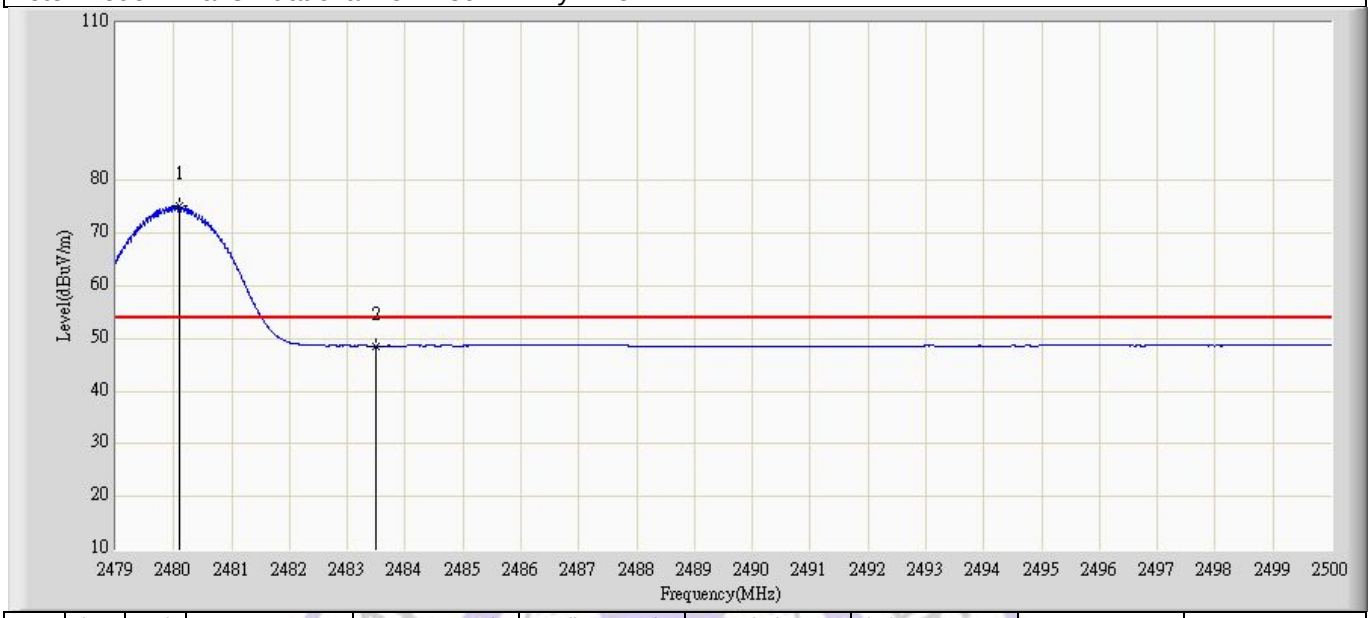
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.029	81.767	50.560	N/A	N/A	31.206	AV
2			2483.500	48.687	17.478	-5.313	54.000	31.209	AV

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:51
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz By DH5	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.092	83.469	52.262	N/A	N/A	31.206	PK
2			2483.500	61.361	30.152	-12.639	74.000	31.209	PK

Engineer: Jame	
Site: AC5	Time: 2013/09/26 - 17:53
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: BBHA9120D_499(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2480MHz By DH5	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2480.103	75.099	43.892	N/A	N/A	31.206	AV
2			2483.500	48.617	17.408	-5.383	54.000	31.209	AV