Shenzhen CTL Electromagnetic Technology Co., Ltd.
Tel: +86-755-89486194 Fax: +86-755-89486194-805

FCC PART 15 SUBPART C TEST REPORT

FCC Part 15.247

Report Reference No. ..... :	**CTL1309121433-WW**
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.
TRF Originator..... :	Shenzhen CTL Electromagnetic Technology Co., Ltd.
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-5
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-WW	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 is 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

1. TEST STANDARDS

The tests were performed according to following standards:

FCC 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.

ANSI C63.4-2003

KDB Publication No. 558074 D01 v03r01Guidance on Measurements for Digital Transmission Systems

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

Description of the test mode

IEEE 802.11b/g: Thirteen channels are provided to the EUT,but only eleventh channels used for USA.

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432		
6	2437		
7	2442		

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

Test Mode:

1. The EUT has been tested under normal operating condition.
2. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed. Channel low (2412MHz), mid (2442MHz) and high (2462MHz) with highest data rate are chosen for full testing.
3. Test Mode:

Test Mode(TM)	Description	Remark
1	Transmitting	802.11 b
2	Transmitting	802.11 g

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. NOTE

1. The EUT is an 802.11b/g 3G WCDMA+GSM Smart Phone,The functions of the EUT listed as below:

	Test Standards	Reference Report
WLAN 802.11b/g	FCC Part 15 Subpart C (Section15.247)	CTL1307161139-WW
WLAN 802.11b/g	FCC Per 47 CFR 2.1091(b)	139S052R-HP-US-P03V01

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

Frequency Band(MHz)	2400-2483.5	5150-5350	5470-5725	5725-5850
802.11b	√	—	—	—
802.11g	√	—	—	—

3. The EUT incorporates a SISO function,Physically,the EUT provides two completed transmitter and two completed receivers.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX

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

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

2.8. Modifications

No modifications were implemented to meet testing criteria.

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 (2003) 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.

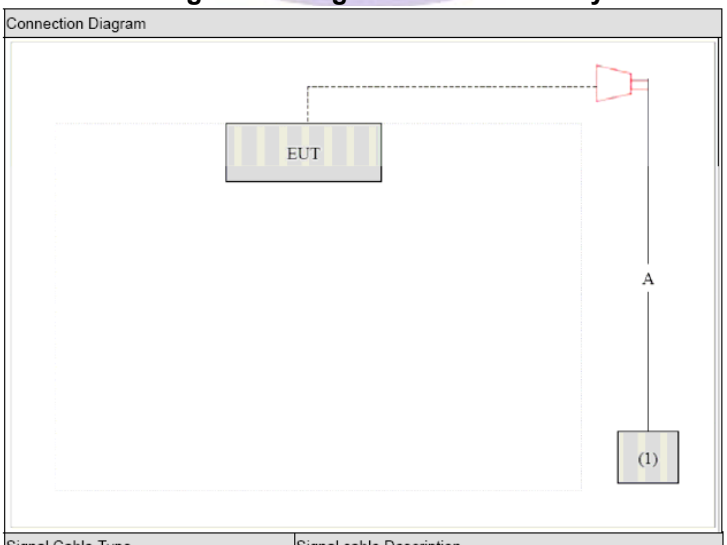
3.3. Environmental conditions

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

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

3.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System



Signal Cable Type		Signal cable Description
A	Coaxial Cable	Shielded, >5m

3.5. 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.

3.6. 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

3.7. Summary of Test Result

FCC PART 15		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Peak Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge Compliance of RF Emission	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

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

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

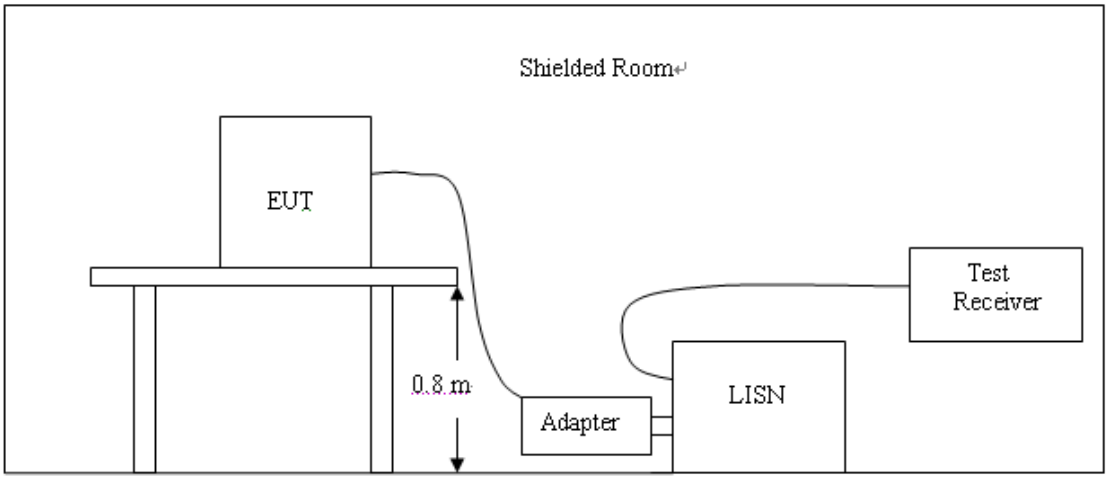
Test Items	Mode	Data Rate	Channel
AC Power Conducted Emission	Normal Link	11 Mbps	1
Maximum Peak Conducted Output Power Power Spectral Density 6dB Bandwidth Spurious RF conducted emission	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
Radiated Emission 30MHz~1GHz	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
Radiated Emission 1GHz~10th Harmonic	11b/DSSS	11 Mbps	1/6/11
	11g/OFDM	54 Mbps	1/6/11
Band Edge Compliance of RF Emission	11b/DSSS	11 Mbps	1/11
	11g/OFDM	54 Mbps	1/11

Note1: According exploratory test, EUT will have maximum output power in those data rate, so those data rate were used for all test.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Emissions Test

TEST CONFIGURATION



TEST PROCEDURE

For unintentional device, according to § 15.107(a) Line 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

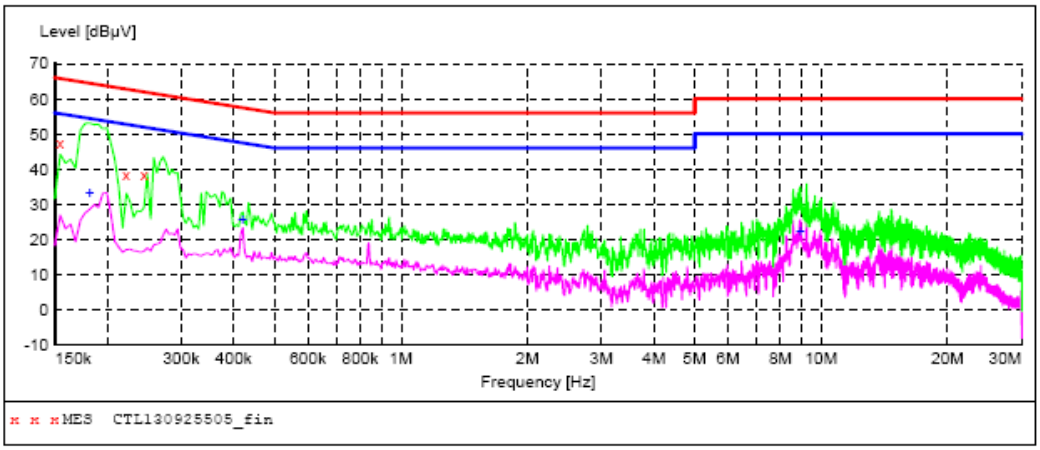
For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

The RBW/VBW for 150KHz to 30MHz: 9KHz

TEST RESULTS

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



MEASUREMENT RESULT: "CTL130925505_fin"

9/25/2013 10:49AM

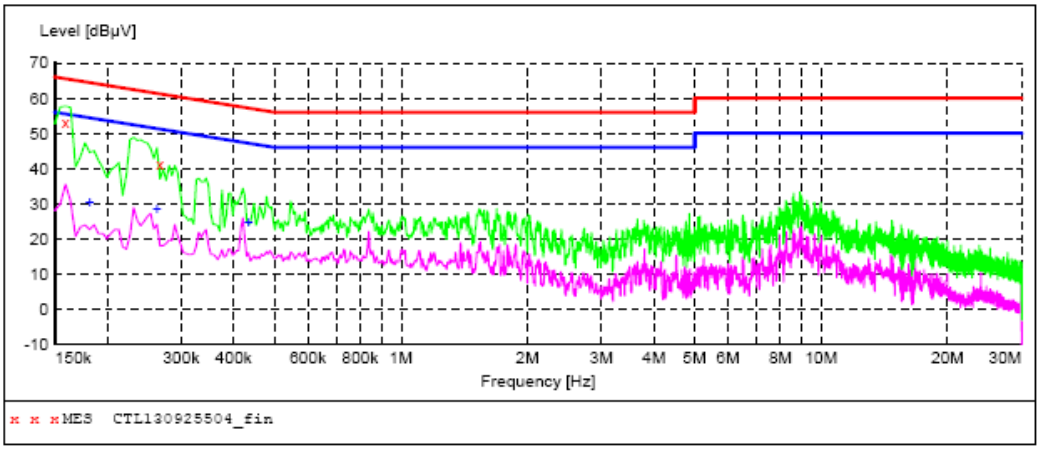
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.154500	47.40	9.8	66	18.4	QP	N	GND
0.222000	38.20	9.8	63	24.5	QP	N	GND
0.244500	38.30	9.8	62	23.6	QP	N	GND

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"

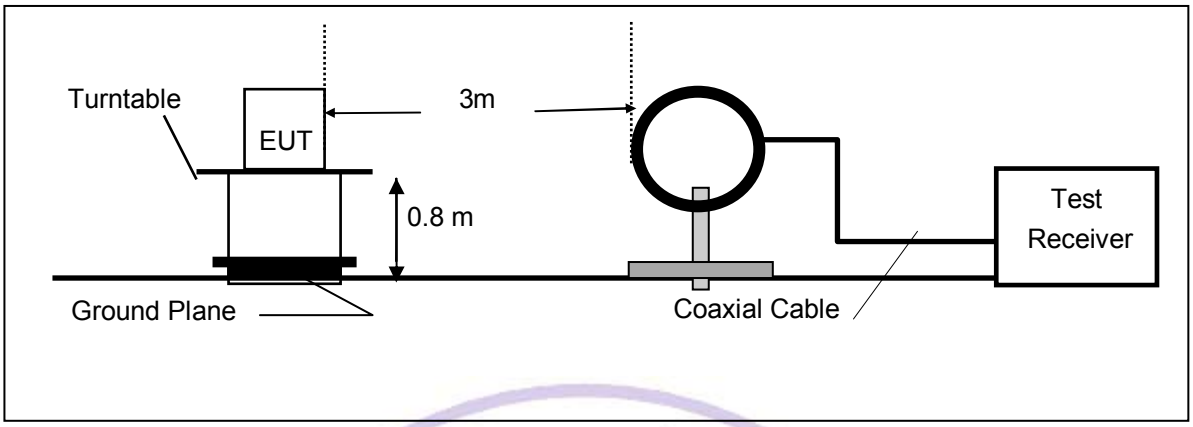
9/25/2013 10:46AM

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

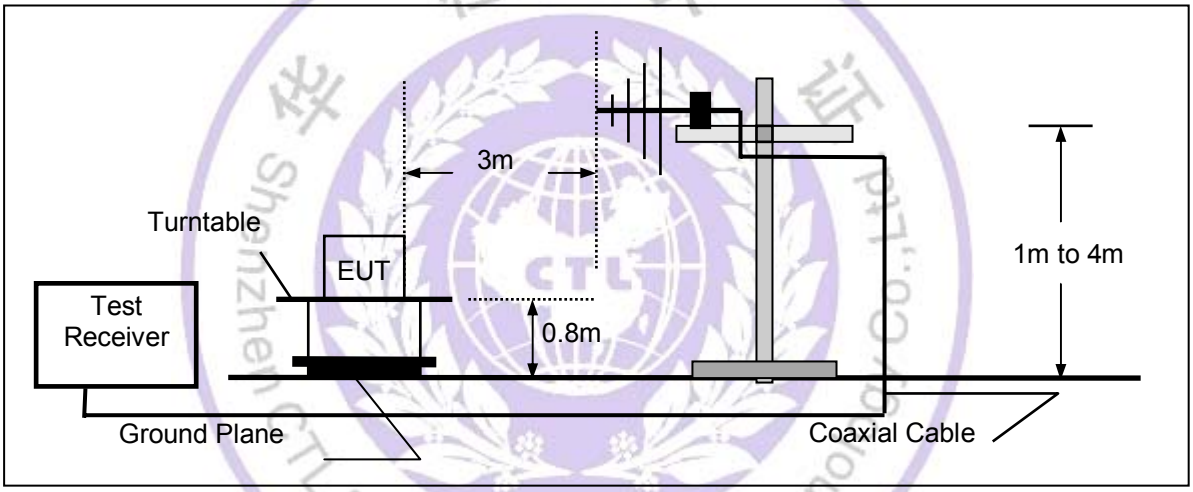
4.2. Radiated Emission Test

TEST CONFIGURATION

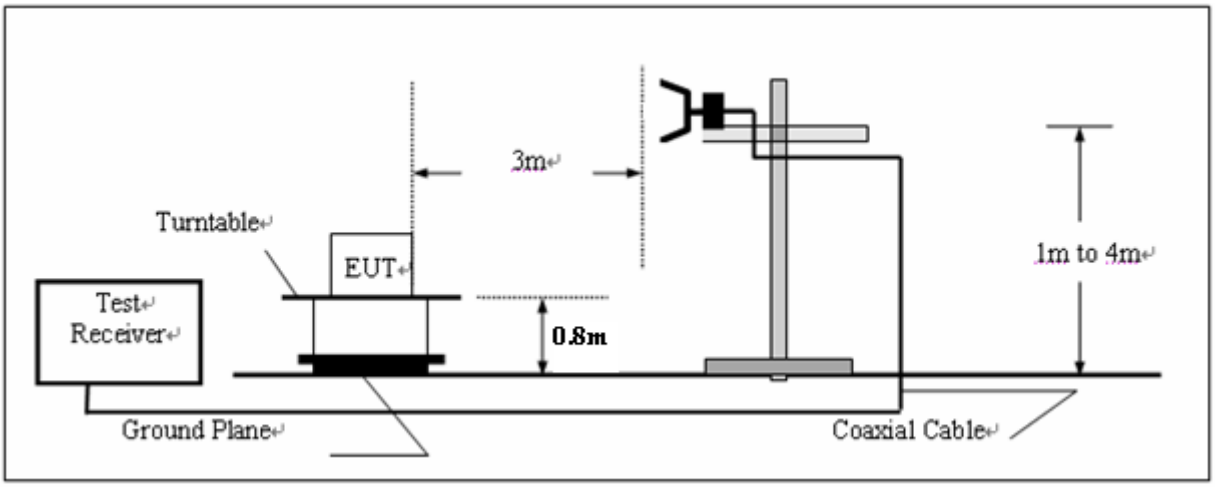
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



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	

TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r01 (Measurement Guidelines of DTS), the EUT was setup according to ANSI C63.4:2003 and tested according to ANSI C63.10 for compliance to FCC 47CFR 15.247 requirements.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. 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
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f >1 GHz, 120 kHz for f < 1 GHz; VBW ≧RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Repeat above procedures until all frequency measurements have been completed.

Note:
When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the "cone of radiation" of EUT. The 3dB beamwidth is 60 degrees for H-plane and 90 degrees for E-plane.

LIMIT

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values：

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

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above 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.

TEST RESULTS

Mode1: Transmit at 802.11b

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.0	46.8	-7.1	39.7	54(note3)	-14.3	PK
	V	4824.0	47.1	-7.2	39.9	54(note3)	-14.1	PK
	H	7236.0	43.2	-1.7	41.5	54(note3)	-12.5	PK
	V	7236.0	42.6	-1.8	40.8	54(note3)	-13.2	PK
	H	9648.0	39.1	4.3	43.4	54(note3)	-10.6	PK
	V	9648.0	38.9	4.4	43.3	54(note3)	-10.7	PK
6	H	4874.0	45.8	-7.0	38.8	54(note3)	-15.2	PK
	V	4874.0	46.8	-7.0	39.8	54(note3)	-14.2	PK
	H	7311.0	43.0	-1.6	41.4	54(note3)	-12.6	PK
	V	7311.0	42.7	-1.6	41.1	54(note3)	-12.9	PK
	H	9748.0	39.1	4.5	43.6	54(note3)	-10.4	PK
	V	9748.0	38.1	4.6	42.7	54(note3)	-11.3	PK
11	H	4924.0	47.5	-7.1	40.4	54(note3)	-13.6	PK
	V	4924.0	47.0	-7.0	40	54(note3)	-14	PK
	H	7386.0	42.6	-1.3	41.3	54(note3)	-12.7	PK
	V	7386.0	41.7	-1.3	40.4	54(note3)	-13.6	PK
	H	9848.0	38.6	4.9	43.5	54(note3)	-10.5	PK
	V	9848.0	37.4	5.0	42.4	54(note3)	-11.6	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.

Mode2: Transmit at 802.11g

CH	Antenna	Frequency (MHz)	Reading Level (dBuV/m)	Factor (dB)	Measure Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	H	4824.0	47.1	-7.1	40	54(note3)	-14	PK
	V	4824.0	47.0	-7.2	39.8	54(note3)	-14.2	PK
	H	7236.0	43.6	-1.7	41.9	54(note3)	-12.1	PK
	V	7236.0	42.6	-1.8	40.8	54(note3)	-13.2	PK
	H	9648.0	39.5	4.3	43.8	54(note3)	-10.2	PK
	V	9648.0	38.8	4.4	43.2	54(note3)	-10.8	PK
6	H	4874.0	45.9	-7.0	38.9	54(note3)	-15.1	PK
	V	4874.0	46.4	-7.0	39.4	54(note3)	-14.6	PK
	H	7311.0	43.3	-1.6	41.7	54(note3)	-12.3	PK
	V	7311.0	42.8	-1.6	41.2	54(note3)	-12.8	PK
	H	9748.0	39.4	4.5	43.9	54(note3)	-10.1	PK
	V	9748.0	39.2	4.6	43.8	54(note3)	-10.2	PK
11	H	4924.0	47.6	-7.1	40.5	54(note3)	-13.5	PK
	V	4924.0	46.6	-7.0	39.6	54(note3)	-14.4	PK
	H	7386.0	42.6	-1.3	41.3	54(note3)	-12.7	PK
	V	7386.0	42.7	-1.3	41.4	54(note3)	-12.6	PK
	H	9848.0	37.2	4.9	42.1	54(note3)	-11.9	PK
	V	9848.0	37.5	5.0	42.5	54(note3)	-11.5	PK

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

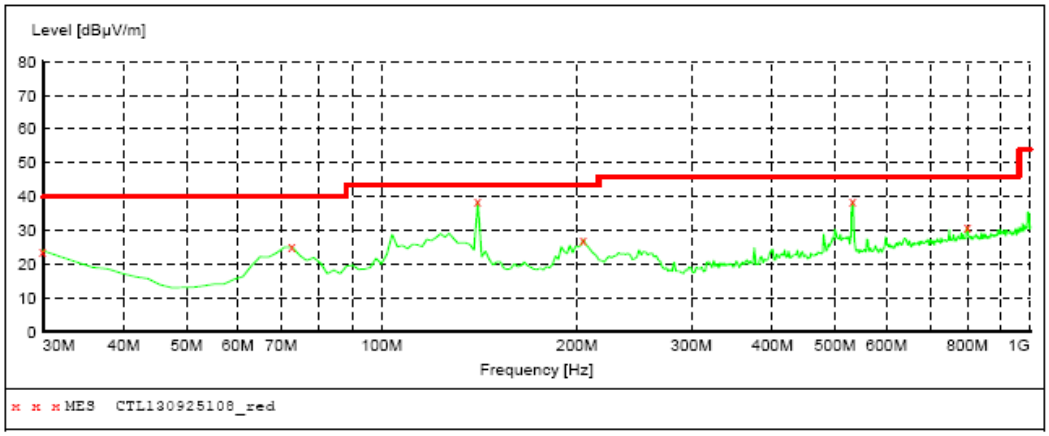
2. The test trace is same as the ambient noise (the test frequency range: 9kHz~30MHz, 18GHz~25GHz), therefore no data appear in the report.

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



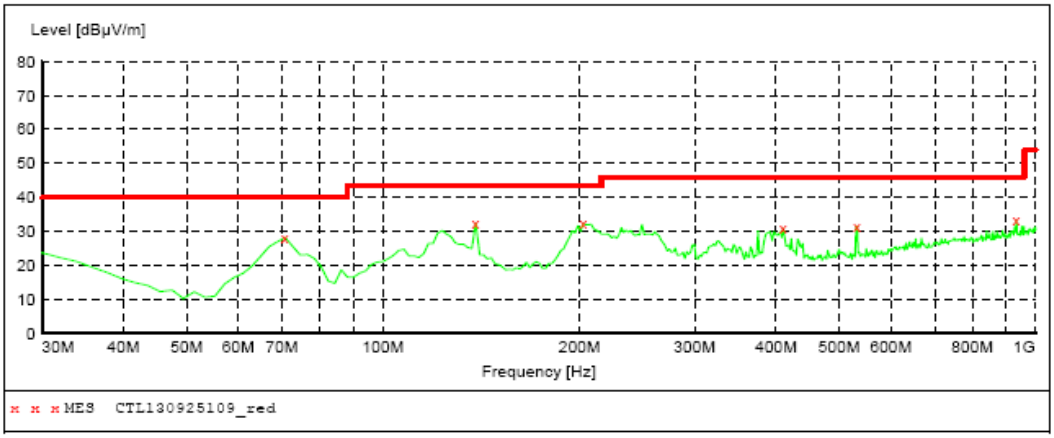
MEASUREMENT RESULT: "CTL130925108_red"

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



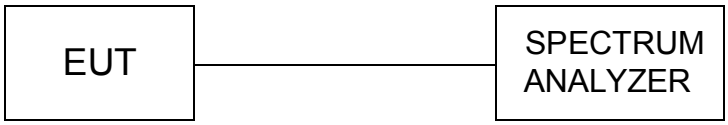
MEASUREMENT RESULT: "CTL130925109_red"

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. 6dB Bandwidth Measurement

TEST CONFIGURATION



TEST PROCEDURE

1. The testing follows FCC KDB Publication No. 558074 D01 v03r01 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW. The 6 dB bandwidth must be greater than 500 kHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

LIMIT

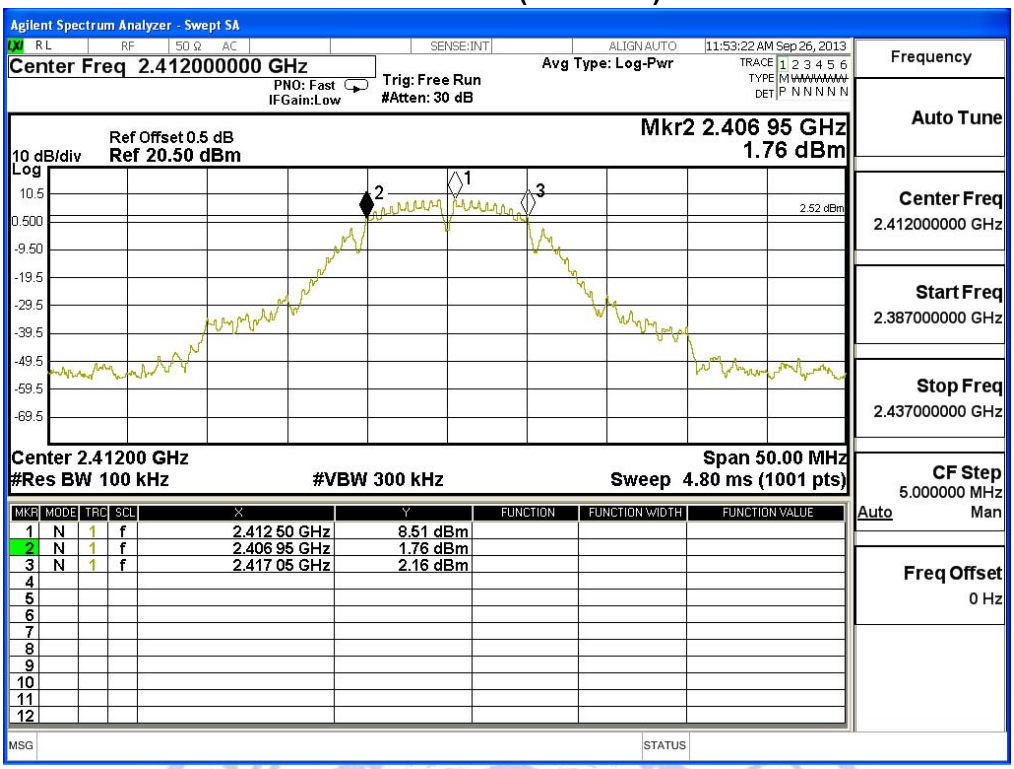
For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST RESULTS

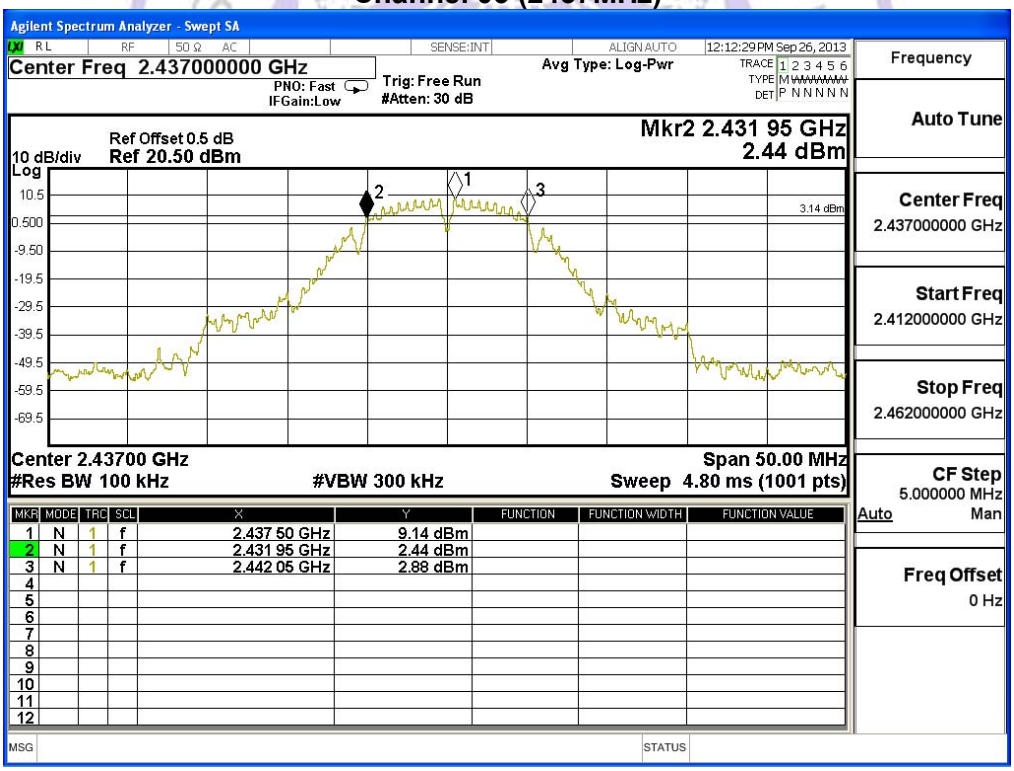
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	10100	500	Pass
06	2437	10100	500	Pass
11	2462	10100	500	Pass

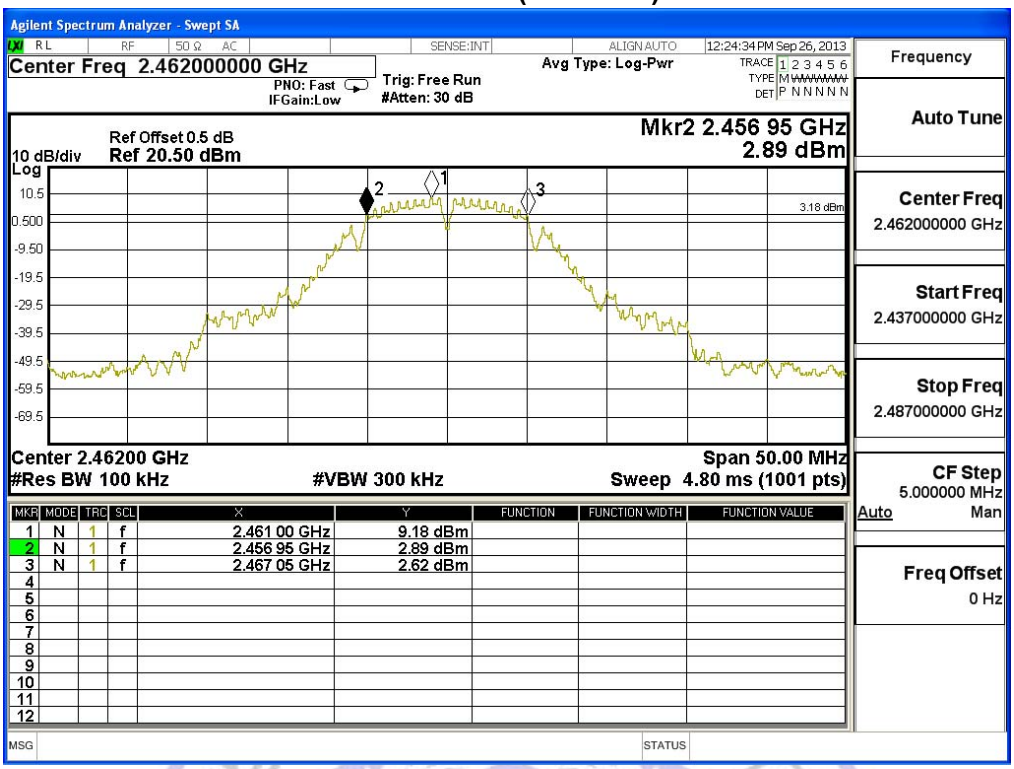
Channel 01 (2412MHz)



Channel 06 (2437MHz)



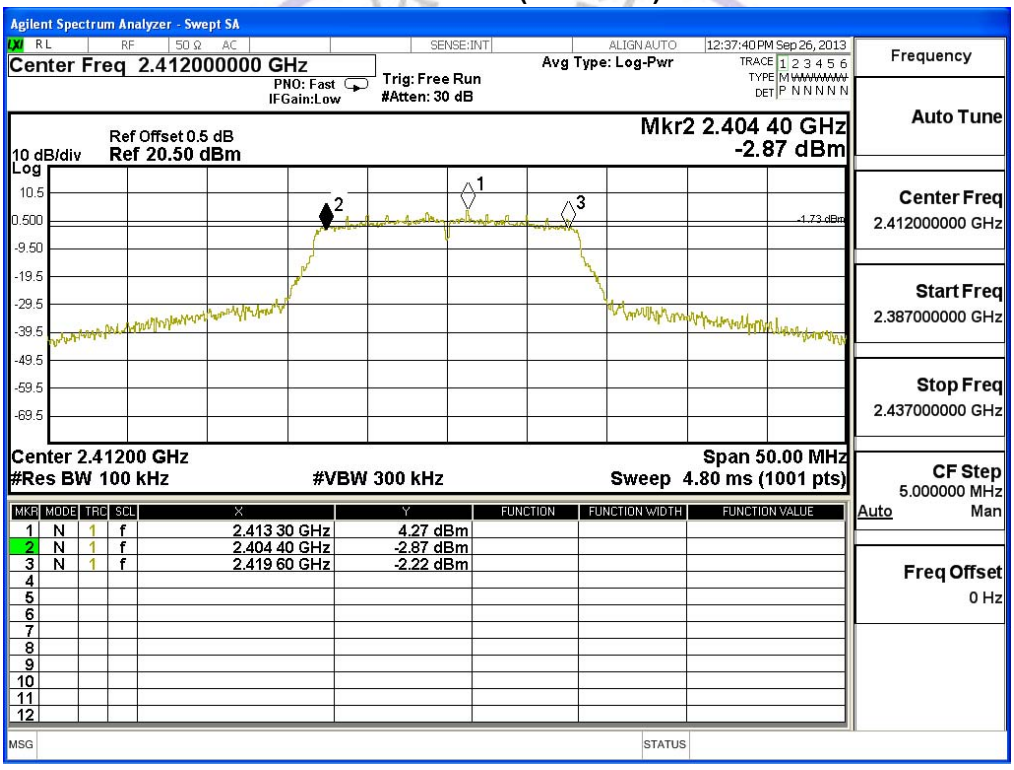
Channel 11 (2462MHz)



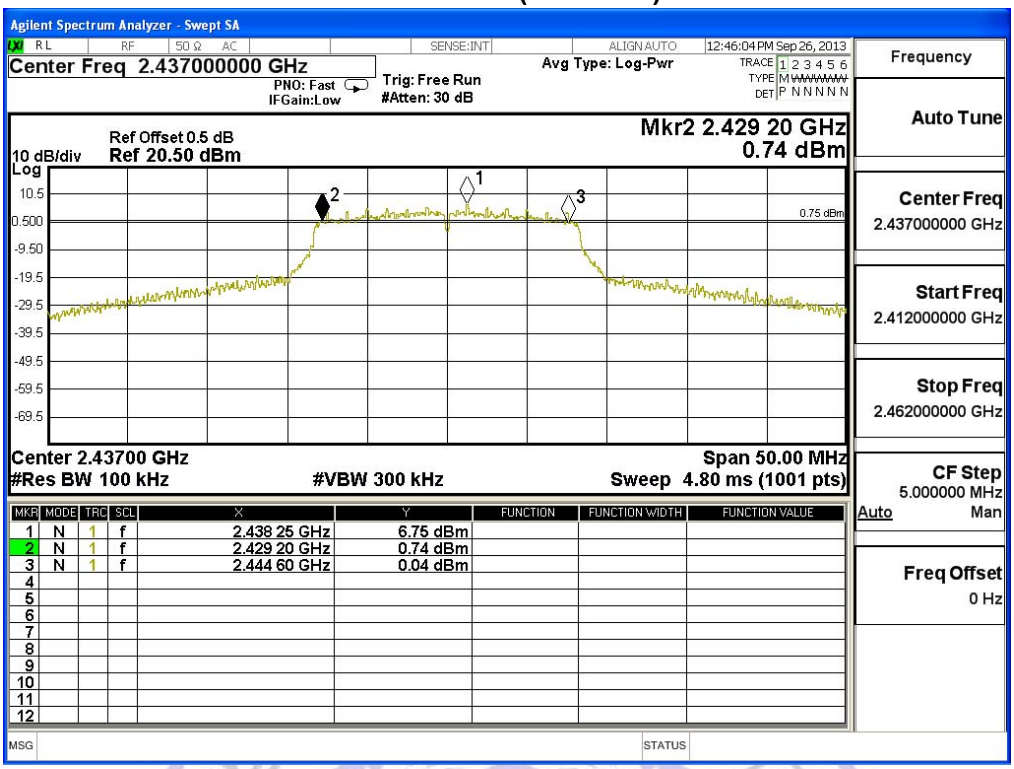
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	6dB Occupied Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Occupied Bandwidth (kHz)	Limit (kHz)	Result
01	2412	15200	500	Pass
06	2437	15400	500	Pass
11	2462	15550	500	Pass

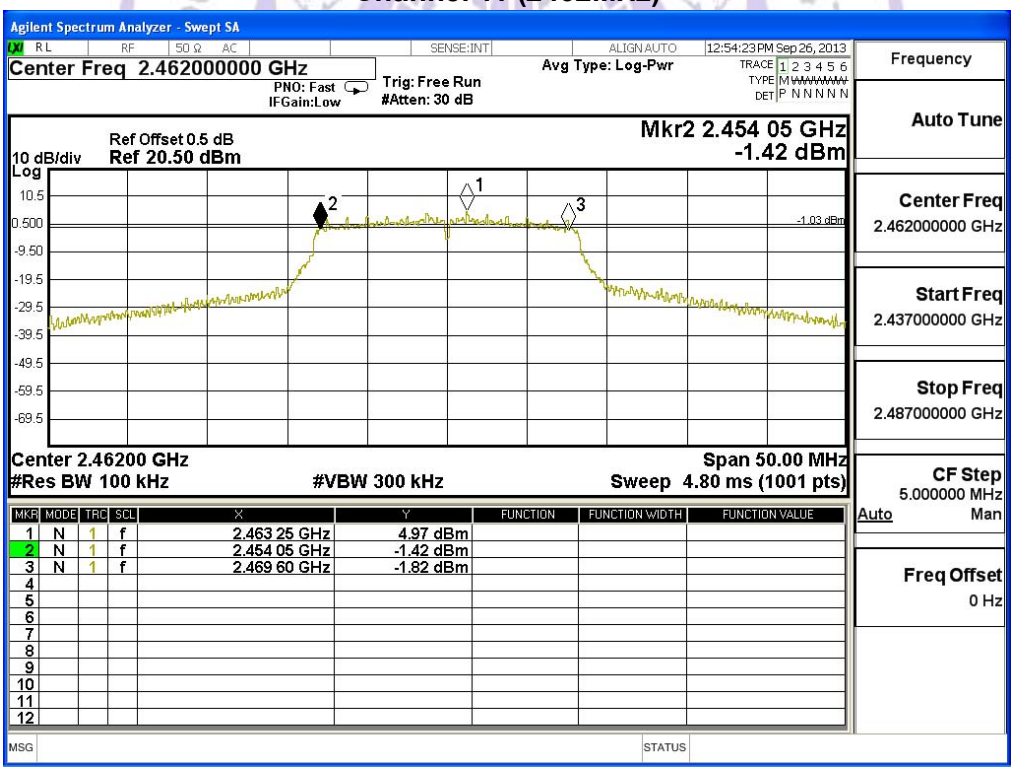
Channel 01 (2412MHz)



Channel 06 (2437MHz)

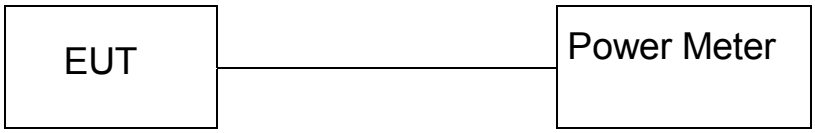


Channel 11 (2462MHz)



4.4. Maximum Peak Output Power

TEST CONFIGURATION



TEST PROCEDURE

According to C63.10 -2009 and KDB558074 D01 v03r01,The EUT was directly connected to the power meter / spectrum analyzer and antenna output port as show in the block diagram as TEST CONFIGURATION shows.

Use the wideband power meter to test peak power and record the result.

LIMIT

The Peak Output Power Measurement limits are 30dBm.

TEST RESULTS

Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 1: Transmit by 802.11b

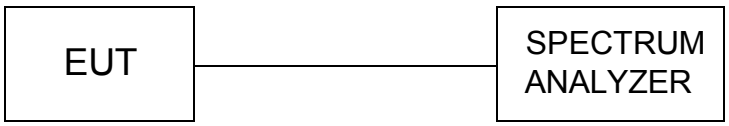
Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	2412	14.74	30.00	Pass
6	2437	14.52	30.00	Pass
11	2462	14.29	30.00	Pass

Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Output
Test Site	:	TR8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Measurement Power Output (dBm)	Limit (dBm)	Result
1	2412	13.38	30.00	Pass
6	2437	13.24	30.00	Pass
11	2462	13.03	30.00	Pass

4.5. Band Edge Measurement

TEST CONFIGURATION



TEST PROCEDURE

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10 and FCC KDB Publication No. 558074 D01 v03r01 (Measurement Guidelines of DTS) with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100 kHz, to measure the conducted peak band edge.

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

- Span: Set Span for minimum 50 MHz - Reference Level: 110 dBμV (corrected for gains and losses of test antenna factor, preamp gain and cable loss) - Attenuation: 10 dB

- Sweep Time: Coupled - Resolution Bandwidth: Up to and including 1 GHz = ≥ 100 kHz

- Resolution Bandwidth: Above 1 GHz = 1 MHz - Video Bandwidth: Below 1 GHz = 300 kHz

- Video Bandwidth: Up to and including 1 GHz =≥ 3 MHz for peak and10 Hz for average

- Detector: Peak

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel.

LIMIT

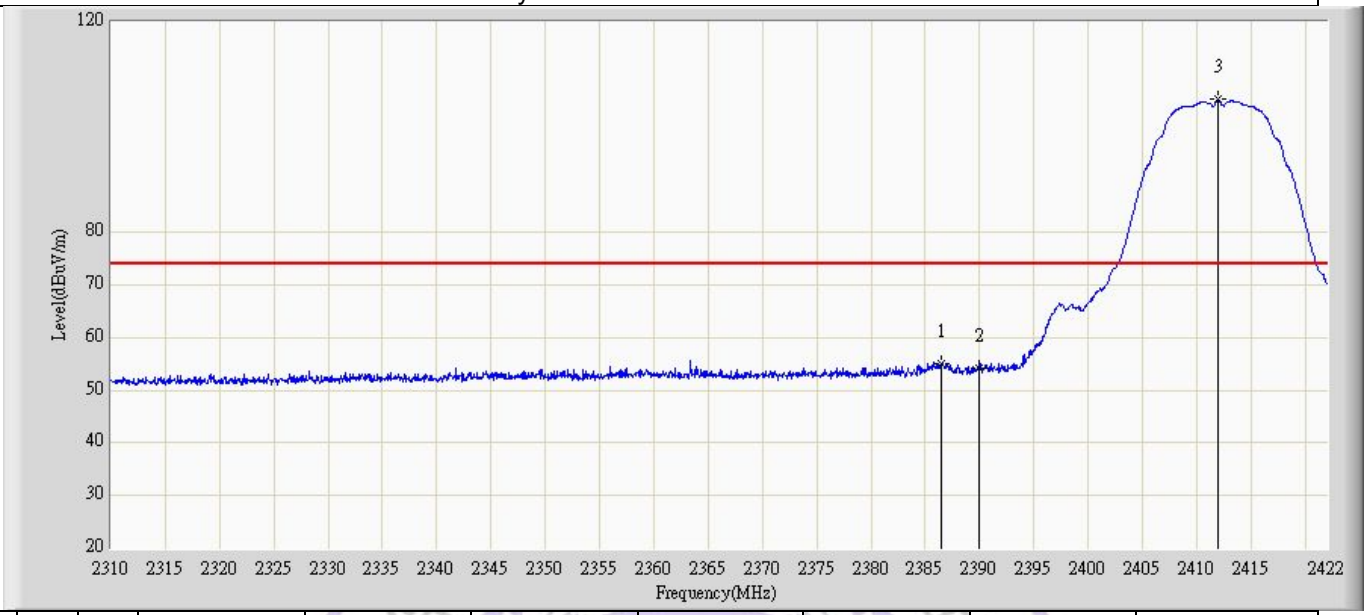
1. Below -20dB of the highest emission level in operating band.

2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209(see Section 15.205(c)).

Frequency (MHz)	Limit Average (dBuv/m)	Limit Peak (dBuv/m)
Below 2390 or Above 2483.5	54	74

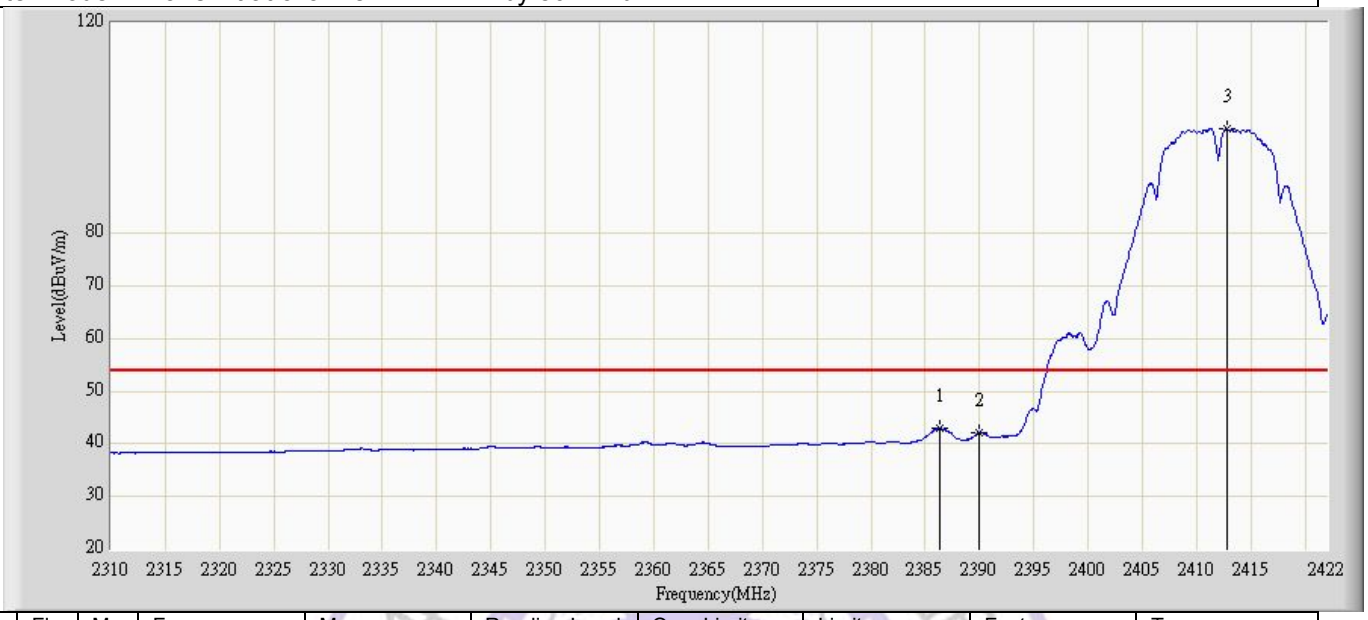
TEST RESULTS

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:07
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



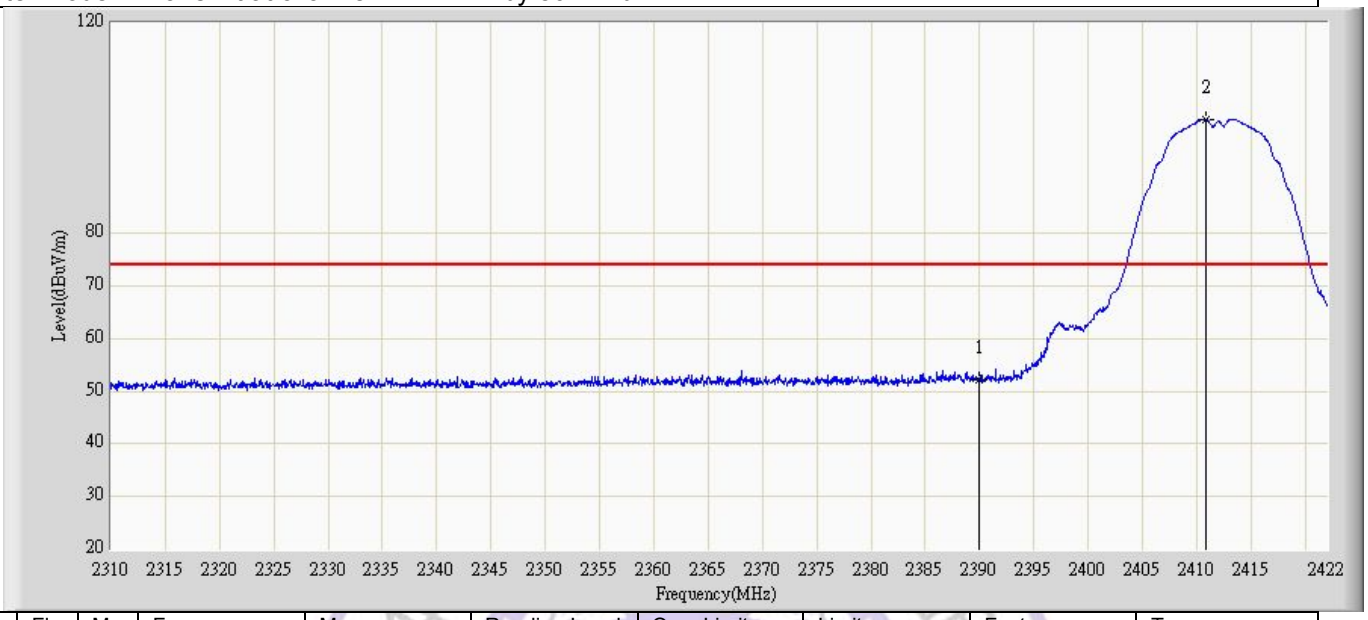
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2386.440	54.952	17.824	-19.048	74.000	37.128	PK
2			2390.000	54.271	17.112	-19.729	74.000	37.159	PK
3		*	2411.976	105.306	67.953	N/A	N/A	37.352	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:11
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



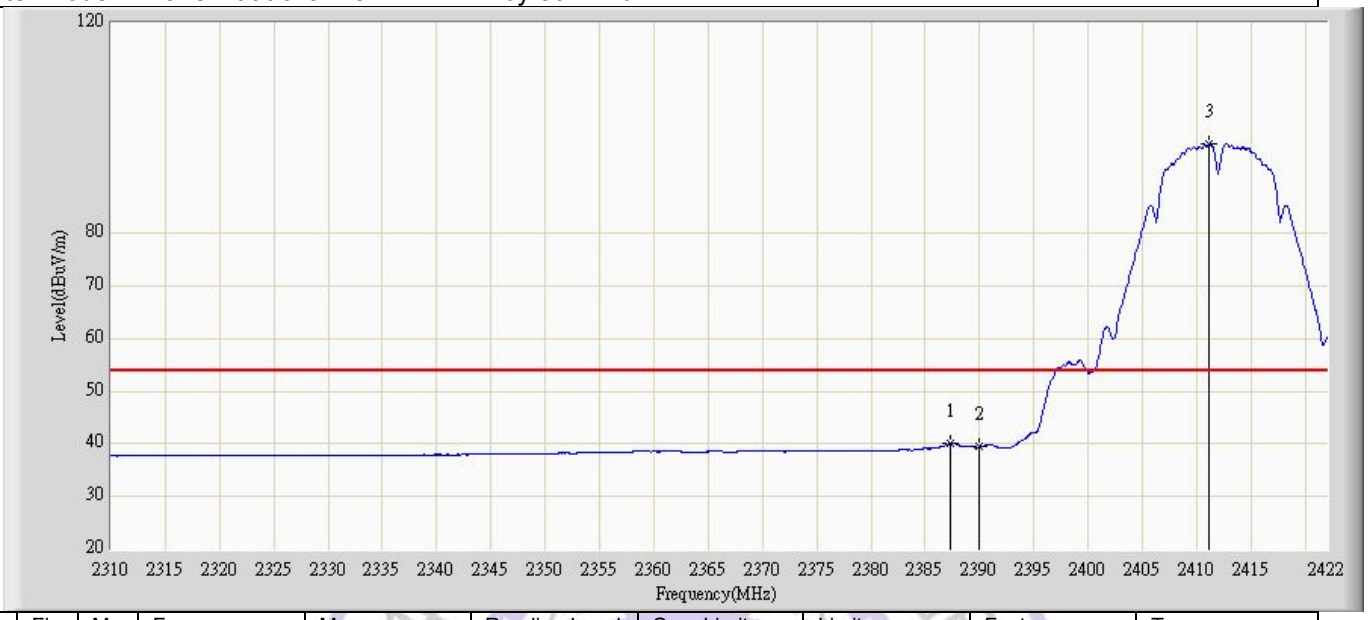
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2386.384	42.950	5.823	-11.050	54.000	37.127	AV
2			2390.000	42.138	4.979	-11.862	54.000	37.159	AV
3		*	2412.760	99.979	62.620	N/A	N/A	37.359	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:13
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



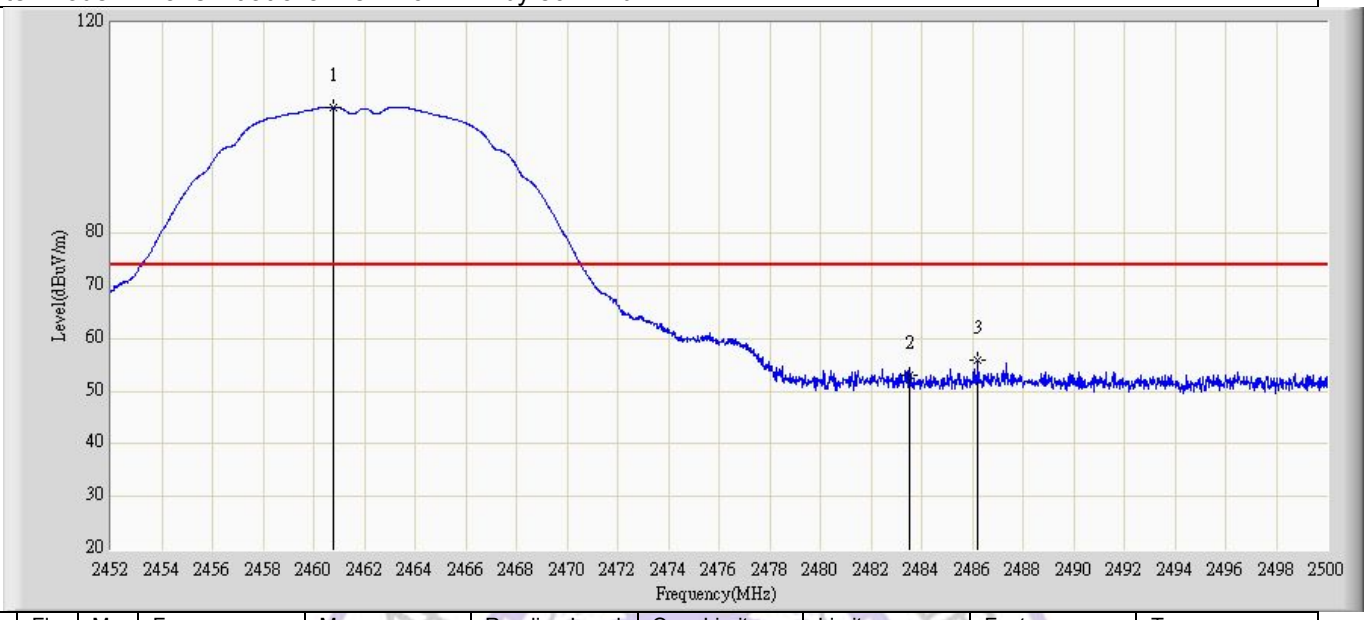
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	52.213	15.714	-21.787	74.000	36.499	PK
2		*	2410.800	101.604	65.005	N/A	N/A	36.599	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:16
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2412MHz by 802.11b	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2387.280	40.093	3.607	-13.907	54.000	36.486	AV
2			2390.000	39.427	2.928	-14.573	54.000	36.499	AV
3		*	2411.136	96.991	60.390	N/A	N/A	36.600	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:17
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2462MHz by 802.11b	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2460.784	104.015	66.244	N/A	N/A	37.771	PK
2			2483.500	53.054	15.084	-20.946	74.000	37.969	PK
3			2486.224	55.907	17.913	-18.093	74.000	37.993	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:20
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2462MHz by 802.11b	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2462.752	99.388	61.600	N/A	N/A	37.788	AV
2			2483.500	40.896	2.926	-13.104	54.000	37.969	AV
3			2487.280	41.383	3.380	-12.617	54.000	38.003	AV

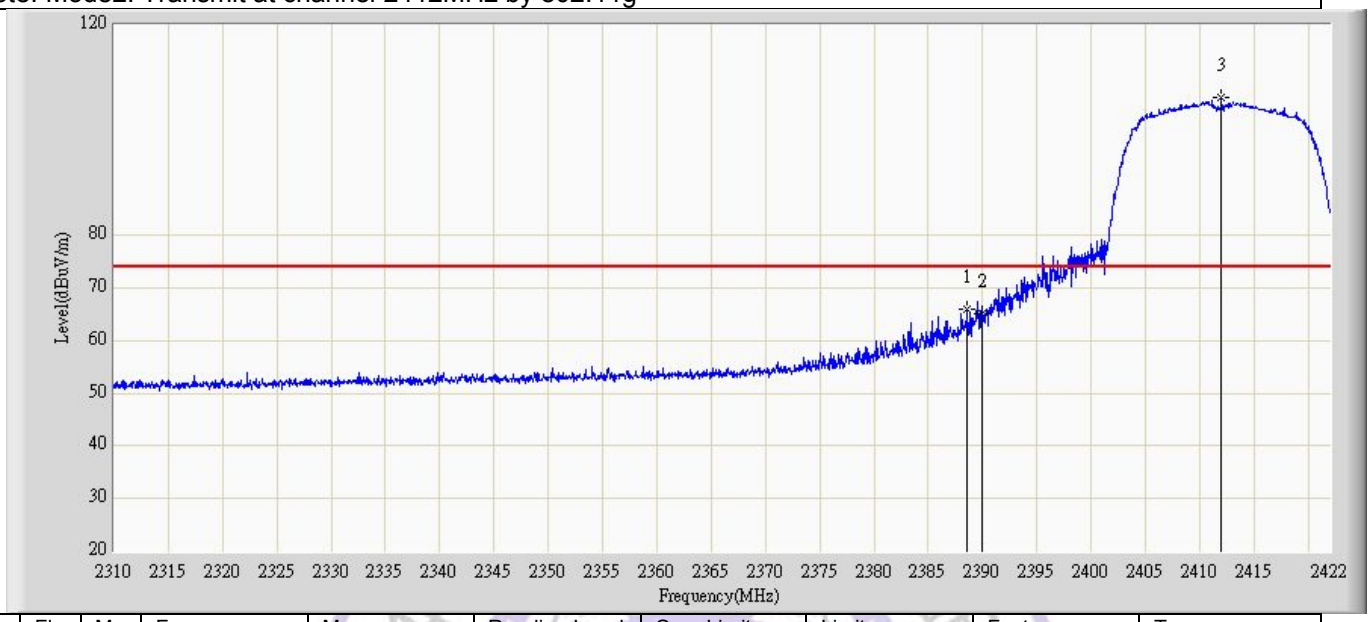
Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:21
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2462MHz by 802.11b	

No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2460.712	102.392	65.564	N/A	N/A	36.827	PK
2			2483.500	52.252	15.316	-21.748	74.000	36.935	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:23
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode1: Transmit at channel 2462MHz by 802.11b	

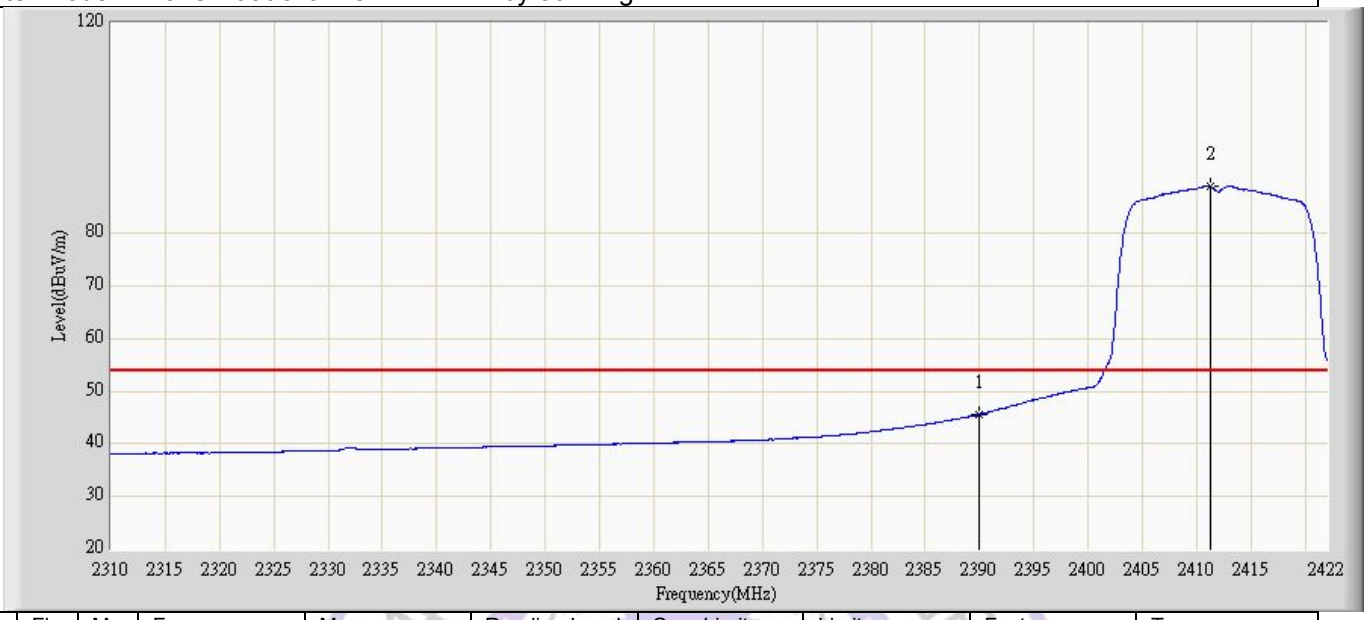
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2462.632	97.494	60.658	N/A	N/A	36.836	AV
2			2483.500	39.625	2.689	-14.375	54.000	36.935	AV
3			2487.352	40.046	3.092	-13.954	54.000	36.954	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:24
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



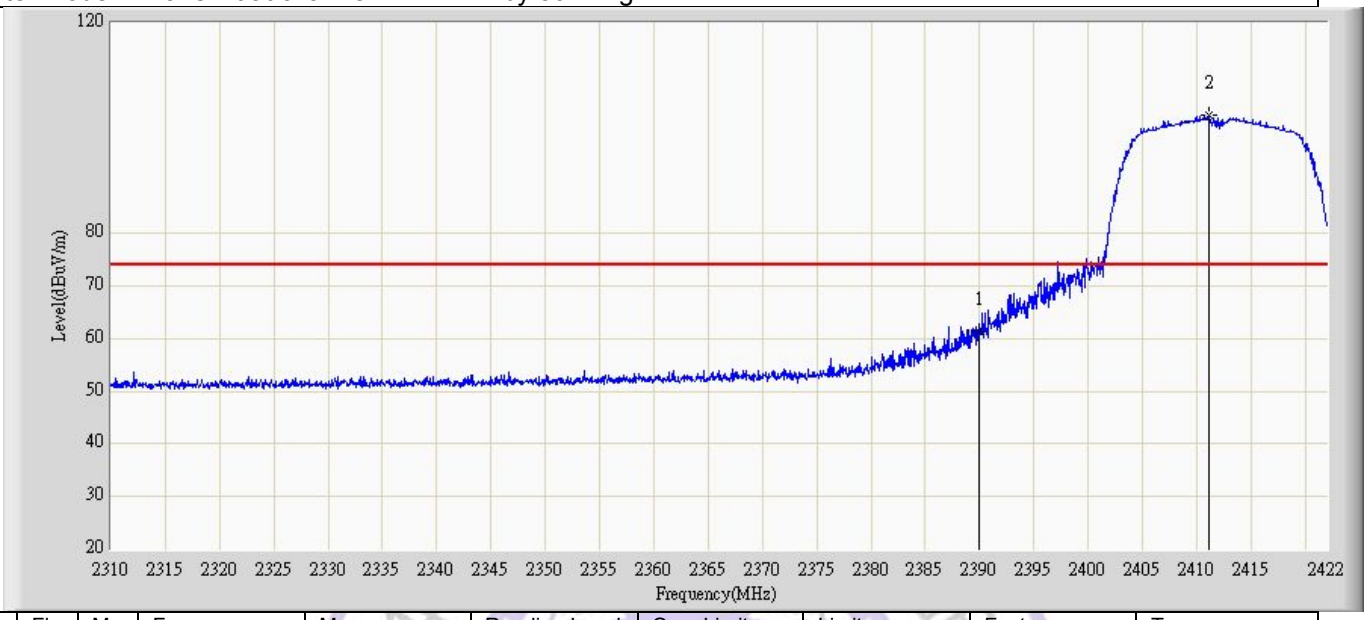
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2388.624	65.926	28.779	-8.074	74.000	37.147	PK
2			2390.000	64.990	27.831	-9.010	74.000	37.159	PK
3		*	2412.032	106.304	68.951	N/A	N/A	37.353	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:26
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



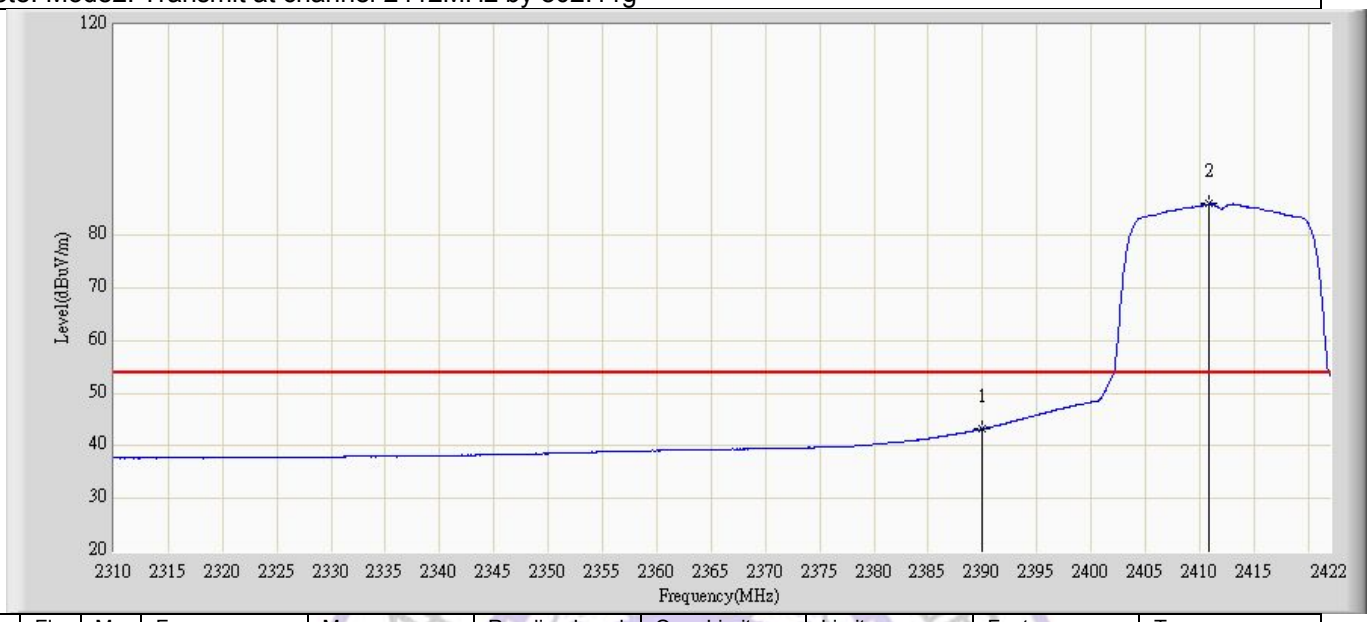
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	45.610	8.451	-8.390	54.000	37.159	AV
2		*	2411.304	88.839	51.492	N/A	N/A	37.346	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:27
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



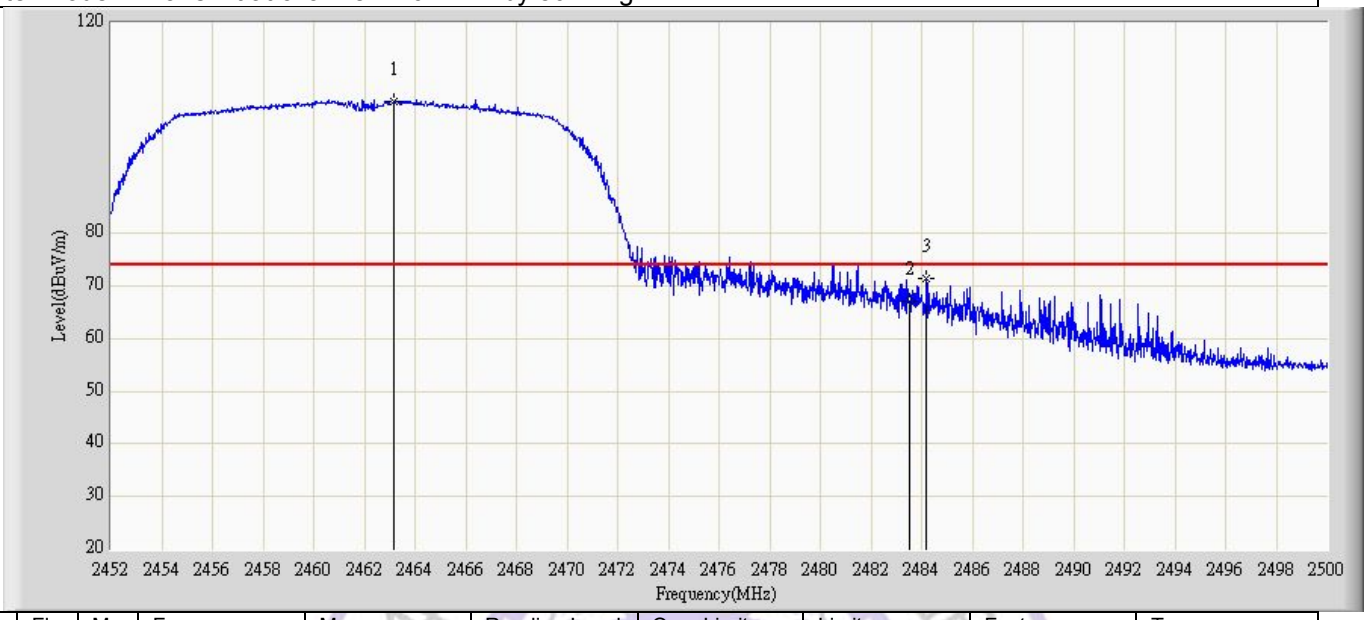
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	61.452	24.953	-12.548	74.000	36.499	PK
2		*	2411.192	102.561	65.960	N/A	N/A	36.601	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:30
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2412MHz by 802.11g	



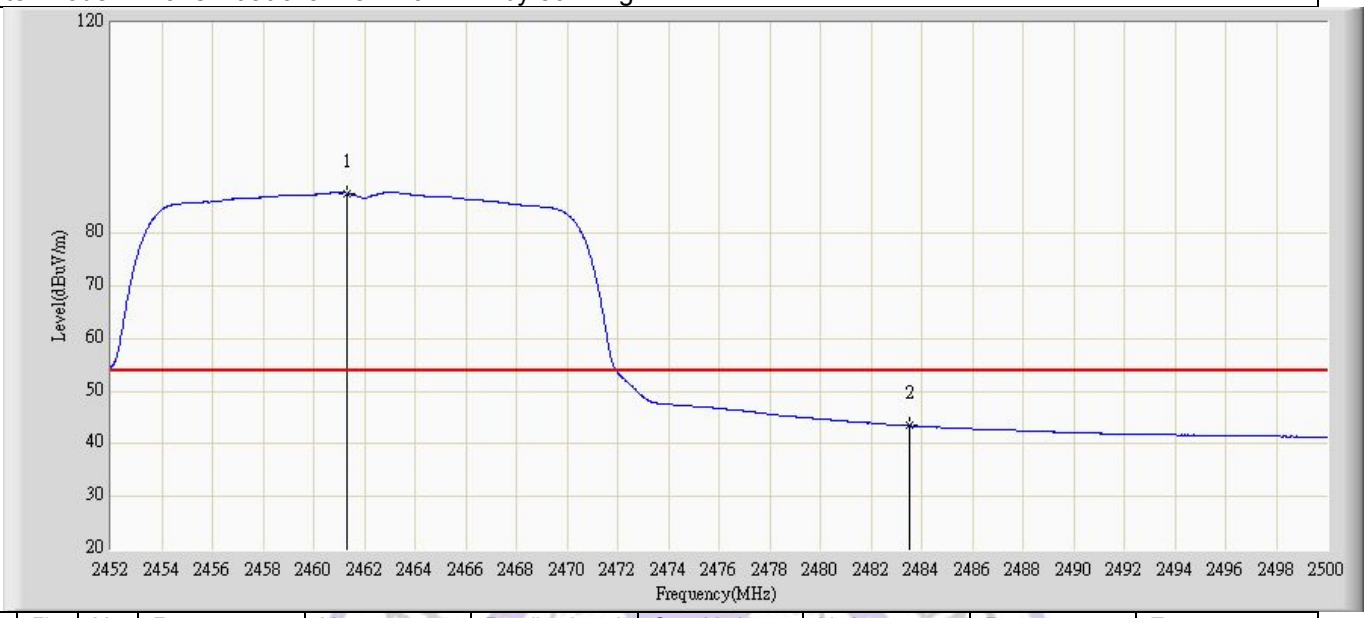
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1			2390.000	43.188	6.689	-10.812	54.000	36.499	AV
2		*	2410.912	86.005	49.405	N/A	N/A	36.600	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:32
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



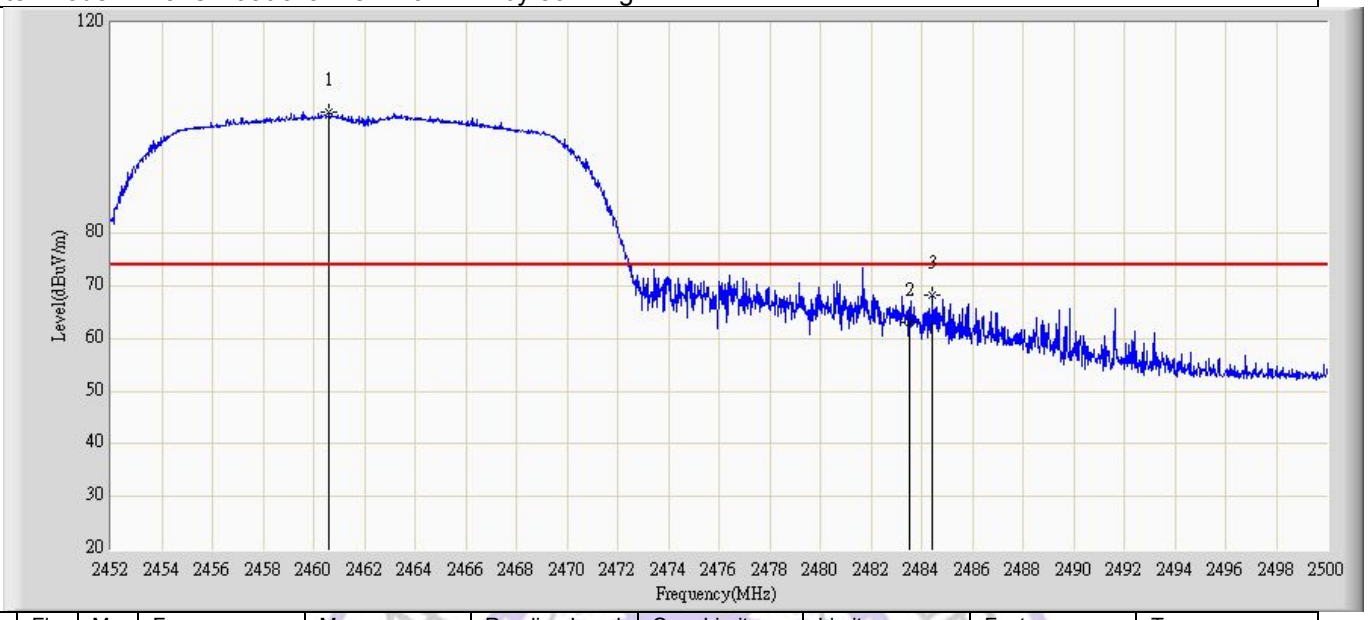
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2463.184	105.050	67.259	N/A	N/A	37.791	PK
2			2483.500	67.154	29.184	-6.846	74.000	37.969	PK
3			2484.208	71.434	33.458	-2.566	74.000	37.976	PK

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:35
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Horizontal
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



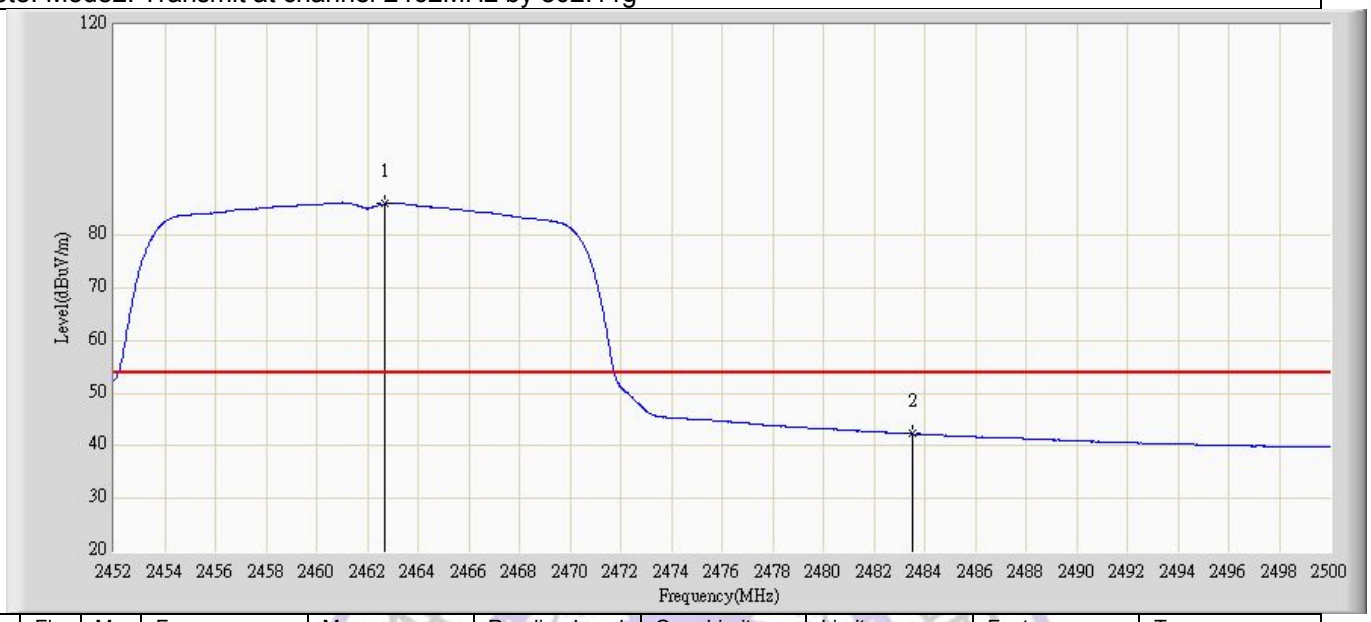
No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2461.312	87.627	49.852	N/A	N/A	37.776	AV
2			2483.500	43.438	5.468	-10.562	54.000	37.969	AV

Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:36
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2460.616	103.075	66.248	N/A	N/A	36.827	PK
2			2483.500	63.231	26.295	-10.769	74.000	36.935	PK
3			2484.400	68.222	31.282	-5.778	74.000	36.940	PK

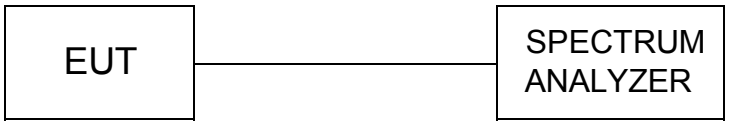
Engineer: Milo	
Site: AC5	Time: 2013/09/26 - 11:38
Limit: FCC_Part15.209_RE(3m)	Margin: 0
Probe: Horn_3117_988(1-18GHz)	Polarity: Vertical
EUT: 3G WCDMA+GSM Smart Phone	Power: DC 3.7V
Note: Mode2: Transmit at channel 2462MHz by 802.11g	



No	Flag	Mark	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	Factor	Type
1		*	2462.704	86.000	49.164	N/A	N/A	36.837	AV
2			2483.500	42.284	5.348	-11.716	54.000	36.935	AV

4.6. Power Spectral Density Measurement

TEST CONFIGURATION



TEST PROCEDURE

The EUT was tested according to KDB558074 D01 v03r01 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 3 kHz, VBW≥10KHz, SPAN to 1.5 times greater than the EBW,.

LIMIT

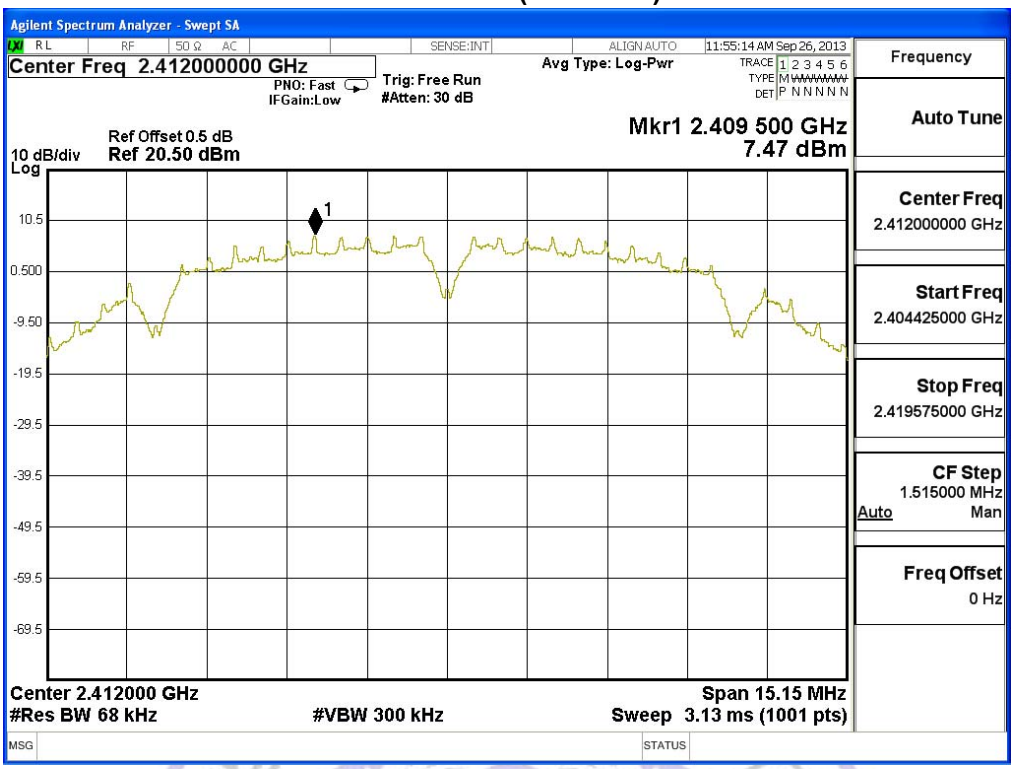
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST RESULTS

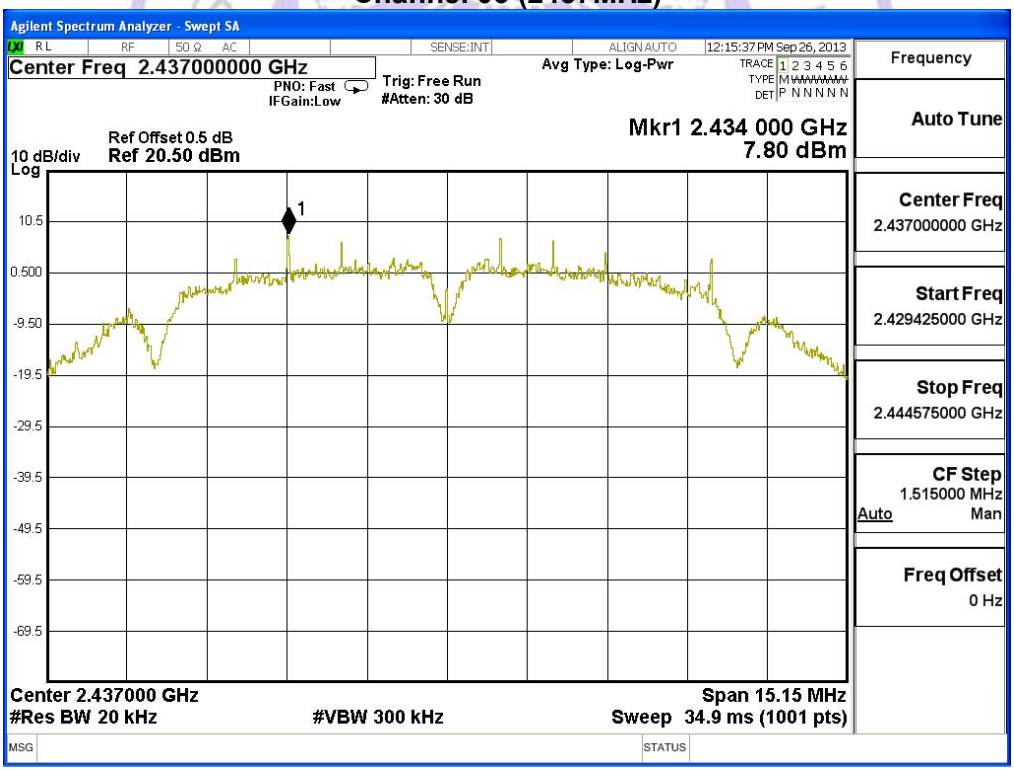
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel No.	Frequency (MHz)	Measurement PPSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
01	2412	7.47	8	Pass
06	2437	7.80	8	Pass
11	2462	7.77	8	Pass

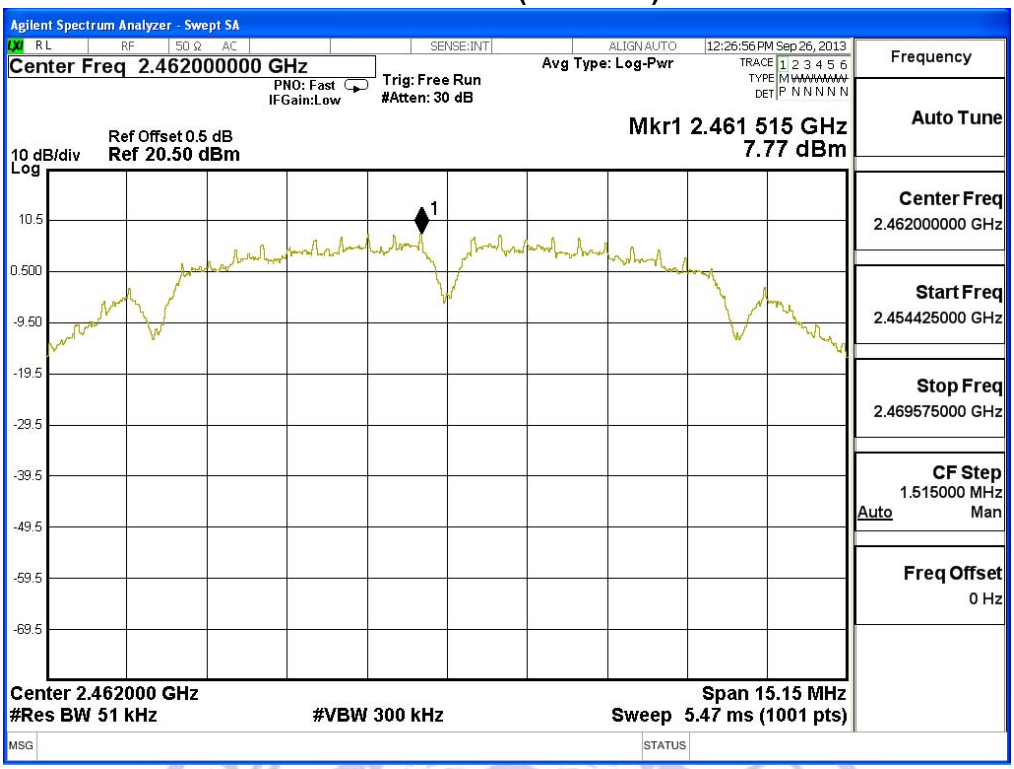
Channel 01 (2412MHz)



Channel 06 (2437MHz)



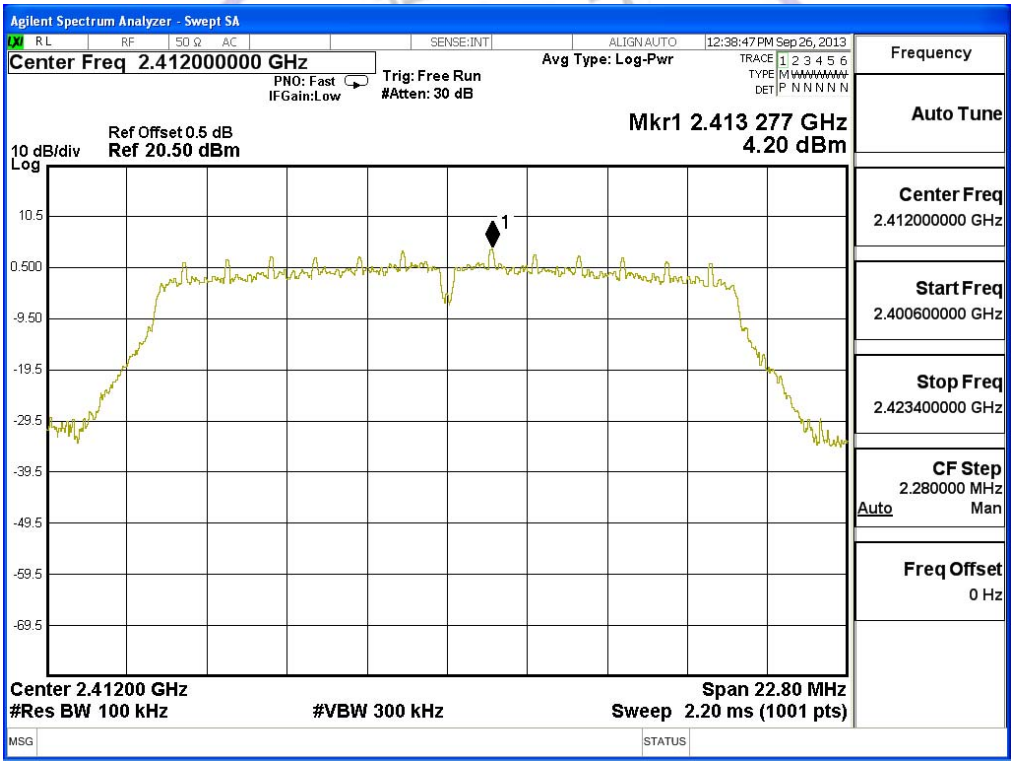
Channel 11 (2462MHz)



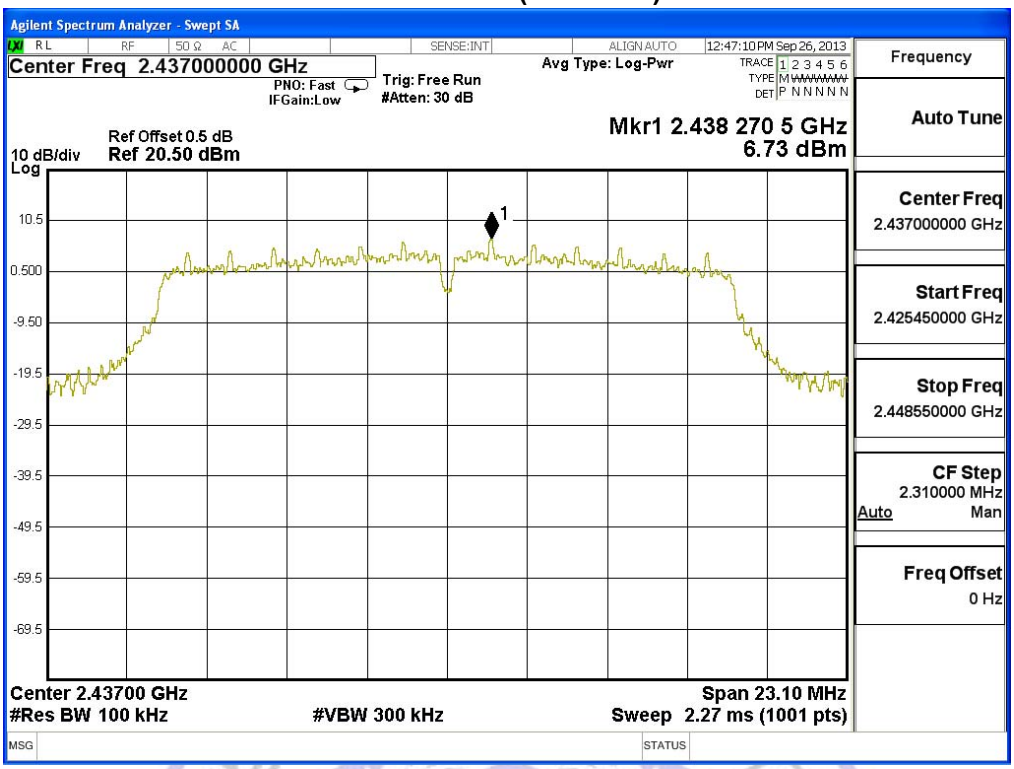
Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Power Spectral Density
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel No.	Frequency (MHz)	Measurement PPSD (dBm/3KHz)	Limit (dBm/3KHz)	Result
01	2412	4.20	8	Pass
06	2437	6.73	8	Pass
11	2462	4.58	8	Pass

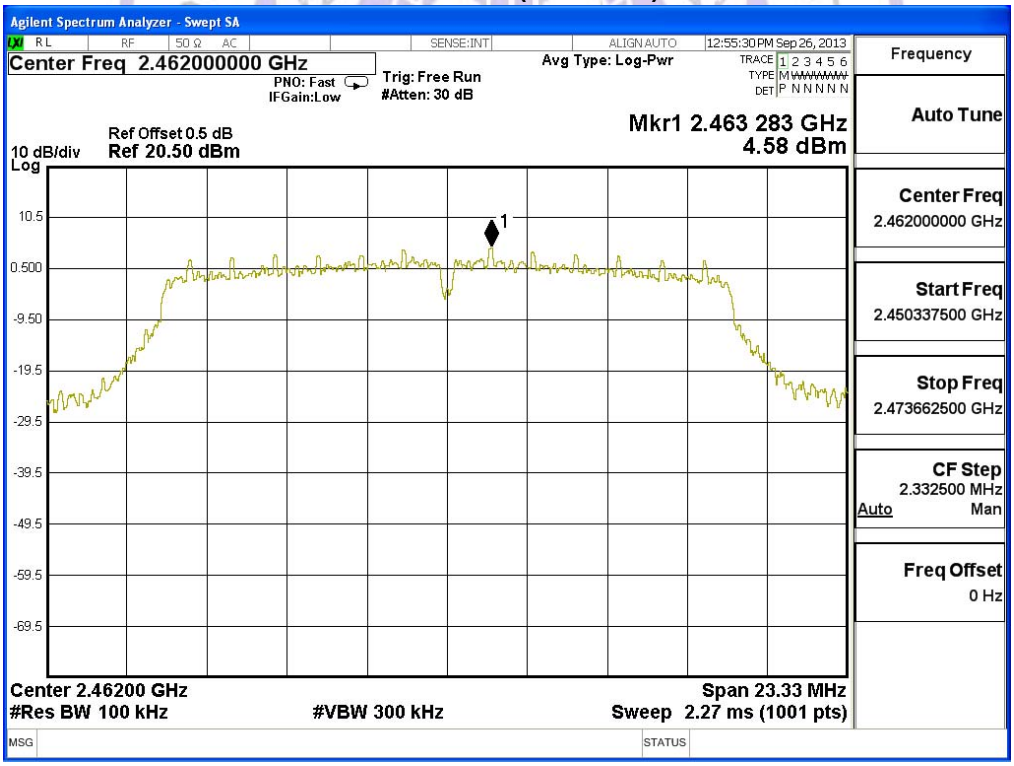
Channel 01 (2412MHz)



Channel 06 (2437MHz)

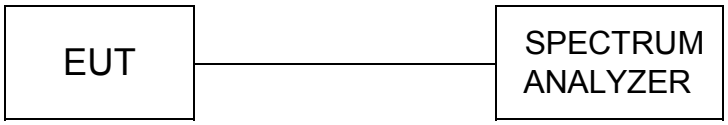


Channel 11 (2462MHz)



4.7. Spurious RF Conducted Emission

TEST CONFIGURATION



TEST PROCEDURE

The EUT was tested according to KDB558074 D01 v03r01 for compliance to FCC 47CFR 15.247 requirements.
The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2009 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBM= 300KHz to measure the peak field strength , and measure frequeny range from 30MHz to 26.5GHz.

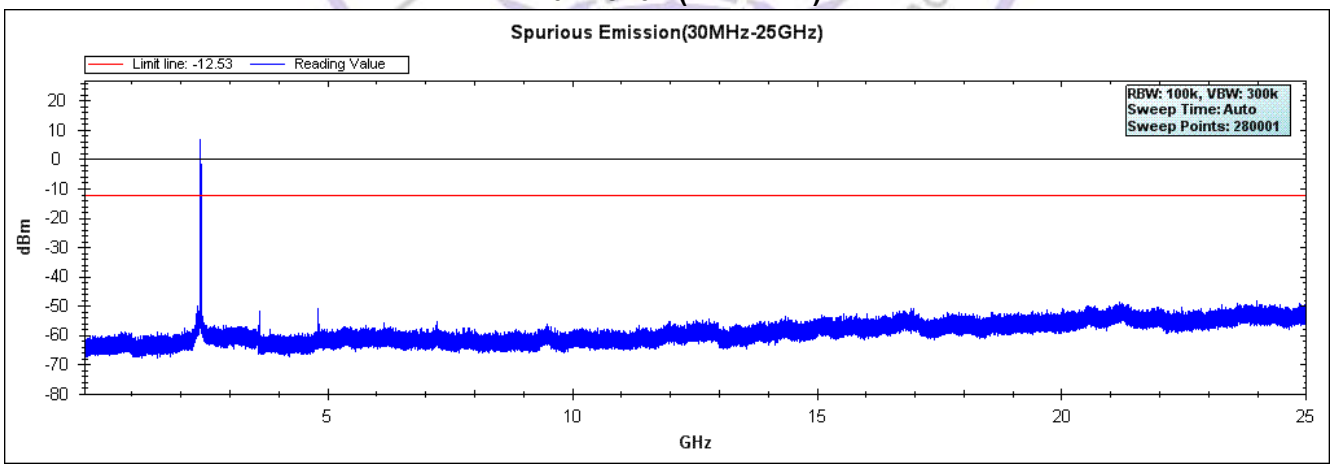
LIMIT

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.

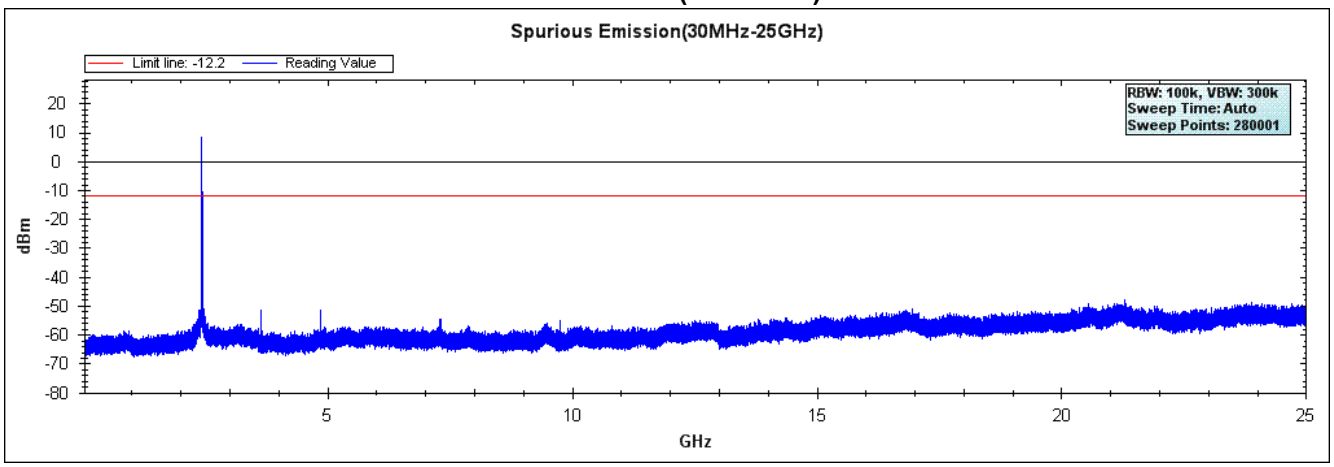
TEST RESULTS

Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

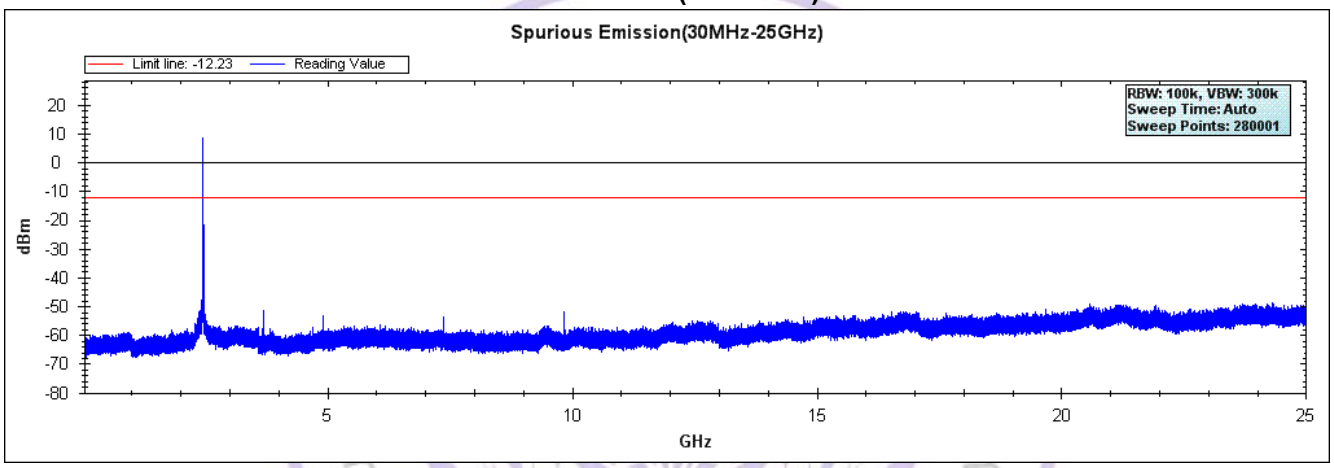
Channel 01 (2412MHz)



Channel 06 (2437MHz)

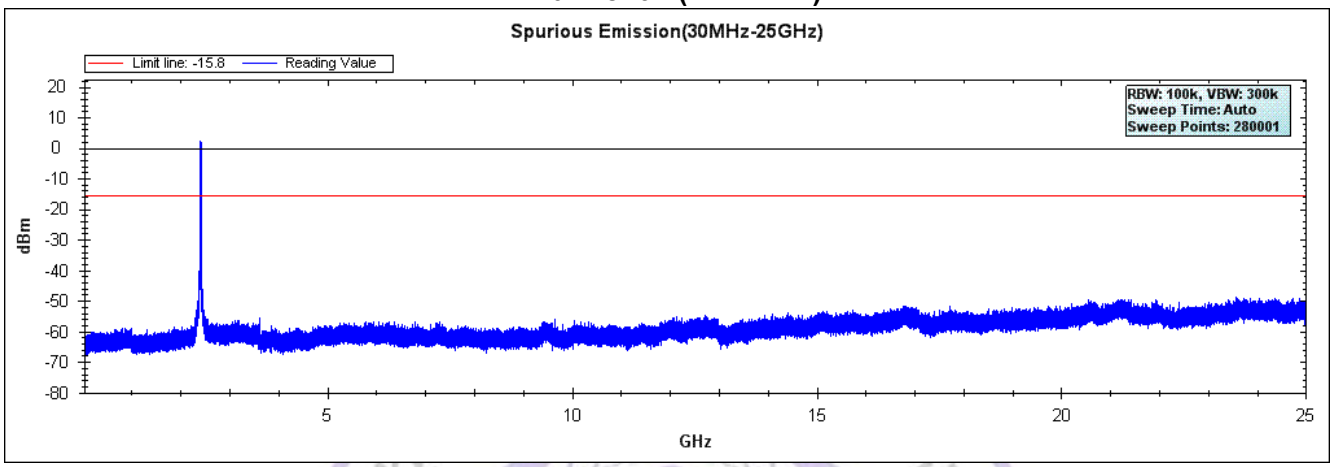


Channel 11 (2462MHz)

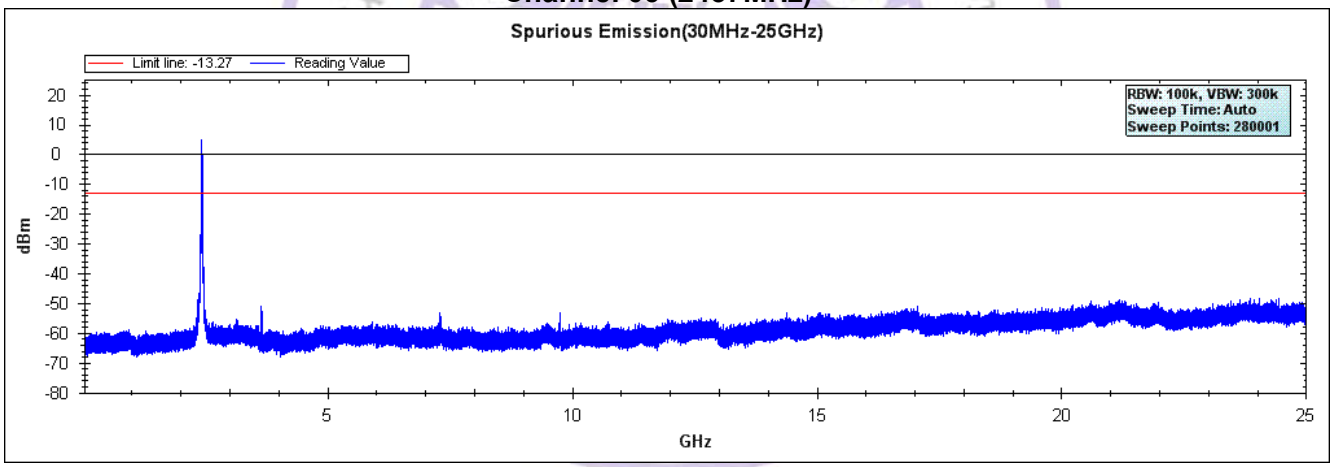


Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	RF Antenna Conducted Spurious
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

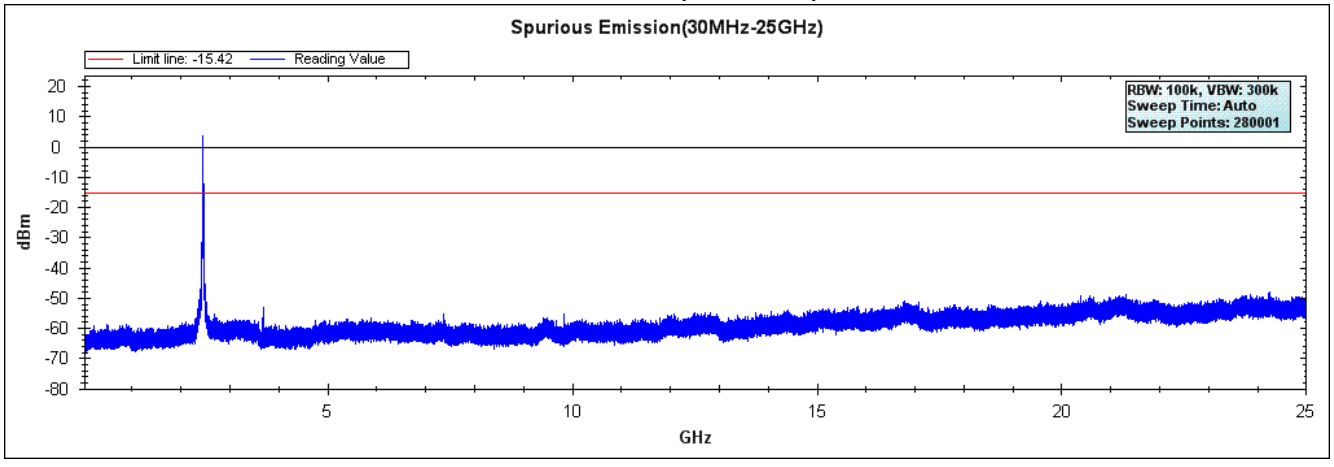
Channel 01 (2412MHz)



Channel 06 (2437MHz)

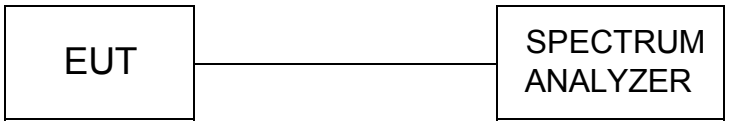


Channel 11 (2462MHz)



4.8. Operation Frequency Range of 20dB Bandwidth

TEST CONFIGURATION



TEST PROCEDURE

The EUT was tested according to KDB558074 D01 v03r01 for compliance to FCC 47CFR 15.247 requirements.
Set RBW = 100 kHz, Span greater than RBW.

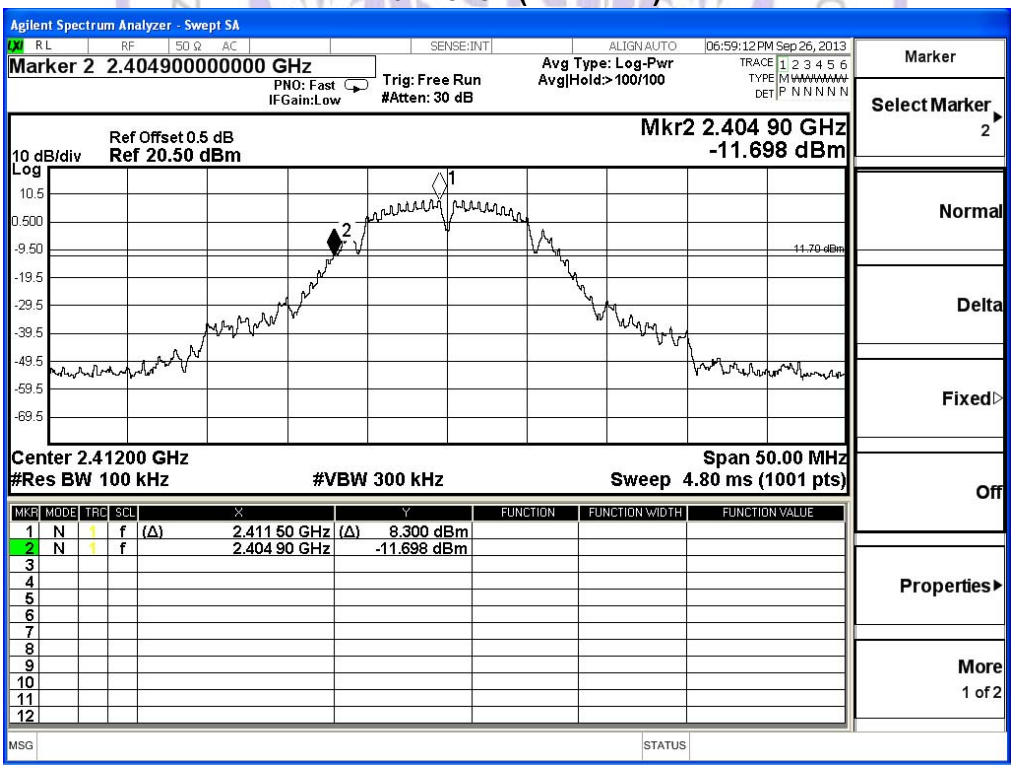
LIMIT

20 dB bandwidth of the emission is contained within the operation frequency band.

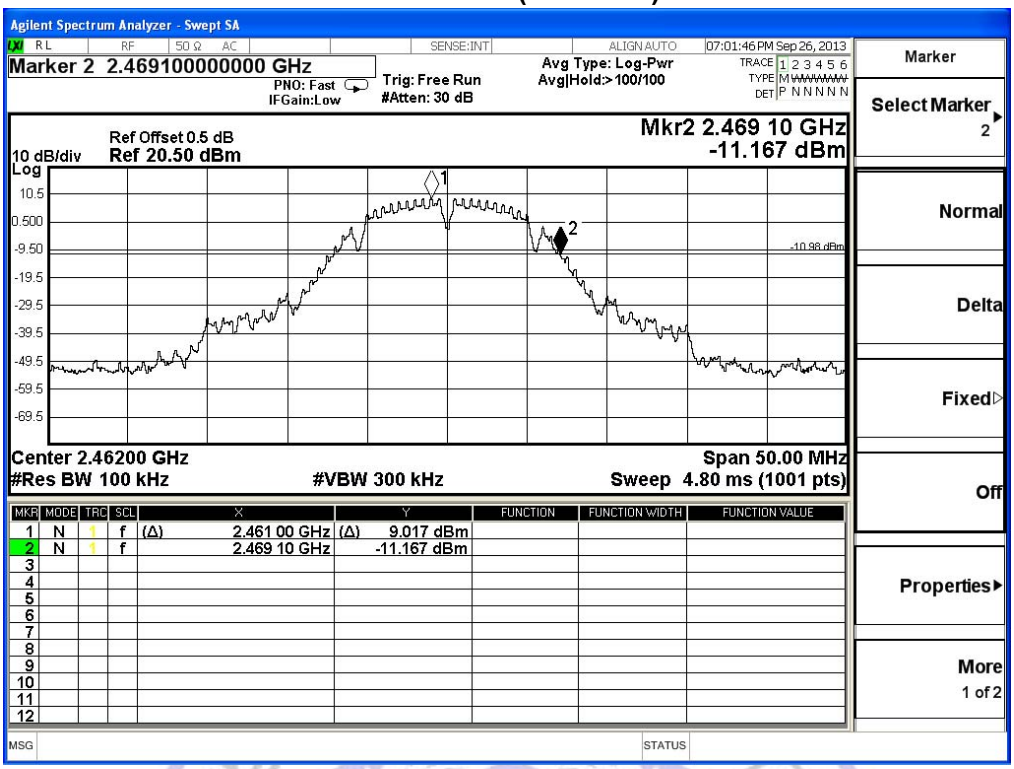
TEST RESUTL

Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 1: Transmit by 802.11b

Channel 01 (2412MHz)

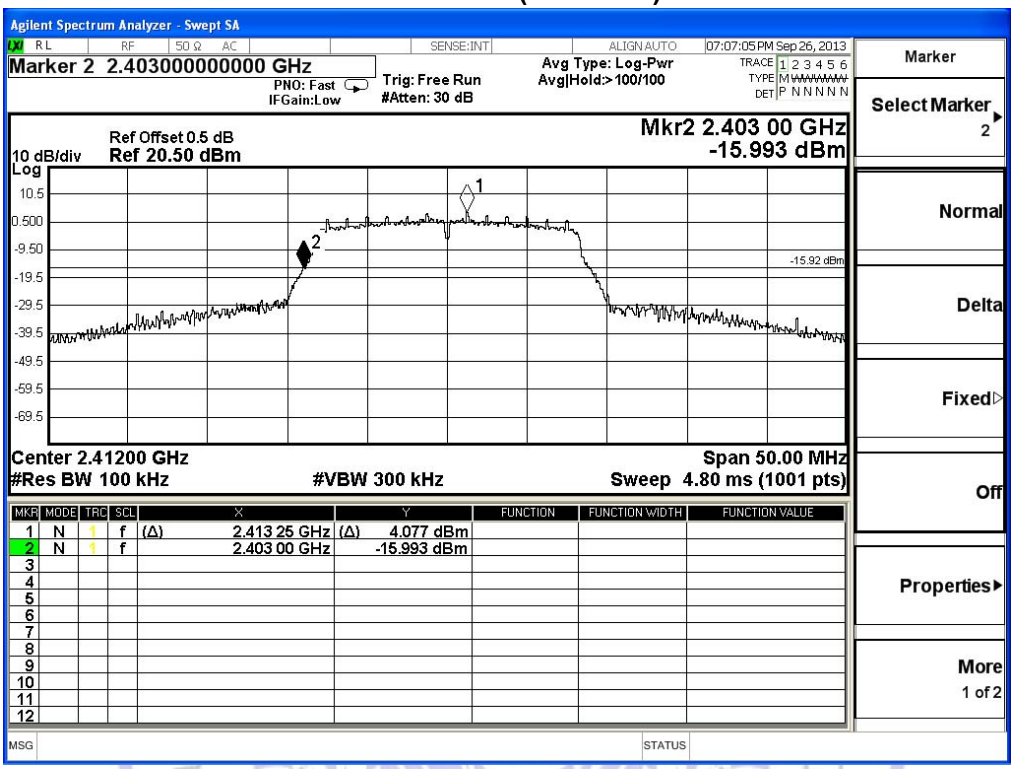


Channel 11 (2462MHz)

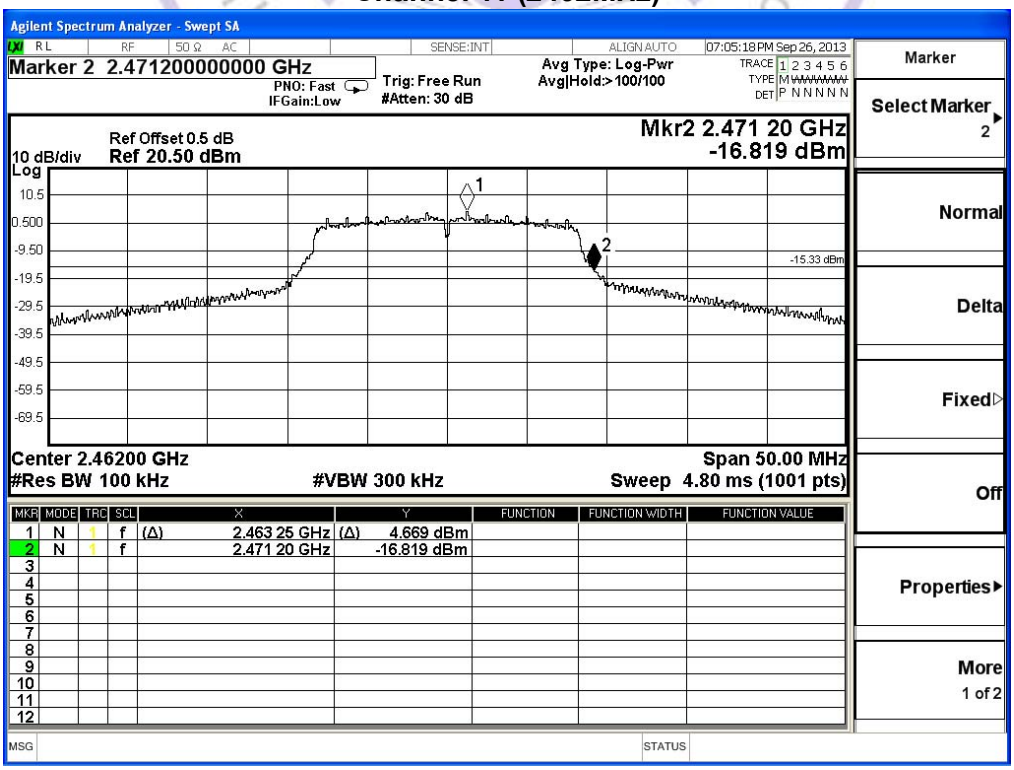


Product	:	3G WCDMA+GSM Smart Phone
Test Item	:	Operation Frequency Range of 20dB Bandwidth
Test Site	:	TR-8
Test Mode	:	Mode 2: Transmit by 802.11g

Channel 01 (2412MHz)



Channel 11 (2462MHz)



4.9. Antenna Requirement

STANDARD APPLICABLE

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

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

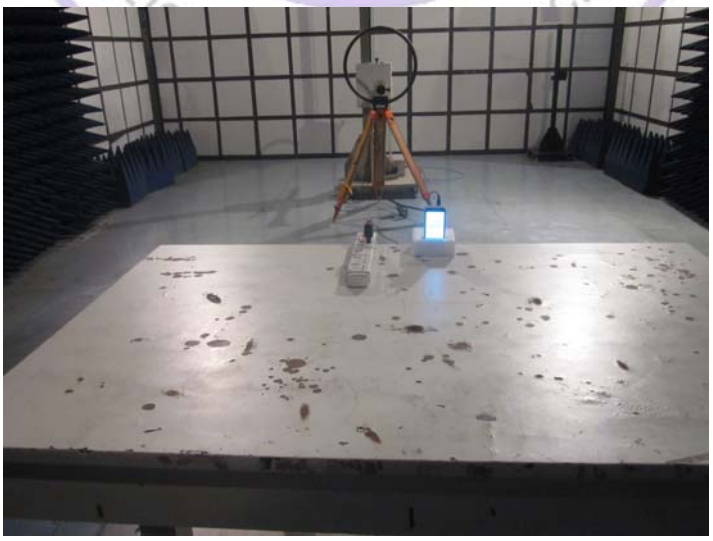
Refer to statement below for compliance.

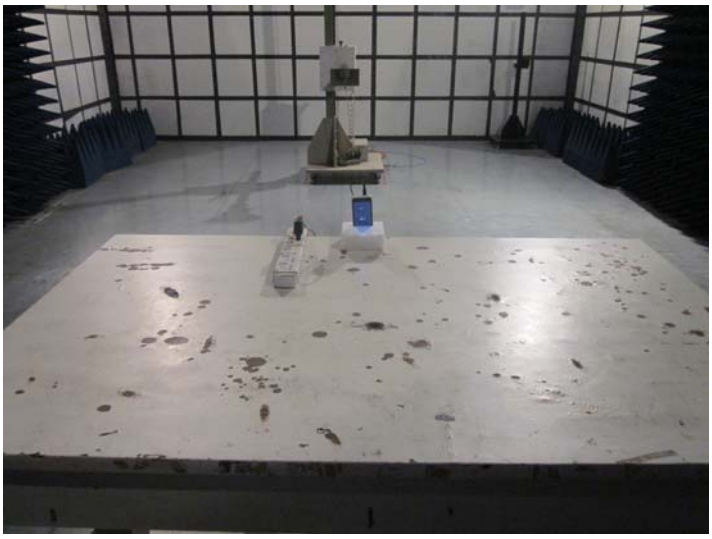
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

ANTENNA CONNECTED CONSTRUCTION

The directional gains of antenna used for transmitting is 1 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

5. Test Setup Photos of the EUT



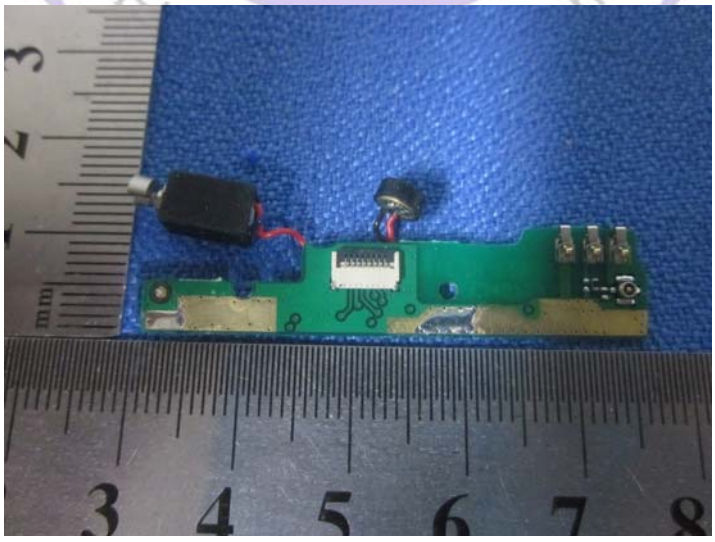


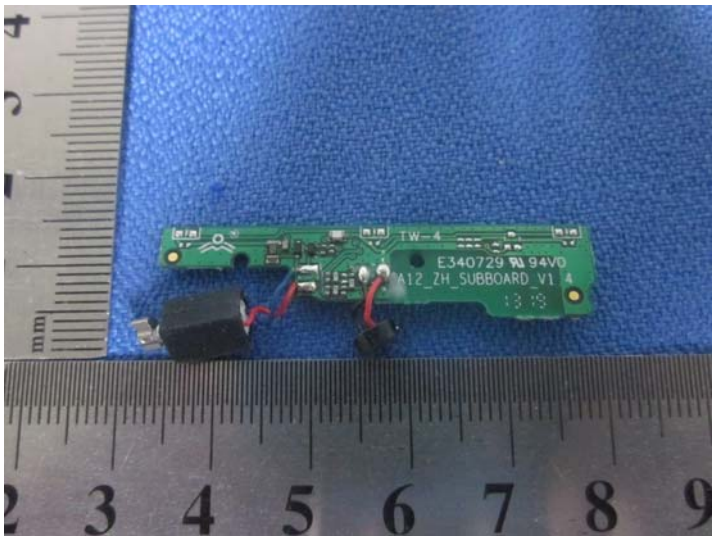
6. External and Internal Photos of the EUT

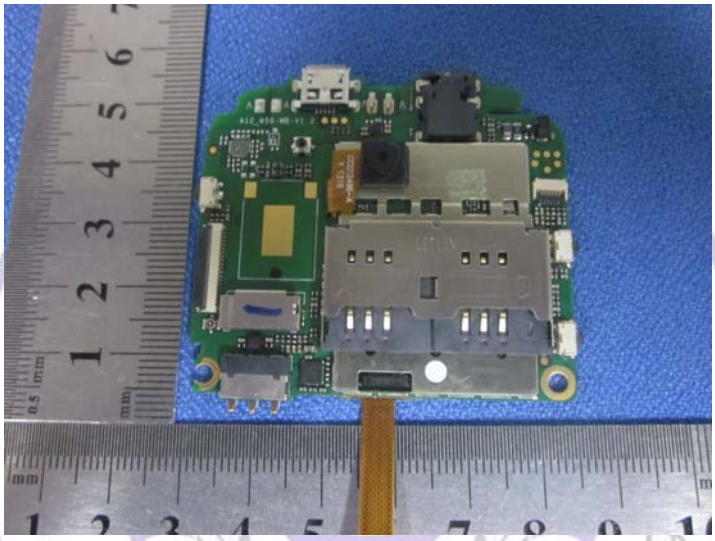
External Photos of EUT

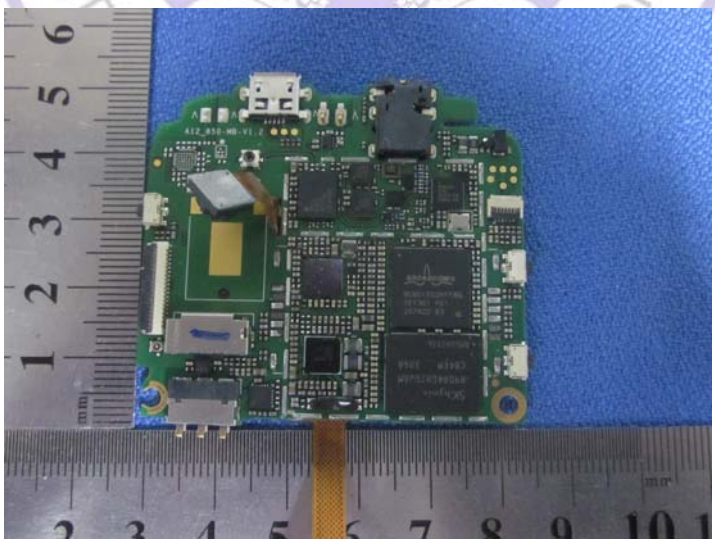

MULTILASER

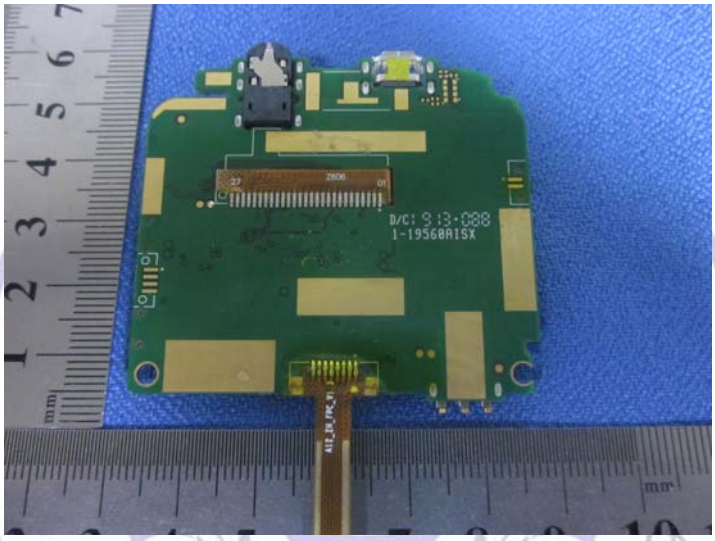
Internal Photos of EUT

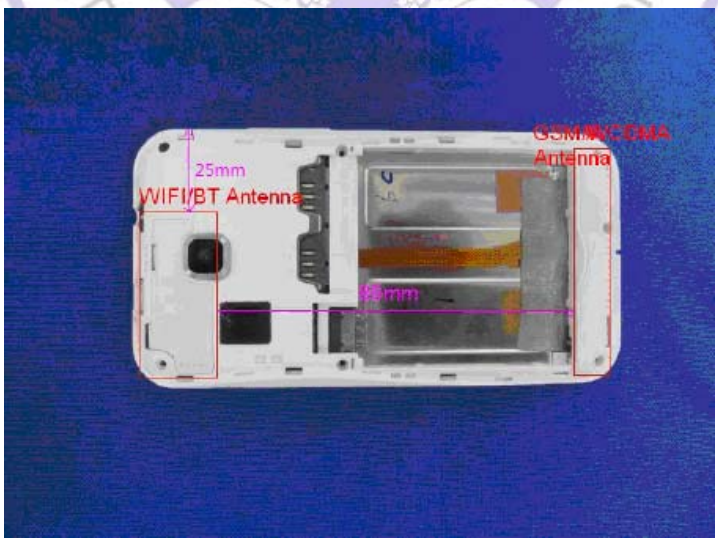



TW-4
E340729 94V0
A12_ZH_SUBBOARD_V1.4









.....End of Report.....