

## FCC TEST REPORT

For

Plus One Marketing Ltd.

Smart phone

Test Model: FTU152D

Prepared for  
Address

: Plus One Marketing Ltd.  
: Sumitomofudosan Hibiya building 2F, 2-8-6 Shinbashi,  
Minatoku, Tokyo, Japan

Prepared by  
Address

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Date of receipt of test sample : December 21, 2015  
Number of tested samples : 1  
Sample number : 15121720  
Date of Test : January 04, 2016 - January 20, 2016  
Date of Report : January 20, 2016

**FCC TEST REPORT****FCC CFR 47 PART 15 C(15.247): 2015****Report Reference No.** ..... : LCS1512191752E

Date of Issue ..... : January 20, 2016

**Testing Laboratory Name** ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.Address ..... : 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue,  
Bao'an District, Shenzhen, Guangdong, ChinaTesting Location/ Procedure ..... : Full application of Harmonised standards   
Partial application of Harmonised standards   
Other standard testing method **Applicant's Name** ..... : Plus One Marketing Ltd.Address ..... : Sumitomofudosan Hibiya building 2F, 2-8-6 Shinbashi,  
Minatoku, Tokyo, Japan**Test Specification**

Standard ..... : FCC CFR 47 PART 15 C(15.247): 2015 / ANSI C63.10: 2013

**Test Report Form No.** ..... : LCSEMC-1.0

TRF Originator ..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF ..... : Dated 2011-03

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**Test Item Description** ..... : Smart phone

Trade Mark ..... : FREETEL

Test Model ..... : FTU152D

Ratings ..... : DC 3.8V by Li-ion Battery(3450mAh)

Recharge Voltage: DC 5V/1500mA or DC 7V/1500mA

Result ..... : Positive

**Compiled by:**

Leo Lee/ File administrators

**Supervised by:**

Glin Lu/ Technique principal

**Approved by:**

Gavin Liang/ Manager

## FCC -- TEST REPORT

<b>Test Report No. : LCS1512191752E</b>	<u>January 20, 2016</u> Date of issue
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Test Model..... : FTU152D

EUT..... : Smart phone

**Applicant..... : Plus One Marketing Ltd.**

Address..... : Sumitomofudosan Hibiya building 2F, 2-8-6 Shinbashi, Minatoku,  
Tokyo, Japan

Telephone..... : /

Fax..... : /

**Manufacturer..... : Toro-tech Company Limited**

Address..... : A802, Block2, Tianan Cyberpark, Longgang, Shenzhen, China

Telephone..... : /

Fax..... : /

**Factory..... : Toro-tech Company Limited**

Address..... : A802, Block2, Tianan Cyberpark, Longgang, Shenzhen, China

Telephone..... : /

Fax..... : /

<b>Test Result</b>	<b>Positive</b>
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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.

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## 1. GENERAL INFORMATION

### 1.1. Description of Device (EUT)

EUT	: Smart phone
Test Model	: FTU152D
Hardware Version	: Y991_MB_V3.1
Software Version	: Freetel_FTU152D_20151208
Power Supply	: DC 3.8V by Li-ion Battery(3450mAh) Recharge Voltage: DC 5V/1500mA or DC 7V/1500mA
EUT Supports	: GSM/GPRS/EGPRS/WCDMA/HSDPA/HSUPA/LTE/
Radios Application	2.4GHz WIFI/5GHz WIFI/Bluetooth/GPS(RX Only)/NFC
Bluetooth	:
Operating Frequency	: 2.402-2.480GHz
Channel Number	: 79 channels for Bluetooth V3.0 (DSS) 40 channels for Bluetooth V4.0 (DTS)
Channel Spacing	: 1MHz for Bluetooth V3.0 (DSS) 2MHz for Bluetooth V4.0 (DTS)
Modulation Type	: GFSK, Pi/4-DQPSK, 8-DPSK for Bluetooth V3.0 (DSS) GFSK for Bluetooth V4.0 (DTS)
Bluetooth Version	: V4.0
Antenna Description	: PIFA Antenna, -2.83dBi (Max.) For 2.4GHz Band
WIFI(2.4GHz Band)	:
Operating Frequency	: 2412-2472MHz
Channel Spacing	: 5MHz
Channel Number	: 13 Channel for 20MHz bandwidth(2412~2472MHz) 9 channels for 40MHz bandwidth(2422~2462MHz)
Modulation Type	: 802.11b: DSSS; 802.11g/n: OFDM
Antenna Description	: PIFA Antenna, -2.83dBi (Max.) For 2.4GHz Band

## 1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
SHENZHEN LIANXUNFA TECHNOLOGY CO.,LTD	Adapter	LX15026R	/	VOC

## 1.3. External I/O

I/O Port Description	Quantity	Cable
Earphone Jack	1	1.2m, unshielded
USB Port	1	1.2m, unshielded

## 1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

There is one 3m semi-anechoic chamber and one line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4:2014, CISPR 22/EN 55022 and CISPR16-4-1 SVSWR requirements.

## 1.5. List Of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18,2015	June 17,2016
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16,2015	July 15,2016
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18,2015	June 17,2016
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18,2015	June 17,2016
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18,2015	June 17,2016
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18,2015	June 17,2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-1GHz 3m	June 18,2015	June 17,2016
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHz	June 18,2015	June 17,2016
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16,2015	July 15,2016
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16,2015	July 15,2016
Spectrum Analyzer	Agilent	E4407B	MY41440292	9k-26.5GHz	July 16,2015	July 15,2016
MAX Signal Analyzer	Agilent	N9020A	MY50510140	20Hz~26.5GHz	Oct. 27, 2015	Oct. 26, 2016
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18,2015	June 17,2016
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	30MHz-1GHz	June 10,2015	June 09,2016
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10,2015	June 09,2016
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 10,2015	June 09,2016
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18,2015	June 17,2016
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18,2015	June 17,2016
Spectrum Meter	R&S	FSP 30	100023	9kHz-30GHz	July 16,2015	July 15,2016
Power Meter	R&S	NRVS	100444	DC-40GHz	June 18,2015	June 17,2016
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18,2015	June 17,2016
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18,2015	June 17,2016
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18,2015	June 17,2016
RF CABLE-2m	JYE Bao	RG142	CB035-2m	20MHz-1GHz	June 18,2015	June 17,2016

*Note: All equipment through GRGT EST calibration*

## 1.6. 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 LCS 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.

## 1.7. Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Radiation Uncertainty :	9KHz~30MHz	3.10dB	(1)
	30MHz~200MHz	2.96dB	(1)
	200MHz~1000MHz	3.10dB	(1)
	1GHz~26.5GHz	3.80dB	(1)
	26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty :	150kHz~30MHz	1.63dB	(1)
Power disturbance :	30MHz~300MHz	1.60dB	(1)

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

## 1.8. Description Of Test Modes

The EUT has been tested under operating condition.

For pre-testing, when performed power line conducted emission measurement, the input Voltage/Frequency AC 120V/60Hz and AC 240V/60Hz were used. Only recorded the worst case in this report.

The EUT was set to transmit at 100% duty cycle. This test was performed with EUT in X, Y, Z position and the worse case was found when EUT in Y position.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was determined to be 802.11b mode(TX-High Channel).

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was determined to be 802.11b mode(TX-High Channel).

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

BLE 4.0: 1Mbps, GFSK

802.11b Mode: 1 Mbps, DSSS.

802.11g Mode: 6 Mbps, OFDM.

802.11n Mode HT20: MCS0, OFDM.

802.11n Mode HT40: MCS0, OFDM.

\*\*\*Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

Channel List & Frequency  
BLE 4.0

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2402~2480MHz	1	2402	21	2442
	2	2404	--	--
	3	2406	--	--
	--	--	38	2476
	--	--	39	2478
	20	2440	40	2480

## 802.11b/g/n(HT20)

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2412~2462MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	--	--

## 802.11n(HT40)

Frequency Band	Channel No.	Frequency(MHz)	Channel No.	Frequency(MHz)
2422~2452MHz	1	--	7	2442
	2	--	8	2447
	3	2422	9	2452
	4	2427	10	--
	5	2432	11	--
	6	2437	--	--

## 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas Guidance v03r03 is required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

### 2.3. General Test Procedures

#### 2.3.1 Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

### 3. SYSTEM TEST CONFIGURATION

#### 3.1. Justification

The system was configured for testing in a continuous transmit condition.

#### 3.2. EUT Exercise Software

N/A

#### 3.3. Special Accessories

N/A

#### 3.4. Block Diagram/Schematics

Please refer to the related document

#### 3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

#### 3.6. Test Setup

Please refer to the test setup photo.

## 4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 15 Subpart C		
FCC Rules	Description of Test	Result
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(e)	Power Spectral Density	Compliant
§15.247(a)(2)	6dB Bandwidth	Compliant
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant
§15.205	Emissions at Restricted Band	Compliant
§15.207(a)	Line Conducted Emissions	Compliant
§15.203	Antenna Requirements	Compliant

*Note: This is a DTS test report for Smart phone, please refer to other document for the DSS test report(LCS1512191751E).*

## 5. TEST RESULT

### 5.1. Maximum Conducted Output Power Measurement

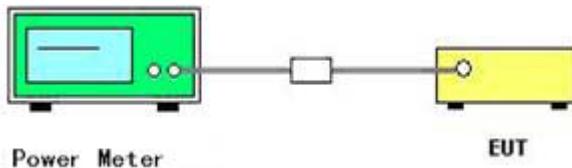
#### 5.1.1. Standard Applicable

According to §15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt.

#### 5.1.2. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

#### 5.1.3. Test Setup Layout



#### 5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 5.1.5. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	60%
Test Engineer	Leo	Configurations	BLE4.0; 802.11b/g/n

Mode	Channel	Frequency (MHz)	Conducted Power (dBm, Peak)	Max. Limit (dBm)	Result
BLE 4.0	1	2402	0.61	30	Complies
	20	2440	2.04	30	Complies
	40	2480	-1.01	30	Complies
802.11b	1	2412	17.47	30	Complies
	6	2437	17.64	30	Complies
	11	2462	17.71	30	Complies
802.11g	1	2412	16.17	30	Complies
	6	2437	16.72	30	Complies
	11	2462	16.59	30	Complies
802.11n HT20	1	2412	16.80	30	Complies
	6	2437	16.09	30	Complies
	11	2462	16.52	30	Complies
802.11n HT40	3	2422	16.29	30	Complies
	6	2437	16.10	30	Complies
	9	2452	15.81	30	Complies

## 5.2. Power Spectral Density Measurement

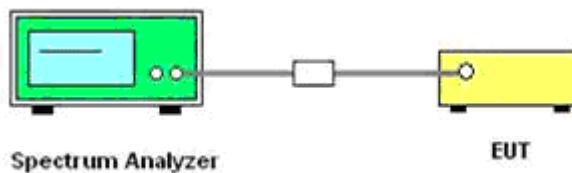
### 5.2.1. Standard Applicable

According to §15.247(e): 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.

### 5.2.2. Test Procedures

- 1) The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
- 2) The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
- 3) Set the RBW = 3 kHz.
- 4) Set the VBW  $\geq 3 \times \text{RBW}$
- 5) Set the span to 1.5 times the DTS channel bandwidth.
- 6) Detector = peak.
- 7) Sweep time = auto couple.
- 8) Trace mode = max hold.
- 9) Allow trace to fully stabilize.
- 10) Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

### 5.2.3. Test Setup Layout



### 5.2.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

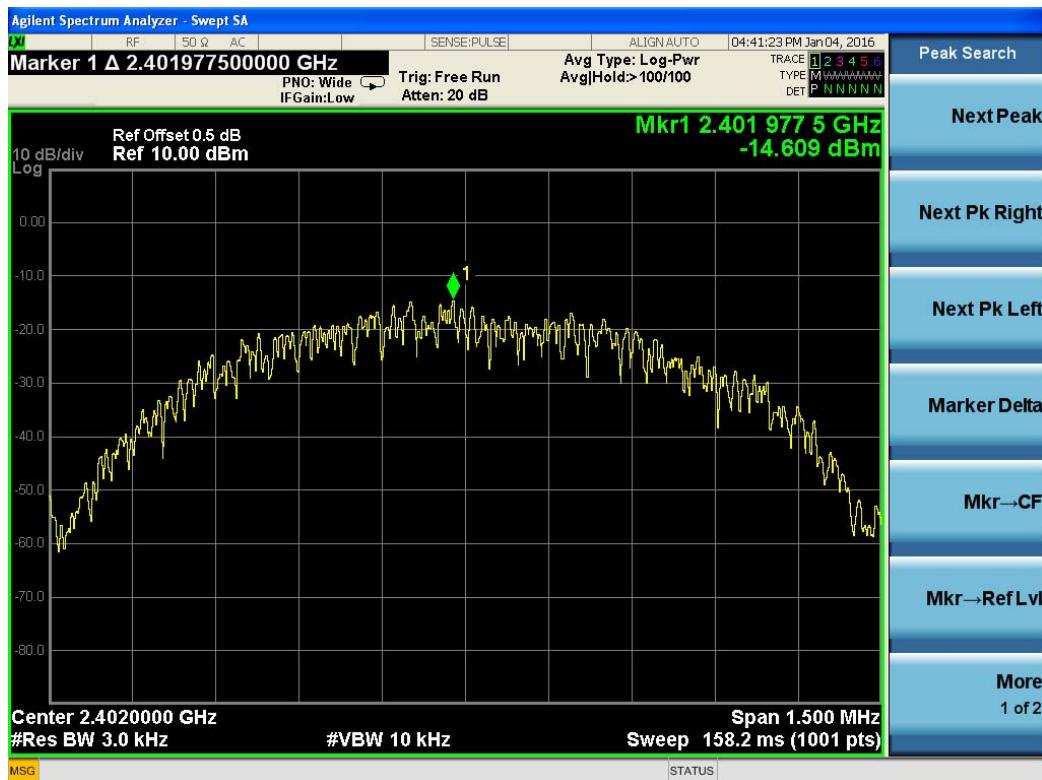
### 5.2.5. Test Result of Power Spectral Density

Temperature	25°C	Humidity	60%
Test Engineer	Leo	Configurations	BLE 4.0; 802.11b/g/n

Mode	Channel	Frequency (MHz)	Power Density (dBm/3KHz)	Max. Limit (dBm/3KHz)	Result
BLE 4.0	1	2402	-14.609	8	Complies
	20	2440	-13.191	8	Complies
	40	2480	-16.308	8	Complies
802.11b	1	2412	-19.754	8	Complies
	6	2437	-19.226	8	Complies
	11	2462	-16.228	8	Complies
802.11g	1	2412	-22.923	8	Complies
	6	2437	-22.262	8	Complies
	11	2462	-21.914	8	Complies
802.11n HT20	1	2412	-23.195	8	Complies
	6	2437	-22.750	8	Complies
	11	2462	-22.683	8	Complies
802.11n HT40	3	2422	-22.303	8	Complies
	6	2437	-22.956	8	Complies
	9	2452	-24.300	8	Complies

Note: The measured power density (dBm) has the offset with cable loss already.

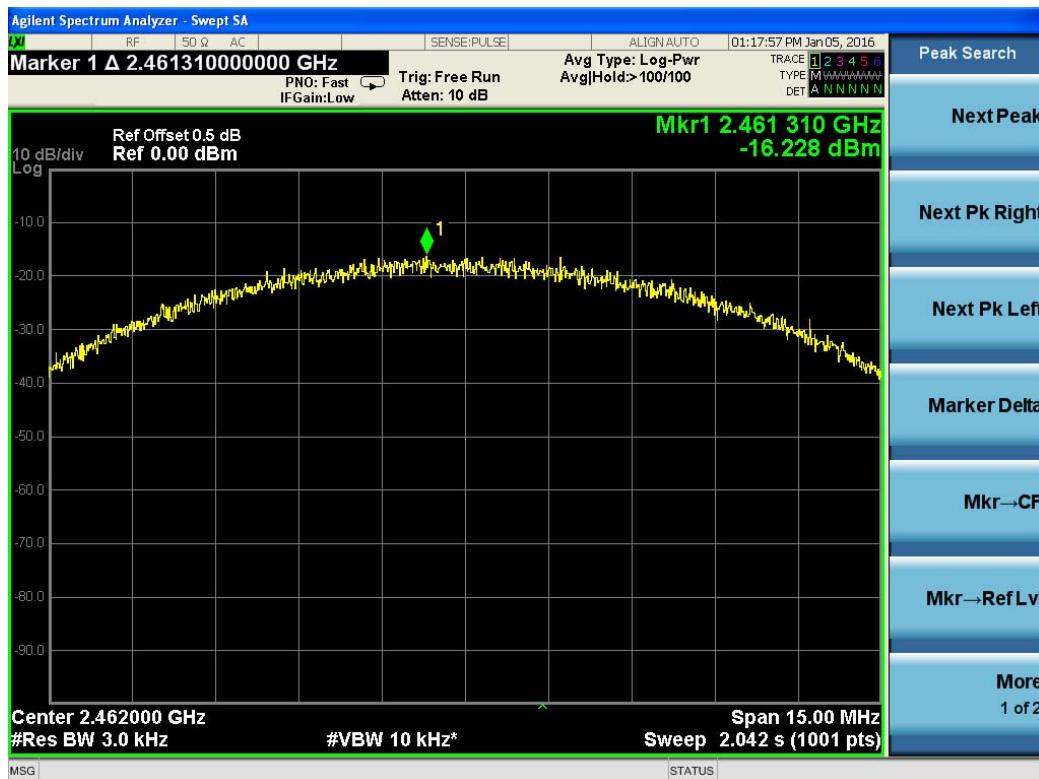
## BLE 4.0 power density



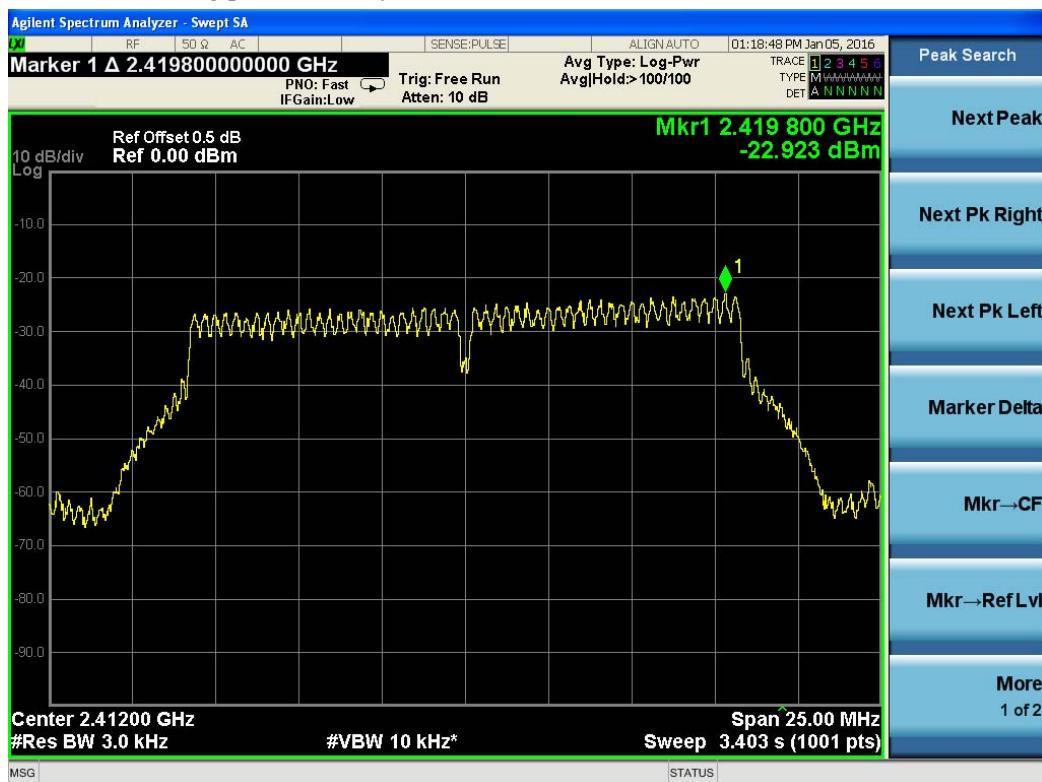


802.11b power density





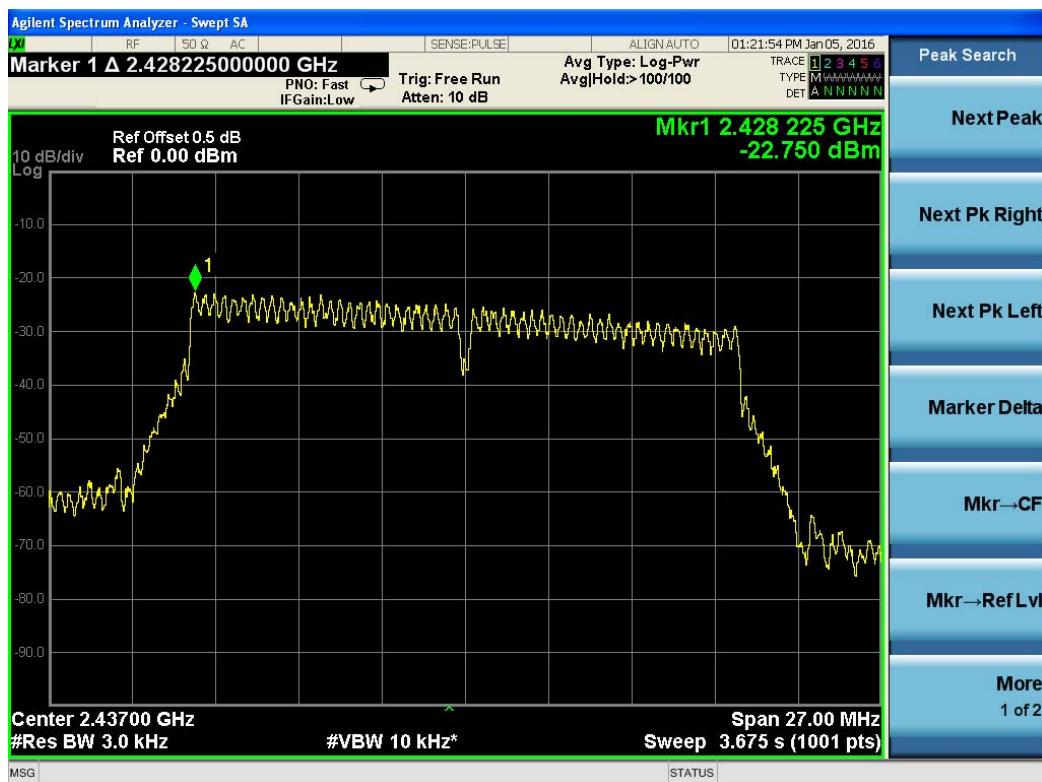
802.11g power density



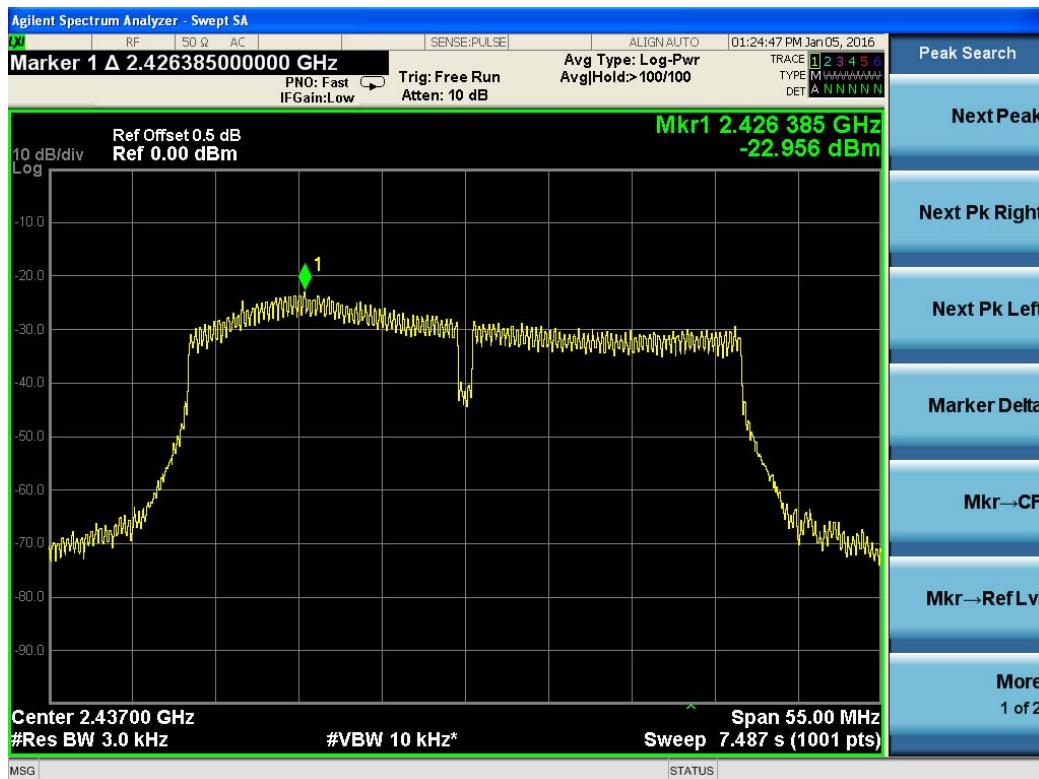
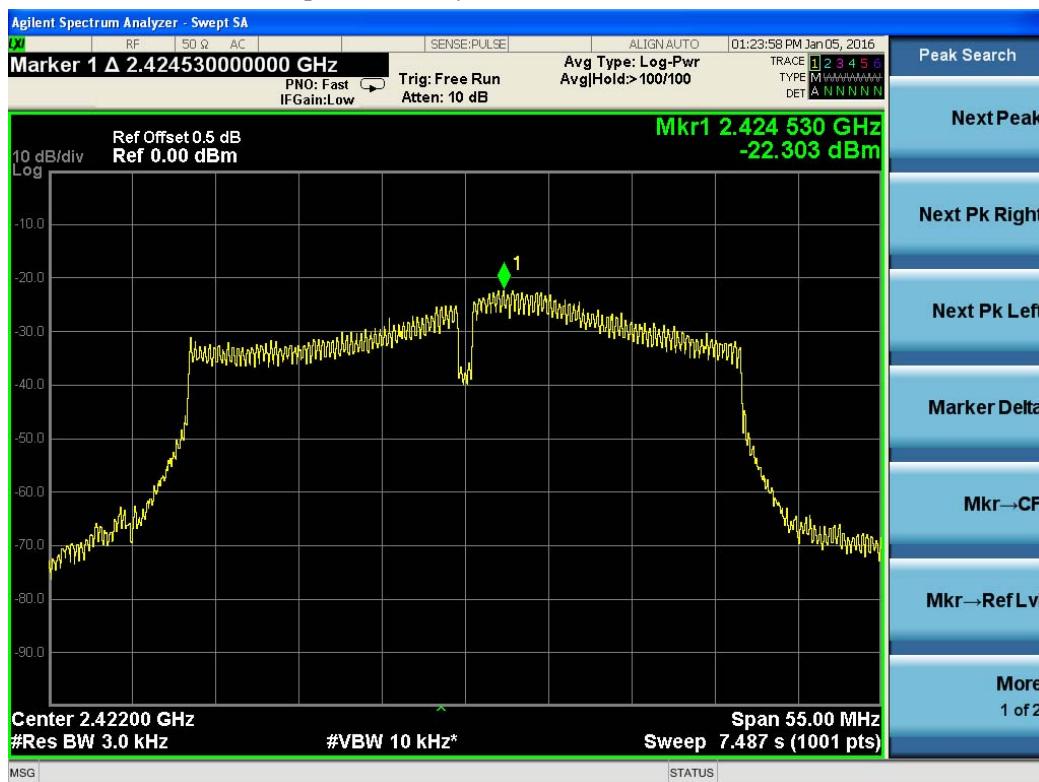


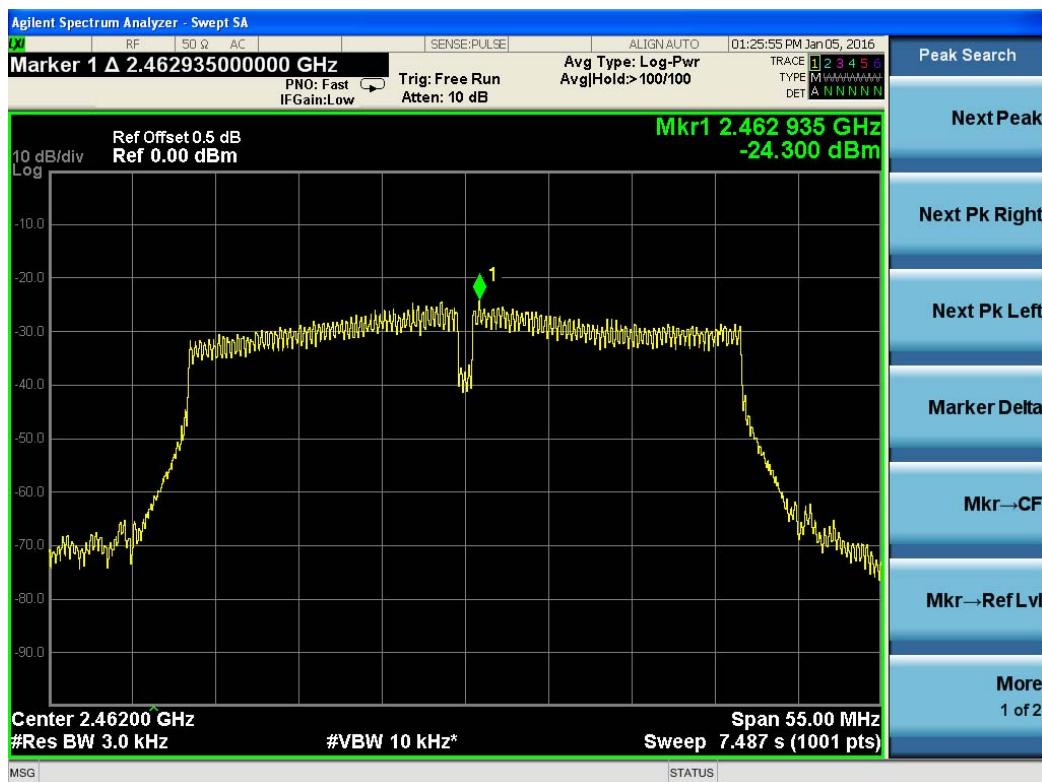
## 802.11n HT20 power density





## 802.11n HT40 power density





### 5.3. 6 dB Spectrum Bandwidth Measurement

#### 5.3.1. Standard Applicable

According to §15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 5.3.2. Instruments Setting

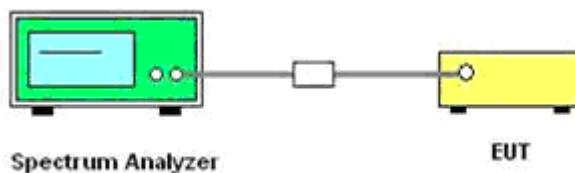
The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	100ms

#### 5.3.3. Test Procedures

- 1) The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- 2) The resolution bandwidth and the video bandwidth were set according to KDB558074 D01 DTS Meas. Guidance v03r03.
- 3) Measured the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

#### 5.3.4. Test Setup Layout



#### 5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 5.3.6. Test Result of Spectrum Bandwidth

Temperature	25°C	Humidity	60%
Test Engineer	Leo	Configurations	BLE 4.0; 802.11b/g/n

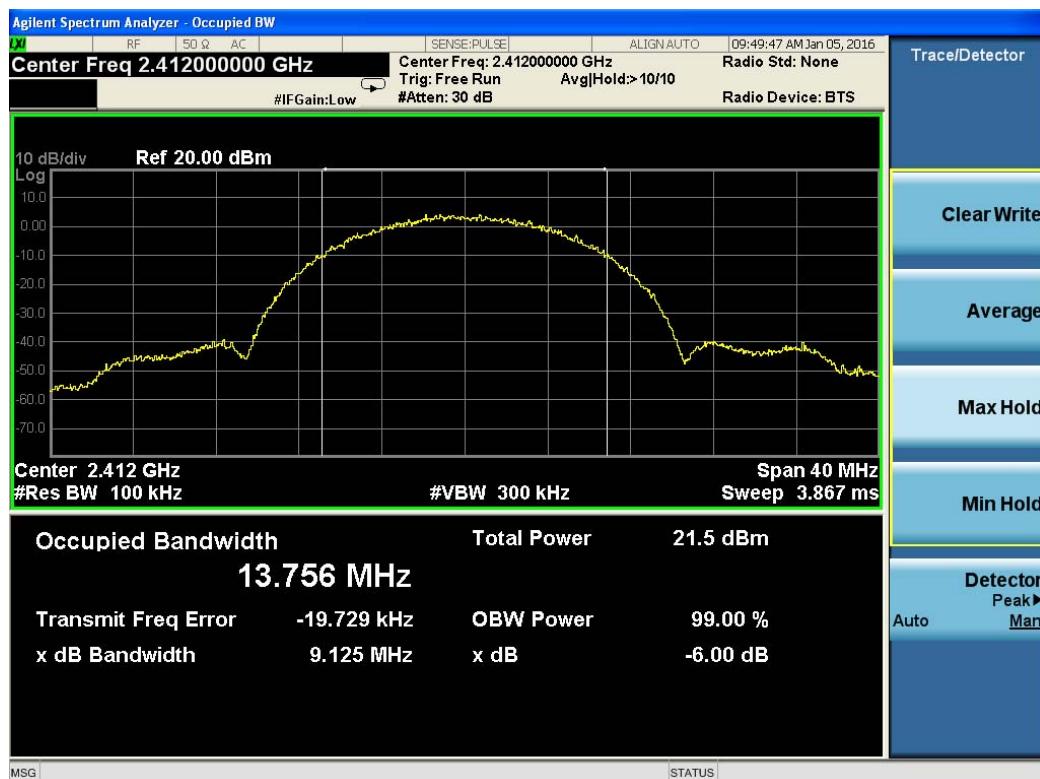
Mode	Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
BLE 4.0	1	2402	0.70	500	Complies
	20	2440	0.71	500	Complies
	40	2480	0.71	500	Complies
802.11b	1	2412	9.13	500	Complies
	6	2437	9.03	500	Complies
	11	2462	7.59	500	Complies
802.11g	1	2412	16.60	500	Complies
	6	2437	15.50	500	Complies
	11	2462	16.33	500	Complies
802.11n HT20	1	2412	17.79	500	Complies
	6	2437	16.15	500	Complies
	11	2462	17.59	500	Complies
802.11n HT40	3	2422	35.91	500	Complies
	6	2437	35.80	500	Complies
	9	2452	36.17	500	Complies

BLE 4.0 channel, 6dB bandwidth





802.11b channel, 6dB bandwidth



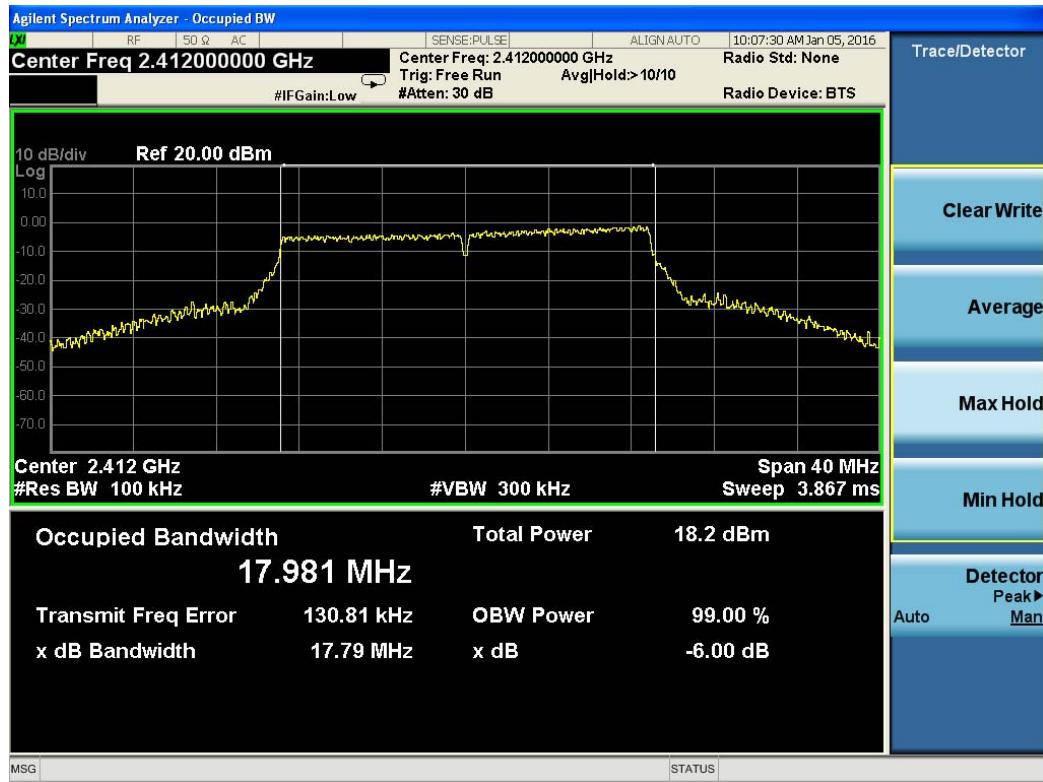


802.11g channel, 6dB bandwidth





802.11n HT20 channel, 6dB bandwidth





802.11n HT40 channel, 6dB bandwidth





## 5.4. Radiated Emissions Measurement

### 5.4.1. Standard Applicable

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies(MHz)	Field Strength(microvolts/meter)	Measurement Distance(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### 5.4.2. Instruments Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

### 5.4.3. Test Procedures

#### 1) Sequence of testing 9 kHz to 30 MHz

##### **Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.
- If the EUT is a floor standing device, it is placed on the ground.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

##### **Premeasurement:**

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 0.8 meter.
- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

##### **Final measurement:**

- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0° to 360°) and by rotating the elevation axes (0° to 360°).
- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

## 2) Sequence of testing 30 MHz to 1 GHz

### Setup:

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

### Premeasurement:

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 to 3 meter.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

### Final measurement:

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45^\circ$ ) and antenna movement between 1 and 4 meter.
- The final measurement will be done with QP detector with an EMI receiver.
- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

### 3) Sequence of testing 1 GHz to 18 GHz

#### **Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 3 meter.
- The EUT was set into operation.

#### **Premeasurement:**

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height scan range is 1 meter to 2.5 meter.
- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

#### **Final measurement:**

- The final measurement will be performed with minimum the six highest peaks.
- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position ( $\pm 45^\circ$ ) and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.
- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

#### 4) Sequence of testing above 18 GHz

##### **Setup:**

- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.
- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables were positioned to simulate normal operation conditions
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- The measurement distance is 1 meter.
- The EUT was set into operation.

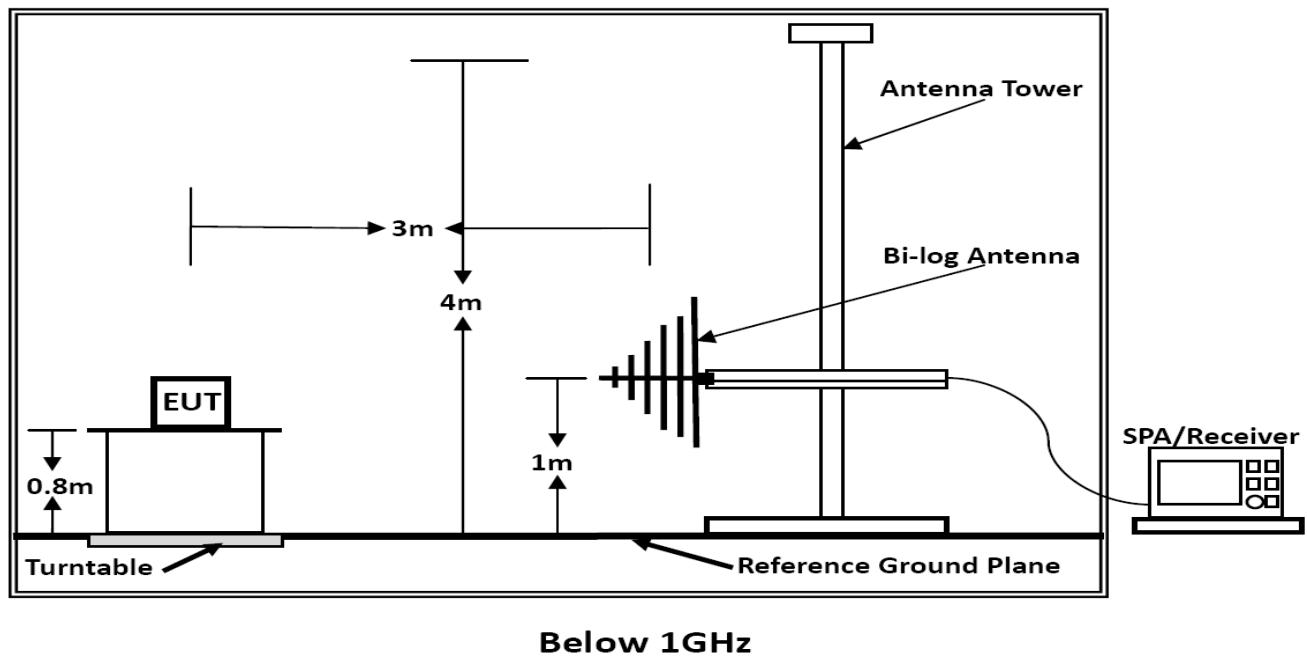
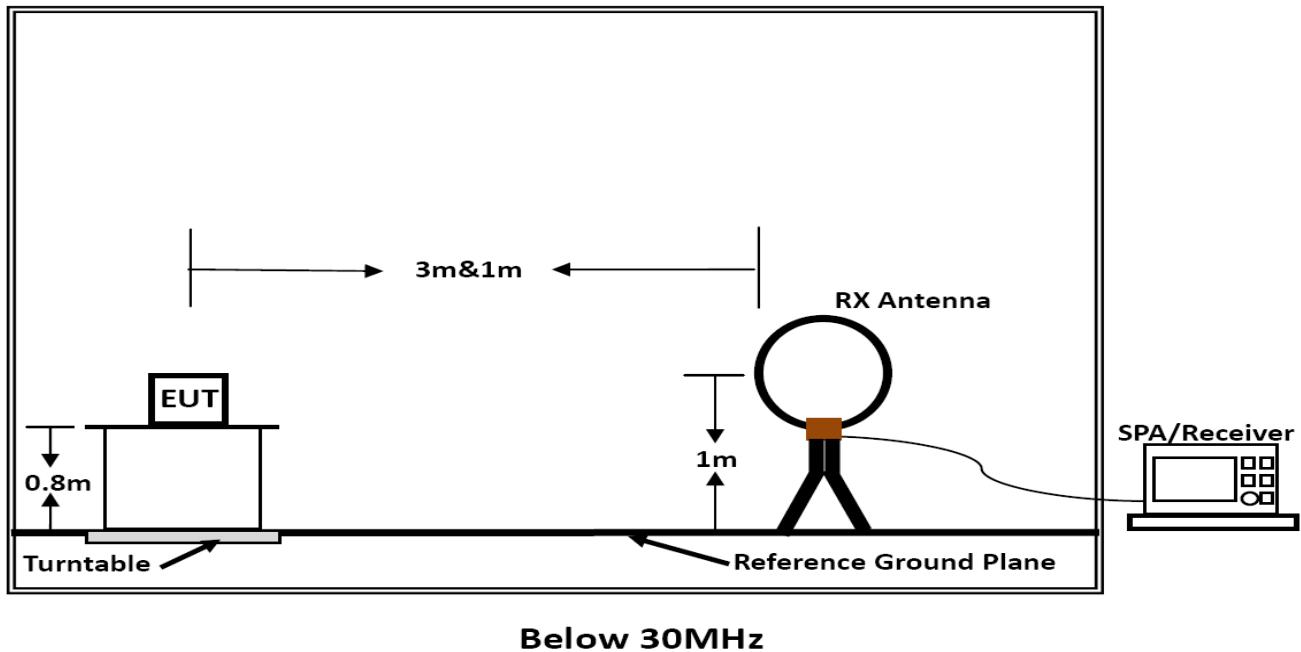
##### **Premeasurement:**

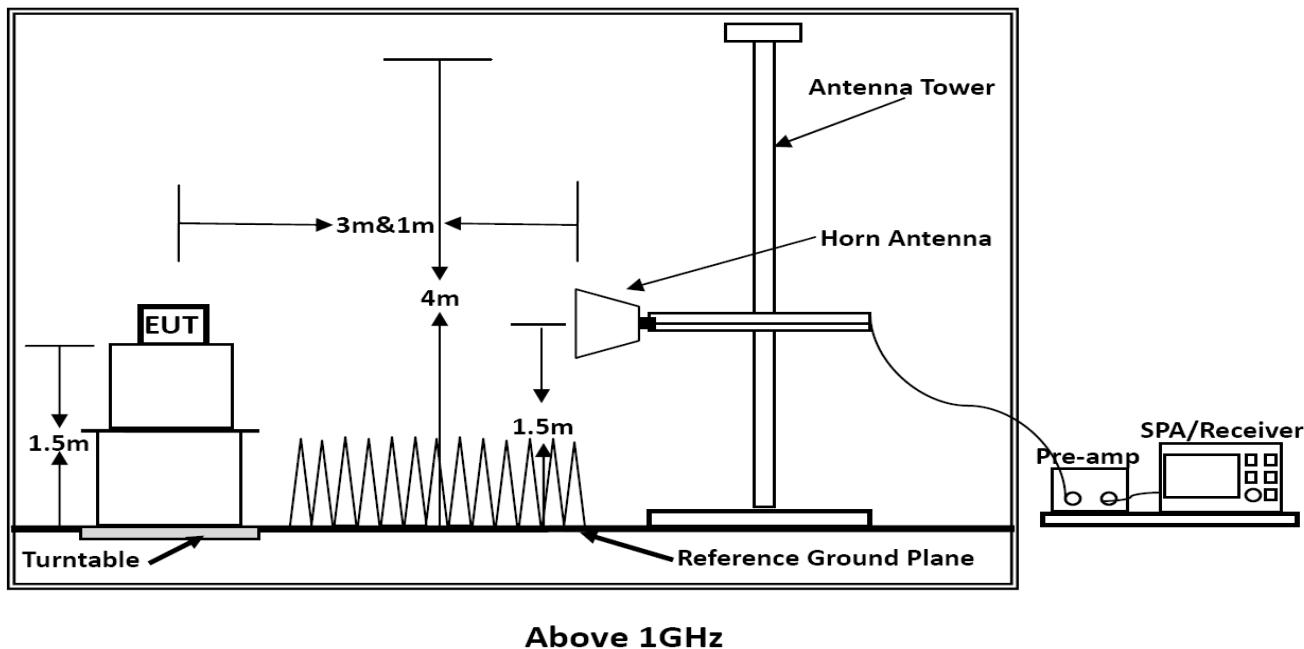
- The antenna is moved spherical over the EUT in different polarisations of the antenna.

##### **Final measurement:**

- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.
- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

#### 5.4.4. Test Setup Layout





#### 5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

#### 5.4.6. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25°C	Humidity	60%
Test Engineer	Leo	Configurations	BLE 4.0; 802.11b/g/n

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

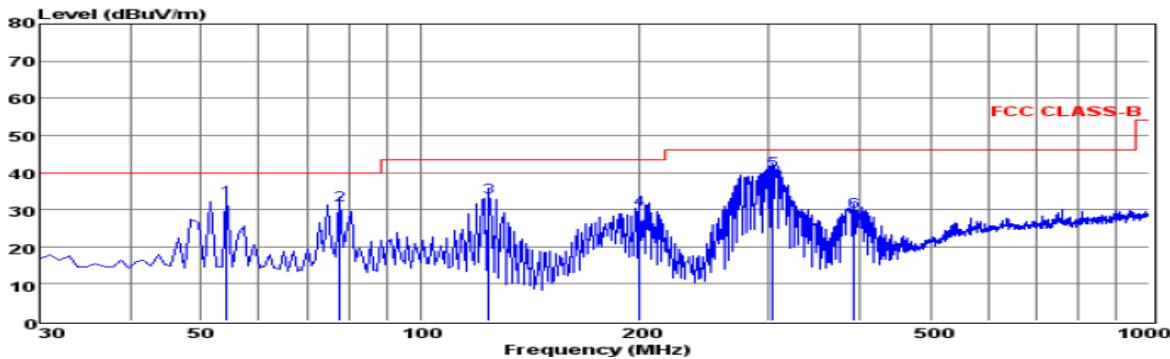
The radiated emissions from 9 kHz to 30MHz are at least 20dB below the official limit and no need to report.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

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

## 5.4.7. Results of Radiated Emissions (30MHz~1GHz)

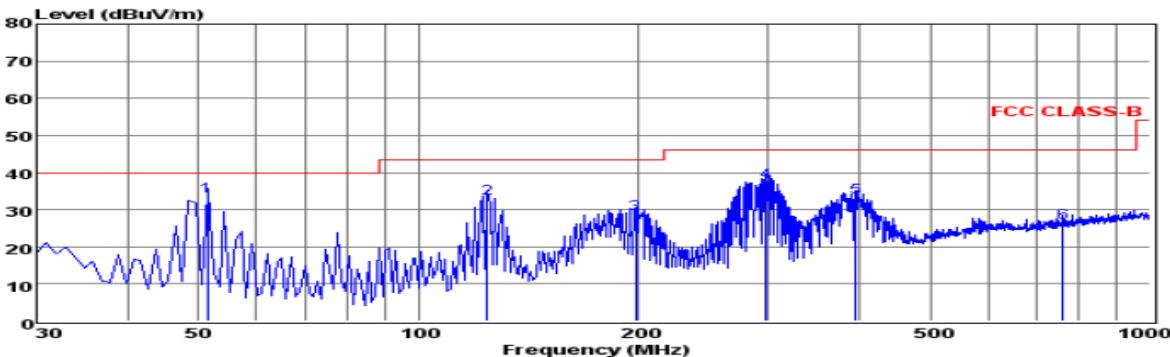
Temperature	25°C	Humidity	60%
Test Engineer	Leo	Configurations	BLE (Middle Channel) 802.11b (High Channel)



Env./Ins: 24 °C / 56%  
 EUT: Smart Phone  
 M/N: FTU152D  
 Power Rating: AC 120V/60Hz  
 Test Mode: TX-Middle Channel  
 Operator: Leo  
 Memo: BLE  
 pol: HORIZONTAL

Freq	Reading	CabLos	Antfac	Measured		Limit	Over	Remark
				MHz	dBuV	dB	dB/m	
1	54.25	19.11	0.46	13.05	32.62	40.00	-7.38	QP
2	77.53	22.58	0.47	8.17	31.22	40.00	-8.78	QP
3	124.09	22.86	0.71	9.85	33.42	43.50	-10.08	QP
4	199.75	18.62	0.84	10.57	30.03	43.50	-13.47	QP
5	304.51	26.23	1.03	13.12	40.38	46.00	-5.62	QP
6	392.78	13.44	1.20	14.89	29.53	46.00	-16.47	QP

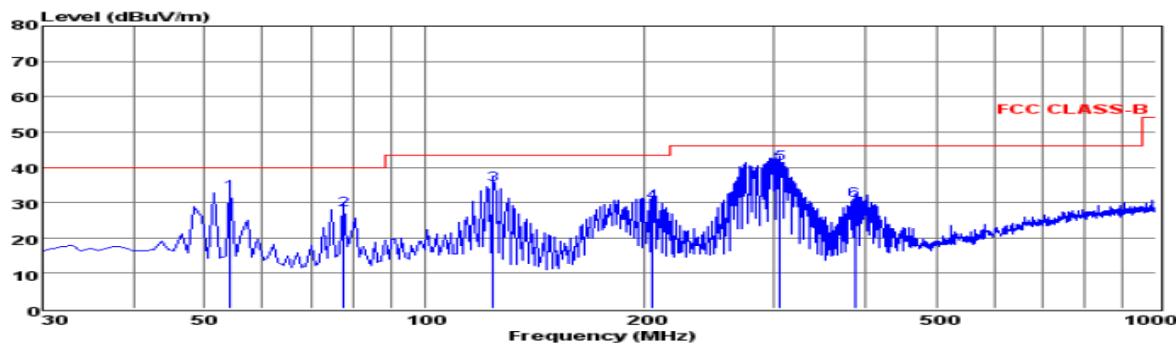
Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that ate 20db blow the official limit are not reported



Env./Ins: 24 °C / 56%  
 EUT: Smart Phone  
 M/N: FTU152D  
 Power Rating: AC 120V/60Hz  
 Test Mode: TX-Middle Channel  
 Operator: Leo  
 Memo: BLE  
 pol: VERTICAL

Freq	Reading	CabLos	Antfac	Measured		Limit	Over	Remark
				MHz	dBuV	dB	dB/m	
1	51.34	19.83	0.54	13.19	33.56	40.00	-6.44	QP
2	124.09	22.53	0.71	9.85	33.09	43.50	-10.41	QP
3	197.81	17.31	0.84	10.57	28.72	43.50	-14.78	QP
4	298.69	23.46	1.12	13.03	37.61	46.00	-8.39	QP
5	395.69	16.95	1.30	14.96	33.21	46.00	-12.79	QP
6	759.44	5.21	1.77	19.55	26.53	46.00	-19.47	QP

Note: 1. All readings are Quasi-peak values.  
 2. Measured= Reading + Antenna Factor + Cable Loss  
 3. The emission that ate 20db blow the official limit are not reported

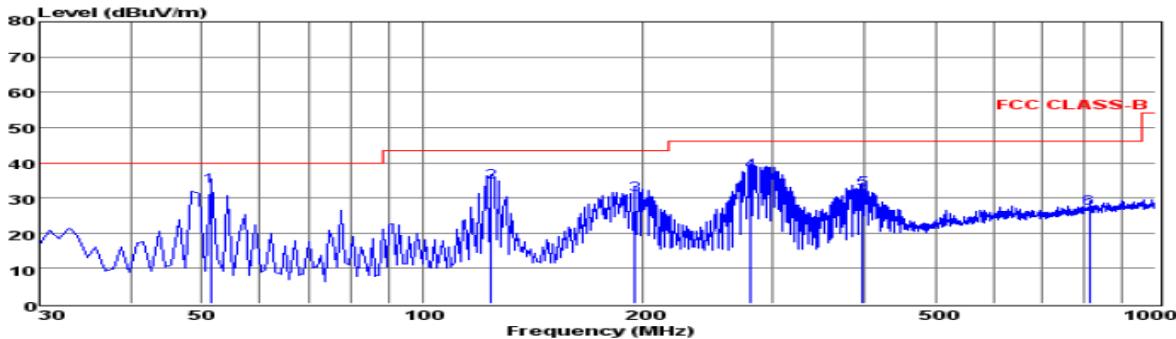


Env./Ins:  
EUT:  
M/N:  
Power Rating:  
Test Mode:  
Operator:  
Memo:  
pol:

24 °C / 56°  
Smart Phone  
FTU152D  
AC 120V/60Hz  
TX-High channel (802.11b)  
Leo  
HORIZONTAL

Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1 54.25	19.17	0.46	13.05	32.68	40.00	-7.32	QP
2 77.53	19.34	0.47	8.17	27.98	40.00	-12.02	QP
3 124.09	24.48	0.71	9.85	35.04	43.50	-8.46	QP
4 204.60	18.25	0.99	10.71	29.95	43.50	-13.55	QP
5 306.45	26.87	1.05	13.15	41.07	46.00	-4.93	QP
6 386.96	14.46	1.32	14.75	30.53	46.00	-15.47	QP

Note: 1. All readings are Quasi-peak values.  
2. Measured= Reading + Antenna Factor + Cable Loss  
3. The emission that ate 20db blow the official limit are not reported



Env./Ins:  
EUT:  
M/N:  
Power Rating:  
Test Mode:  
Operator:  
Memo:  
pol:

24 °C / 56°  
Smart Phone  
FTU152D  
AC 120V/60Hz  
TX-High channel (802.11b)  
Leo  
VERTICAL

Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1 51.34	19.54	0.54	13.19	33.27	40.00	-6.73	QP
2 124.09	24.03	0.71	9.85	34.59	43.50	-8.91	QP
3 194.90	19.35	0.96	10.56	30.87	43.50	-12.63	QP
4 280.26	23.84	1.01	12.68	37.53	46.00	-8.47	QP
5 398.60	16.08	1.22	15.03	32.33	46.00	-13.67	QP
6 812.79	5.24	1.78	20.19	27.21	46.00	-18.79	QP

Note: 1. All readings are Quasi-peak values.  
2. Measured= Reading + Antenna Factor + Cable Loss  
3. The emission that ate 20db blow the official limit are not reported

### \*\*\*Note:

Pre-scan all mode and recorded the worst case results in this report (802.11b (TX-High Channel)).  
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preampl Factor = Level.