MOX GROUP LIMITED

Mobile phone

Main Model: A32

Serial Model: N/A

November 17, 2014

Report No.: 14070621-FCC-R4

(This report supersedes none)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Hank Li	Alex Liu	
Hank Li **Compliance Engineer**	**Alex Liu** **Technical Manager**	

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Test result presented in this test report is applicable to the representative sample only.

RF Test Report

To: FCC Part 15.247: 2013, ANSI C63.4: 2009

SIEMIC, INC.

Accessing global markets

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

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SIEMIC (Shenzhen - China) Laboratories Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC , RF/Wireless , Telecom
Canada	EMC, RF/Wireless , Telecom
Taiwan	EMC, RF, Telecom , Safety
Hong Kong	RF/Wireless ,Telecom
Australia	EMC, RF, Telecom , Safety
Korea	EMI, EMS, RF , Telecom, Safety
Japan	EMI, RF/Wireless, Telecom
Singapore	EMC , RF , Telecom
Europe	EMC, RF, Telecom , Safety

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CONTENTS

1 Executive Summary & EUT information

The purpose of this test programme was to demonstrate compliance of the MOX GROUP LIMITED, Mobile phone and model: A32 against the current Stipulated Standards. The Mobile phone has demonstrated compliance with the FCC Part 15.247: 2013, ANSI C63.4: 2009.

EUT Information

EUT Description	:	**Mobile phone**
Main Model	:	**A32**
Serial Model	:	**N/A**
Antenna Gain	:	**GSM850: 0.7 dBi** **PCS1900: 1.5 dBi** **Bluetooth/BLE: 2 dBi** **WIFI: 2 dBi**
Input Power	:	**Battery:** **Model: 454841AR** **Spec: 3.7V 1000mAh** **Limited charger voltage: 4.2V** **Adapter:** **Model: NTR-S01** **Input: AC 100-240V; 50/60Hz 150mA** **Output: DC 5.0V; 700mA**
Classification Per Stipulated Test Standard	:	**FCC Part 15.247: 2013, ANSI C63.4: 2009**

Note: This is the amended report application (14070621-FCC-R4) of the device, the original submission (14070434-FCC-R4) was granted on September 10, 2014. The difference between the original device and the current one was as following the detail information:

The difference of these two Mobile Phone is for different Model Name, Trade Name, Product Name, the information of Applicant & Manufacturer

All above were explained in the attached Declaration Letter. And based on the letter the difference between them will not affect any test items, so in this report we didn't revised any test data and photos, and the following test data and photos please refer to report 14070434-FCC-R4.

2 TECHNICAL DETAILS

Purpose	**Compliance testing of Mobile phone with stipulated standard**
Applicant / Client	**MOX GROUP LIMITED RM2508-2509, T-Share international building A, taoyuan Road Nan shan,Shenzhen,China**
Manufacturer	**MOX GROUP LIMITED RM2508-2509, T-Share international building A, taoyuan Road Nan shan,Shenzhen,China**
Laboratory performing the tests	**SIEMIC (Shenzhen - China) Laboratories Zone A, Floor 1, Building 2, Wan Ye Long Technology Park, South Side of Zhoushi Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-0755-2601 4629 / 2601 4953 Fax: +86-0755-2601 4953-810 Email: China@siemic.com.cn**
Test report reference number	**14070621-FCC-R4**
Date EUT received	**November 12, 2014**
Standard applied	**FCC Part 15.247: 2013, ANSI C63.4: 2009**
Dates of test (from – to)	**August 15 to September 04, 2014**
No of Units :	**#1**
Equipment Category :	**DTS**
Trade Name :	**MOX**
RF Operating Frequency (ies)	**GSM850 TX : 824.2 ~ 848.8 MHz; RX : 869.2 ~ 893.8 MHz PCS1900 TX : 1850.2 ~ 1909.8 MHz; RX : 1930.2 ~ 1989.8 MHz 802.11b/g/n: 2412-2462 MHz Bluetooth& BLE: 2402-2480 MHz**
Number of Channels	**299CH (PCS1900) and 124CH (GSM850) Bluetooth: 79CH 802.11b/g/n: 11CH BLE: 40CH**
Modulation	**GSM /PCS: GMSK 802.11b/g/n: DSSS/OFDM Bluetooth: GFSK& π/4DQPSK&8DPSK BLE: GFSK**
GPRS Multi-slot class	**8/10/12**
FCC ID	**2ABBS-A32**

3 MODIFICATION

NONE

4 TEST SUMMARY

The product was tested in accordance with the following specifications.
All testing has been performed according to below product classification:

Test Results Summary

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.247 (a)(2)	DTS (6 dB) CHANNEL BANDWIDTH	Compliance
§15.247(b)(3)	Conducted Maximum Output Power	Compliance
§15.247(e)	Power Spectral Density	Compliance
§15.247(d)	Band-Edge	Compliance
§15.207 (a),	AC Power Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

5.1 §15.247 (i) and §2.1093 – RF Exposure

Standard Requirement:

According to §15.247 (i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[17]
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

Two antennas are available for the EUT (GSM antenna, Bluetooth/BLE/WIFI antenna).
The maximum average output power(turn-up power) in low channel of BLE is -1.286 dBm= 0.74 mW
The calculation results= $0.74/5*\sqrt{2.402}$ = 0.23< 3

The maximum average output power(turn-up power) in middle channel of BLE is -1.111 dBm= 0.77 mW
The calculation results= $0.77/5*\sqrt{2.440}$ = 0.24< 3

The maximum average output power(turn-up power) in high channel of BLE is -1.492 dBm= 0.71 mW
The calculation results= $0.71/5*\sqrt{2.480}$ = 0.22< 3

According to KDB 447498, no stand-alone required for BLE antenna, and no simultaneous SAR measurement is required , please refer to SAR report.

Test Result: Pass

5.2 §15.203 - ANTENNA REQUIREMENT

Applicable Standard

According to § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the 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 6 dBi.

Antenna Connector Construction

The EUT has 2 antennas: a PIFA antenna for WIFI/Bluetooth/BLE, the gain is 2 dBi for Bluetooth/ BLE/WIFI.
a PIFA antenna for GSM850 and 0.7 dBi PCS1900 and 1.5 dBi
which in accordance to section 15.203, please refer to the internal photos.

Test Result: Pass

5.3 §15.247(a) (2) –DTS (6 dB) CHANNEL BANDWIDTH

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions

Temperature	20°C
Relative Humidity	50%
Atmospheric Pressure	1001mbar

3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : September 01, 2014
   Tested By : Hank Li

Requirement(s): The minimum 6 dB bandwidth of a DTS transmission shall be at least 500 kHz. Within this document, this bandwidth is referred to as the DTS bandwidth. The procedures provided herein for measuring the maximum peak conducted output power assume the use of the DTS bandwidth.

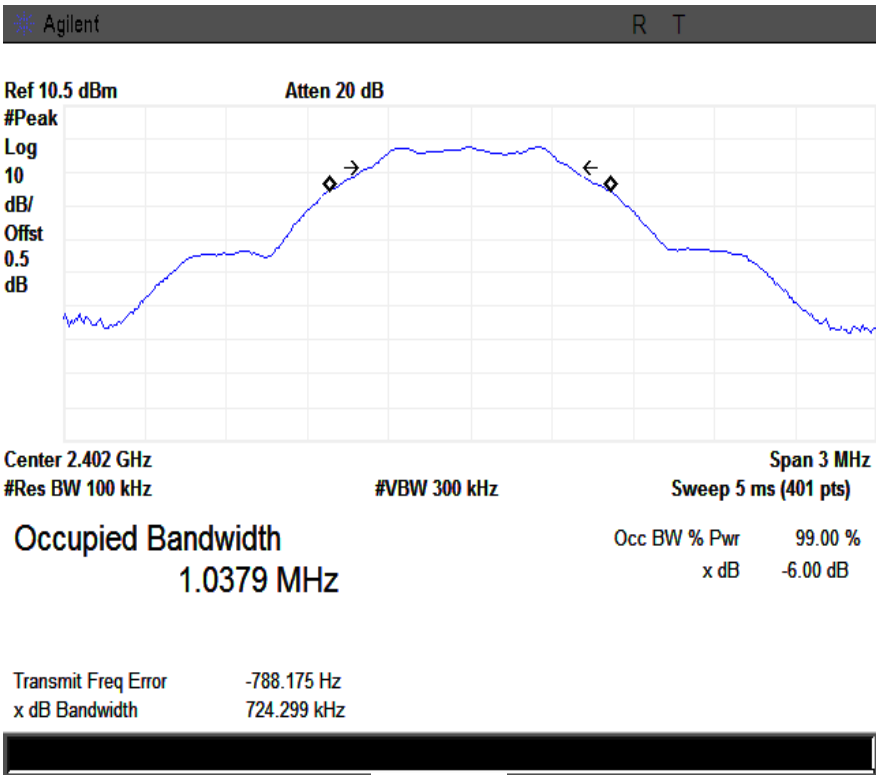
Procedures:

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure 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 6 dB relative to the maximum level measured in the fundamental emission.

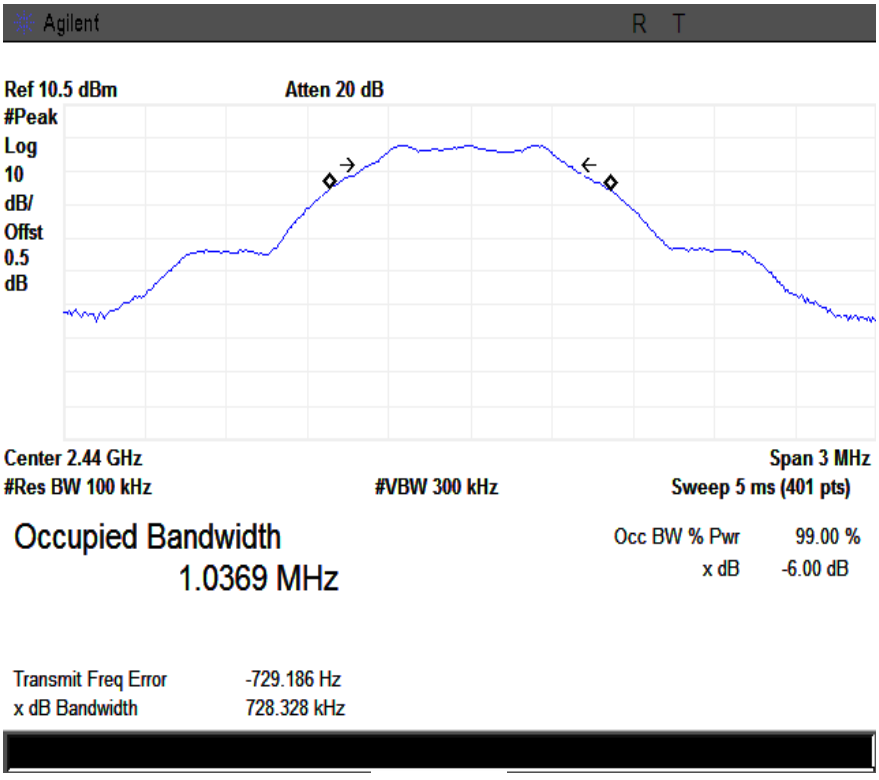
Test Result: Pass.

Please refer to the following tables and plots.

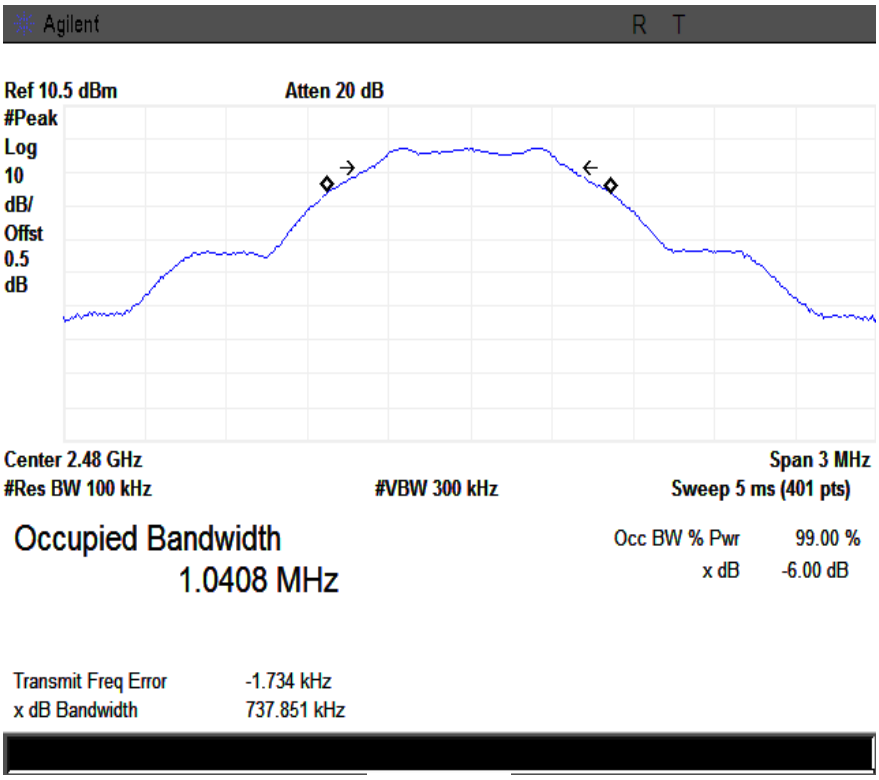
Channel	Channel Frequency (MHz)	Measured 6dB Bandwidth (kHz)	FCC Part 15.247 Limit (kHz)
Low	2402	724.299	＞500
Middle	2440	728.328	＞500
High	2480	737.851	＞500



6DB-2402



6DB-2440


Agilent
R T
Ref 10.5 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
0.5
dB
Center 2.48 GHz
Span 3 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)
Occupied Bandwidth
1.0408 MHz
Occ BW % Pwr 99.00 %
x dB -6.00 dB
Transmit Freq Error -1.734 kHz
x dB Bandwidth 737.851 kHz

6DB-2480.

5.4 §15.247(b) (3) - Conducted Maximum Output Power

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
3. Environmental Conditions

Temperature	21°C
Relative Humidity	51%
Atmospheric Pressure	1002mbar

4. Test date : September 02, 2014
   Tested By : Hank Li

Standard Requirement: One of the following procedures may be used to determine the maximum peak conducted output power of a DTS EUT.

Procedures:

RBW ≥ DTS bandwidth:
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

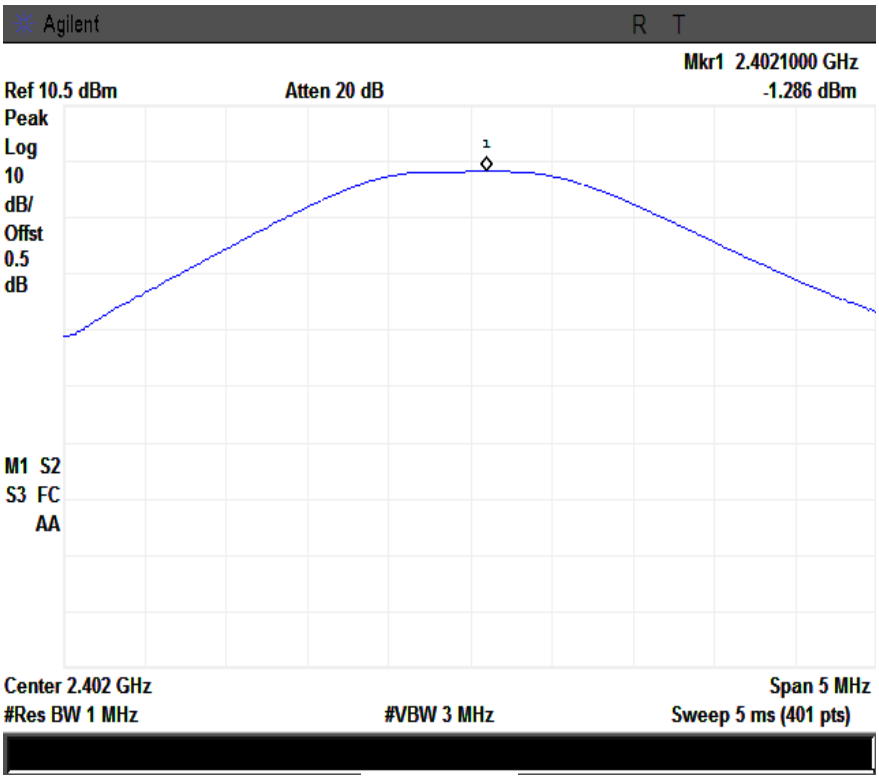
1. Set the RBW ≥ DTS bandwidth.
2. Set VBW ≥ 3 RBW.
3. Set span ≥ 3 x RBW
4. Sweep time = auto couple.
5. Detector = peak.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use peak marker function to determine the peak amplitude level.

Test Result: Pass.

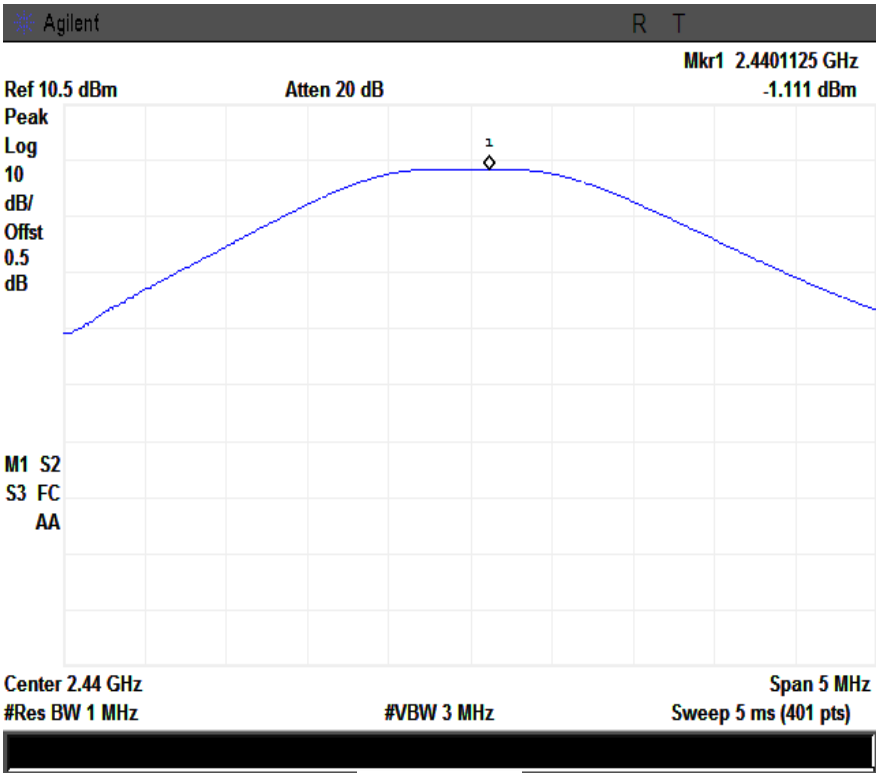
Please refer to the following tables and plots.

The Maximum peak conducted output power:

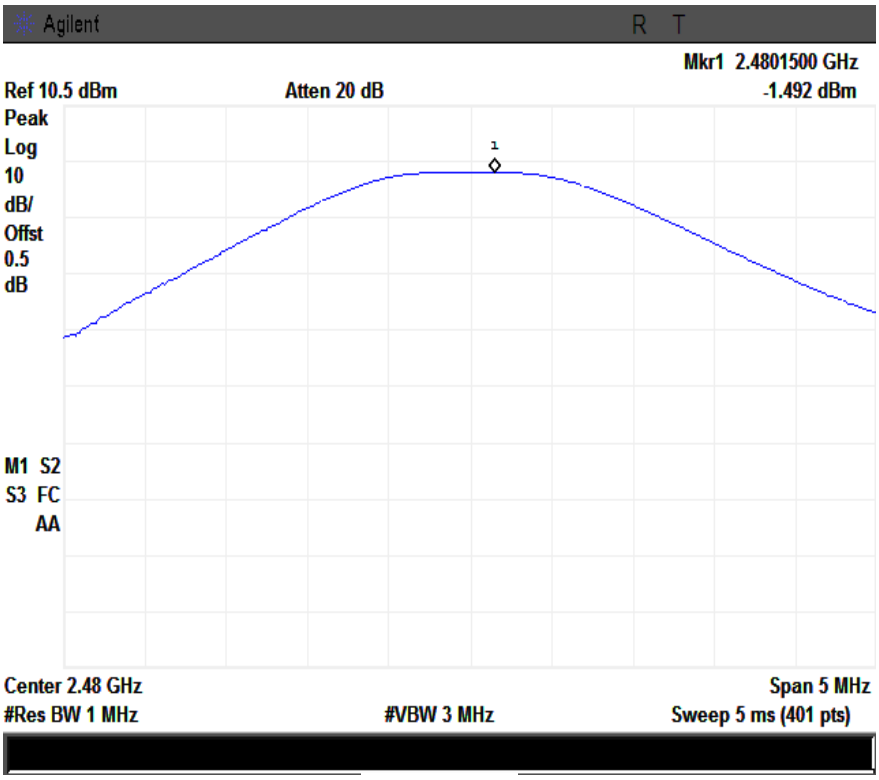
Channel	Channel Frequency (MHz)	PK Output Power (dBm)	Limit (dBm)
Low	2402	-1.286	30
Middle	2440	-1.111	30
High	2480	-1.492	30



Power-2402



Power-2440.


Agilent
R T
Mkr1 2.4801500 GHz
Ref 10.5 dBm
Atten 20 dB
-1.492 dBm
Peak
Log
10
dB/
Offst
0.5
dB
1
M1 S2
S3 FC
AA
Center 2.48 GHz
Span 5 MHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 5 ms (401 pts)

Power-2480

5.5 §15.247(e) - Power Spectral Density

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The spectrum analyzer was connected to the antenna terminal.
2. Environmental Conditions — Temperature 22 °C; Relative Humidity 52%; Atmospheric Pressure 1003mbar
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.
4. Test date : September 03, 2014
   Tested By : Hank Li

Requirement(s):
The DTS rules specify a conducted PSD limit within the DTS bandwidth during any time interval of continuous transmission.5 Such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. Therefore, if maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option)

Procedures:

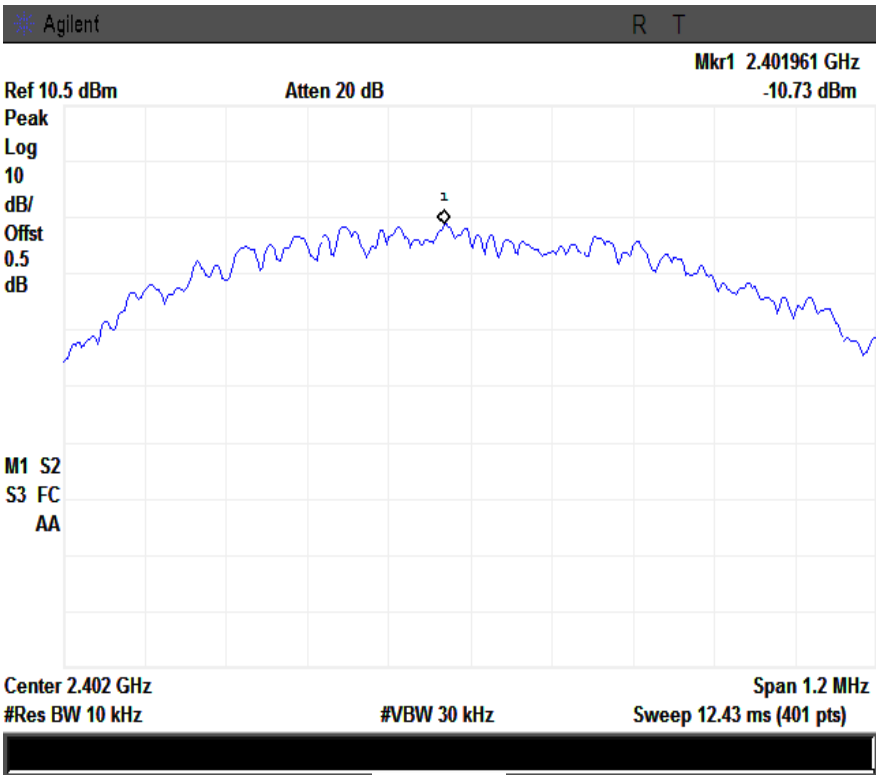
Method PKPSD (peak PSD):
This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance, and is optional if the maximum conducted (average) output power was used to demonstrate compliance.

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

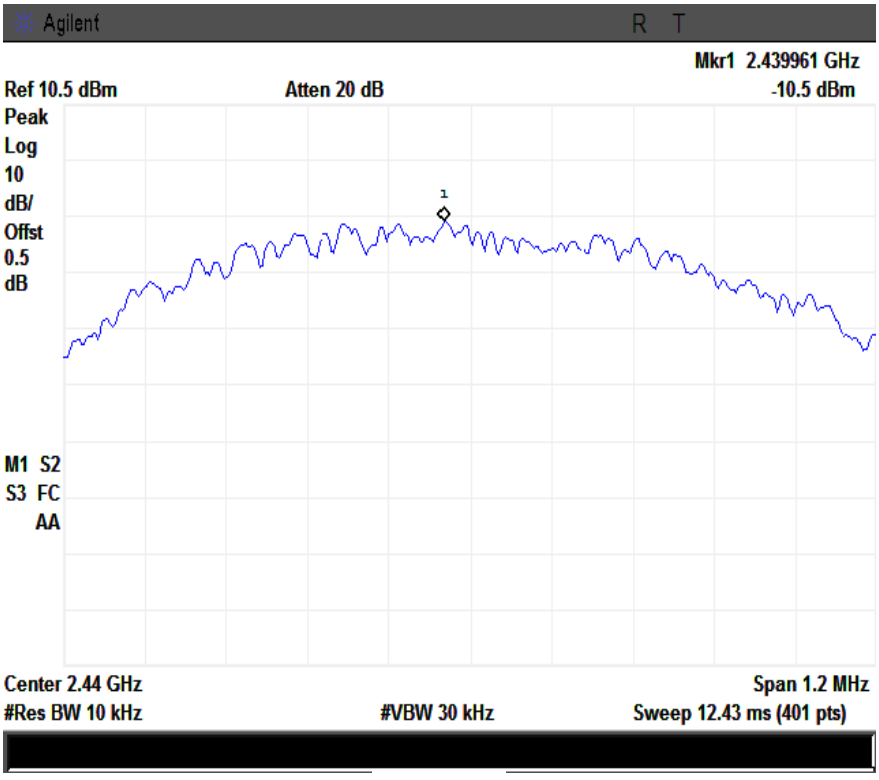
Test Result: Pass.

Please refer to the following tables and plots.

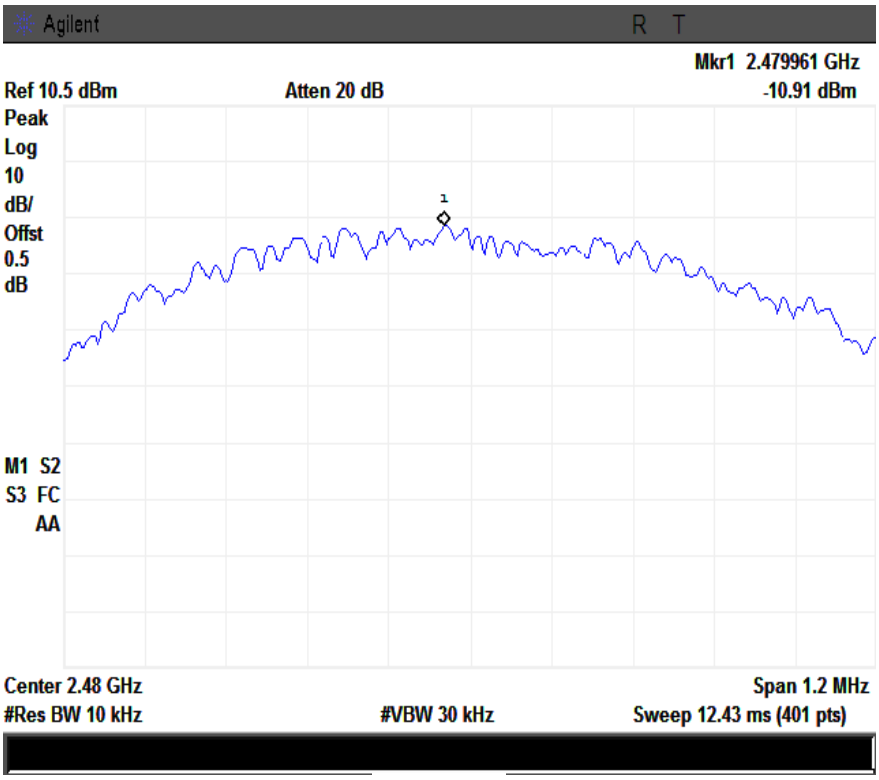
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)
Low	2402	-10.73	8
Middle	2440	-10.50	8
High	2480	-10.91	8



PSD-2402



PSD-2440


Agilent
R T
Mkr1 2.479961 GHz
Ref 10.5 dBm
Atten 20 dB
-10.91 dBm
Peak
Log
10
dB/
Offst
0.5
dB
1
M1 S2
S3 FC
AA
Center 2.48 GHz
Span 1.2 MHz
#Res BW 10 kHz
#VBW 30 kHz
Sweep 12.43 ms (401 pts)

PSD-2480

5.6 §15.247(d) –Band-Edge

1. 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))

2. Environmental Conditions

Temperature	20°C
Relative Humidity	55%
Atmospheric Pressure	1016mbar

3. Test date : August 15, 2014
   Tested By : Hank Li

Requirement(s):

Band-Edge Measurements
An additional consideration when performing conducted measurements of restricted band emissions is that unwanted emissions radiating from the EUT cabinet, control circuits, power leads, or intermediate circuit elements will likely go undetected in a conducted measurement configuration. To address this concern, a radiated test shall be performed to ensure that emissions emanating from the EUT cabinet (rather than the antenna port) also comply with the applicable limits.

For these cabinet radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Procedures for performing radiated measurements are specified in ANSI C63.10. All detected emissions shall comply with the applicable limits.

Procedures: (Radiated Method Only)

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Put it on the Rotated table and turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. First, set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, check the emission of EUT, if pass then set Spectrum Analyzer as below:

   a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.

   b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.

   c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth for Average detection (AV) as below at frequency above 1GHz.

   ■ 1 kHz (Duty cycle < 98%) ☐ 10 Hz (Duty cycle > 98%)

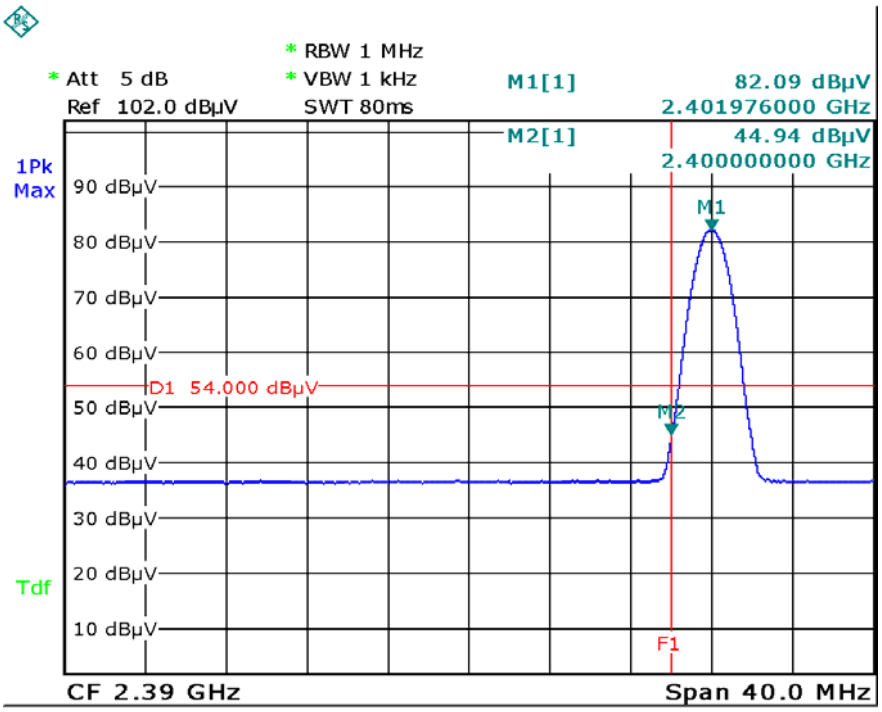
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Note:

For Hopping device, should test hopping mode and CW Tx mode separately. For hopping mode, find out the worst points outside the frequency band firstly, then set the worst points as the center frequency, use above average 3 (c) spectrum analyzer set, find out the final worst average value separately.

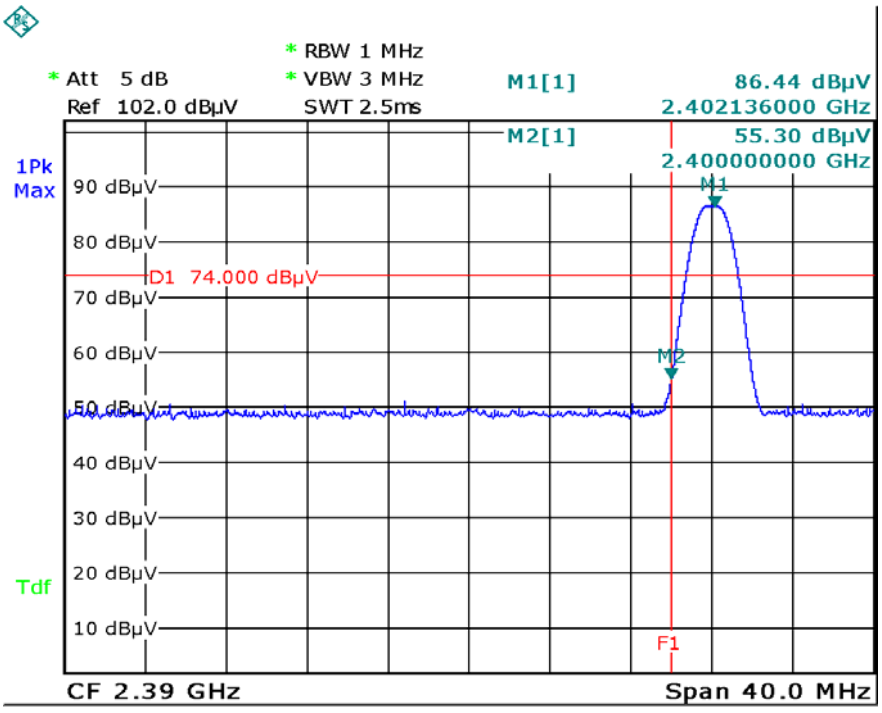
Test Result: Pass.

Please refer to the following tables and plots.



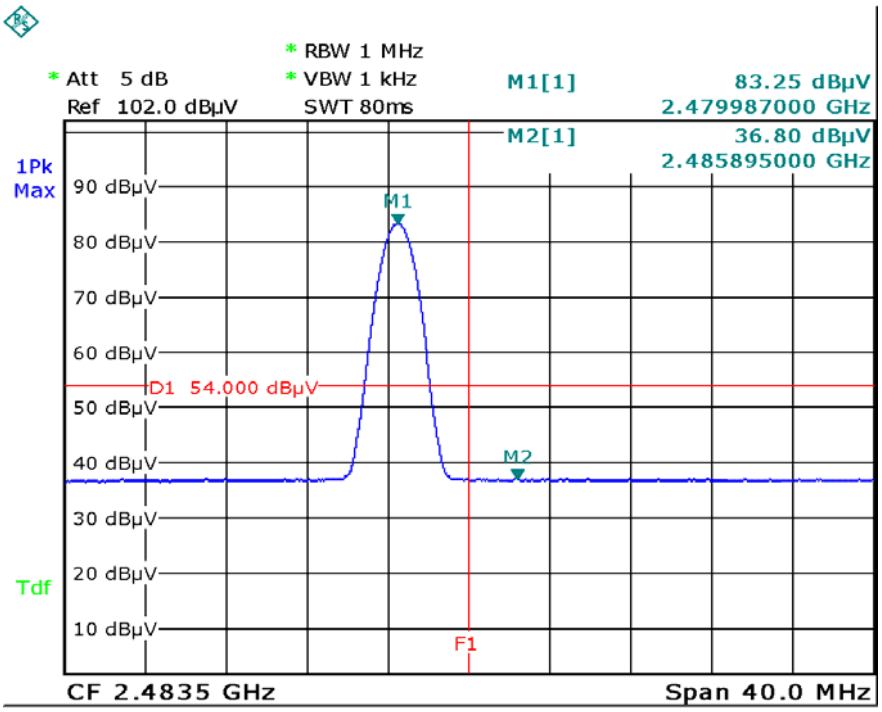
Date: 15.AUG.2014 15:33:42

Left Side-AV



Date: 15.AUG.2014 15:32:24

Left Side-PK



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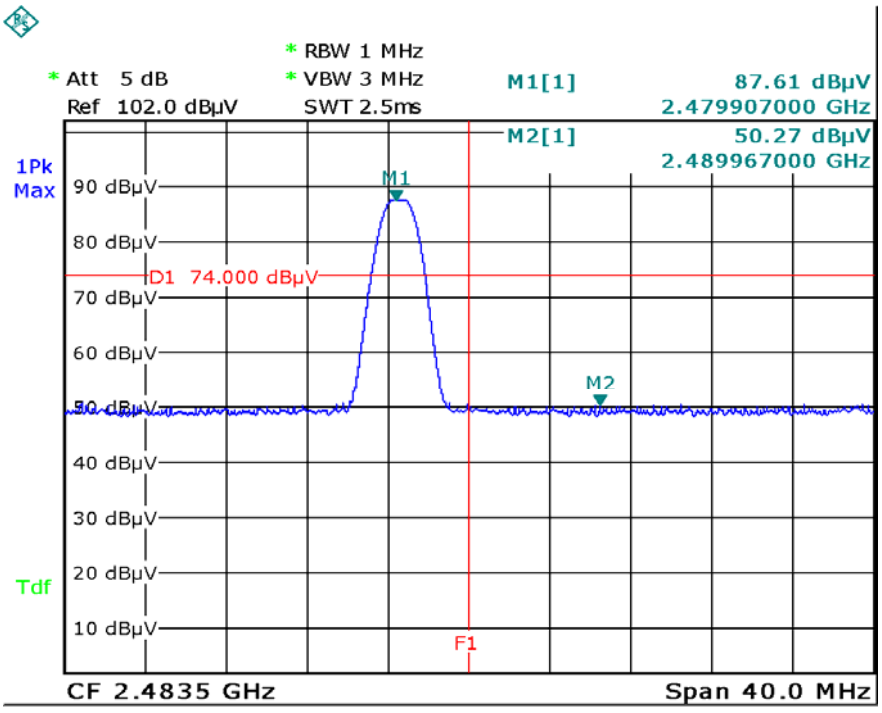
Right Side-AV



Date: 15.AUG.2014 15:36:39

Right Side-PK

5.7 §15.207 (a) - AC Power Line Conducted Emissions

Requirement:

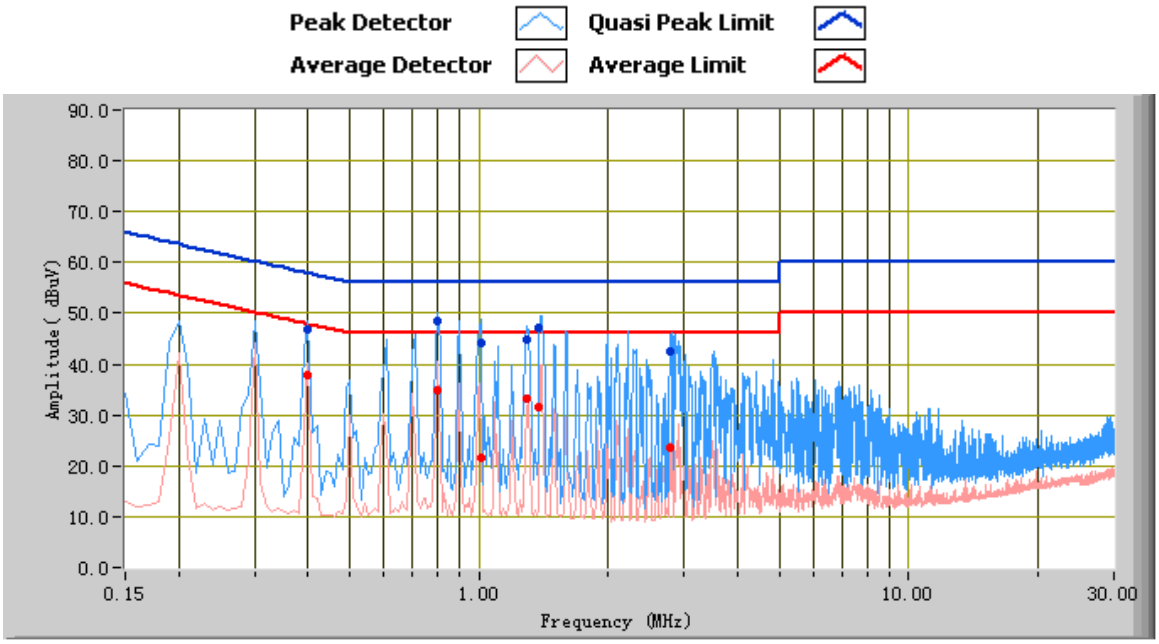
Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

Procedures:

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR and Average detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Conducted Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 9kHz – 30MHz (Average & Quasi-peak) is ±3.5dB.
4. Environmental Conditions
   Temperature 21 °C
   Relative Humidity 51%
   Atmospheric Pressure 1002mar
5. Test date: September 02, 2014
   Tested By : Hank Li

Test Mode:	GFSK Transmitting Mode

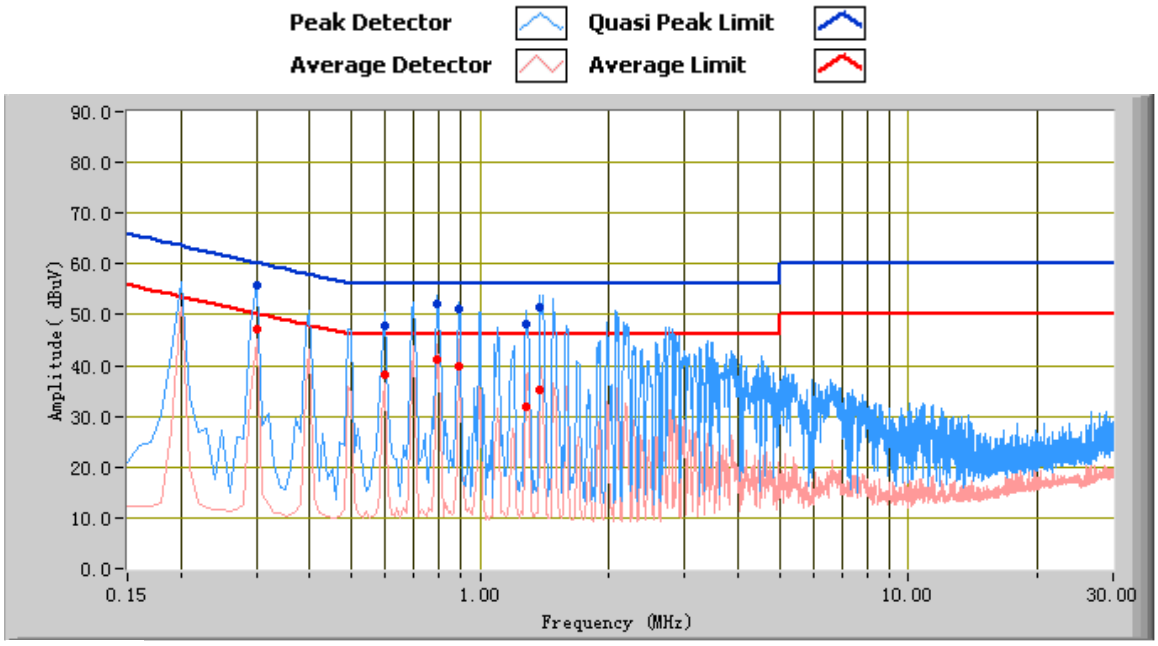


Test Data

Phase Line Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
0.80	48.42	56.00	-7.58	34.73	46.00	-11.27	10.40
1.01	44.29	56.00	-11.71	21.44	46.00	-24.56	10.29
1.29	44.98	56.00	-11.02	33.28	46.00	-12.72	10.31
0.40	46.82	57.85	-11.03	37.82	47.85	-10.03	10.98
1.38	47.13	56.00	-8.87	31.53	46.00	-14.47	10.33
2.78	42.37	56.00	-13.63	23.46	46.00	-22.54	10.58

Test Mode:	GFSK Transmitting Mode



Test Data

Phase Neutral Plot at 120Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBuV)	Limit (dBuV)	Margin (dB)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Factors (dB)
1.38	51.40	56.00	-4.60	35.25	46.00	-10.75	10.33
0.79	52.18	56.00	-3.82	41.29	46.00	-4.71	10.40
0.89	51.00	56.00	-5.00	39.77	46.00	-6.23	10.35
0.30	55.68	60.24	-4.56	47.14	50.24	-3.10	11.50
1.28	48.24	56.00	-7.76	31.98	46.00	-14.02	10.31
0.60	47.80	56.00	-8.20	38.13	46.00	-7.87	10.51

5.8 §15.209, §15.205 & §15.247(d) - Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands

1. All possible modes of operation were investigated. Only the 6 worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. A "-ve" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
3. Radiated Emissions Measurement Uncertainty
   All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 1GHz & 1GHz above (3m & 10m) is +/-6dB.
4. Environmental Conditions

Temperature	22°C
Relative Humidity	52%
Atmospheric Pressure	1003mbar

5. Test date : September 03, 2014
   Tested By : Hank Li

Requirement:

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)).

Procedures:

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Maximization of the emissions was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:

a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.

b. The EUT was then rotated to the direction that gave the maximum emission.

c. Finally, the antenna height was adjusted to the height that gave the maximum emission.

3. A Quasi-peak measurement was then made for that frequency point for below 1GHz test, PK and AV for above 1GHz emission test.

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasiy Peak detection at frequency below 1GHz.

b. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.

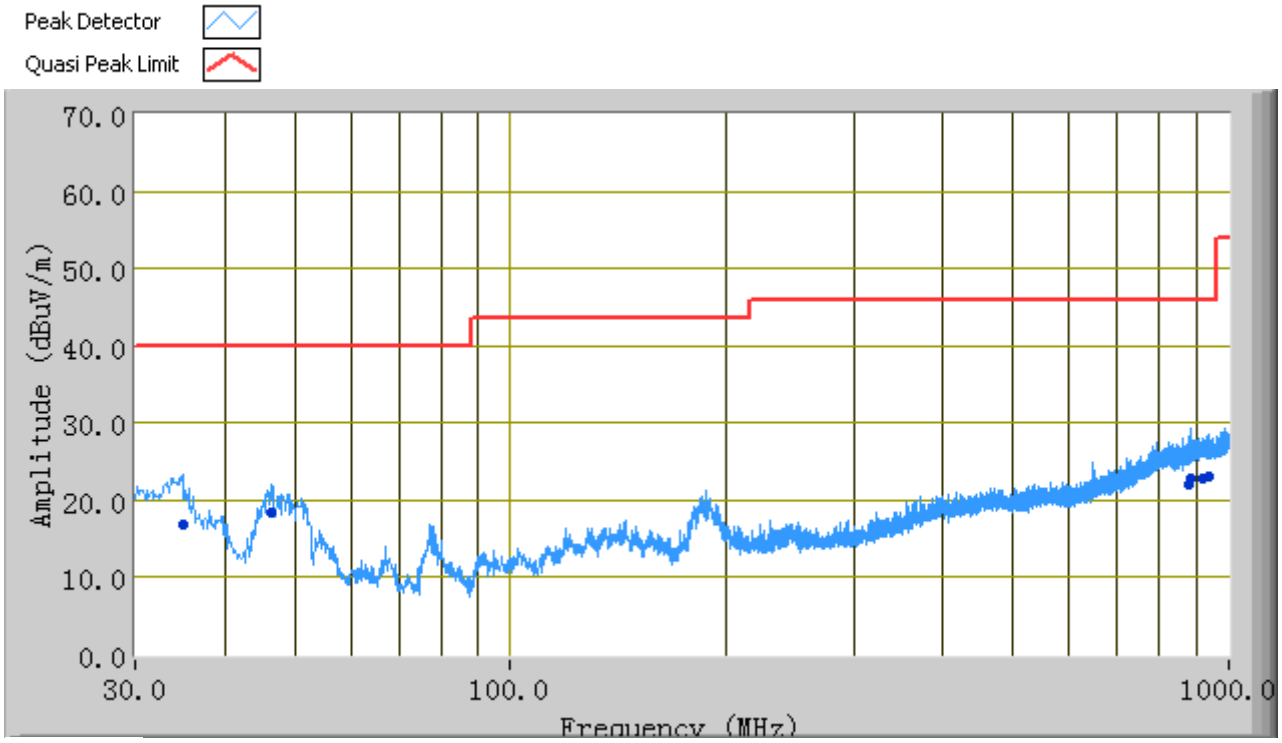
c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth for Average detection (AV) as below at frequency above 1GHz.

■1 kHz (Duty cycle < 98%) ☐ 10 Hz (Duty cycle > 98%)

4. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

Test Result: Pass

Test Mode:	**GFSK Transmitting Mode**



Test Data

Frequency (MHz)	Quasi Peak (dBuV/m)	Azimuth	Polarity(H/V)	Height (cm)	Factors (dB)	Limit (dBuV)	Margin (dB)
34.96	16.89	0.00	V	168.00	-4.13	40.00	-23.11
884.03	22.71	1.00	V	122.00	4.56	46.00	-23.29
936.61	23.02	291.00	H	290.00	5.35	46.00	-22.98
878.22	21.97	92.00	V	254.00	4.49	46.00	-24.03
917.86	22.77	91.00	V	398.00	5.05	46.00	-23.23
46.54	18.32	197.00	V	101.00	-12.28	40.00	-21.68

Above 1 GHz:

Test Mode: Transmitting

Low Channel (2402 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	30.63	AV	V	33.83	4.87	3.88	24	49.21	54	-4.79
4804	31.27	AV	H	33.83	4.87	3.88	24	49.85	54	-4.15
4804	40.35	PK	V	33.83	4.87	—	24	55.05	74	-18.95
4804	41.61	PK	H	33.83	4.87	—	24	56.31	74	-17.69

Duty cycle factor=20log(1/Duty cycle)=20log(1/0.64)=3.88

Middle Channel (2440 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	30.68	AV	V	33.86	4.87	3.74	24	49.15	54	-4.85
4880	31.21	AV	H	33.86	4.87	3.74	24	49.68	54	-4.32
4880	40.91	PK	V	33.86	4.87	—	24	55.64	74	-18.36
4880	41.89	PK	H	33.86	4.87	—	24	56.62	74	-17.38

Duty cycle factor=20log(1/Duty cycle)=20log(1/0.65)=3.74

High Channel (2480 MHz)

Frequency (MHz)	S.A. Reading (dBμV)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Duty cycle Factor (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	30.24	AV	V	33.9	4.87	3.1	24	48.11	54	-5.89
4960	31.57	AV	H	33.9	4.87	3.1	24	49.44	54	-4.56
4960	41.01	PK	V	33.9	4.87	—	24	55.78	74	-18.22
4960	41.87	PK	H	33.9	4.87	—	24	56.64	74	-17.36

Duty cycle factor=20log(1/Duty cycle)=20log(1/0.7)=3.10

Annex A. TEST INSTRUMENT & METHOD

Annex A.i. TEST INSTRUMENTATION & GENERAL PROCEDURES

Instrument	Model	Serial #	Calibration Date	Calibration Due Date
AC Line Conducted Emissions				
EMI test receiver	ESCS30	8471241027	05/27/2014	05/26/2015
Line Impedance Stabilization Network	LI-125A	191106	11/14/2013	11/13/2014
Line Impedance Stabilization Network	LI-125A	191107	11/14/2013	11/13/2014
LISN	ISN T800	34373	01/11/2014	01/10/2015
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	11/20/2013	11/19/2014
Transient Limiter	LIT-153	531118	09/02/2014	09/01/2015
RF conducted test				
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/17/2013	09/16/2014
Power Splitter	1#	1#	09/02/2014	09/01/2015
DC Power Supply	E3640A	MY40004013	09/17/2013	09/16/2014
Wireless Connectivity Test Set	N4010A	GB44440198	03/20/2014	03/19/2015
Radiated Emissions				
EMI test receiver	ESL6	100262	11/23/2013	11/22/2014
Positioning Controller	UC3000	MF780208282	11/19/2013	11/19/2014
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/02/2014	09/01/2015
Microwave Preamplifier (0.5～18GHz)	PAM-118	443008	09/02/2014	09/01/2015
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/23/2013	09/22/2014
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	11/20/2013	11/19/2014
Universal Radio Communication Tester	CMU200	121393	09/17/2013	09/16/2014

Annex A. ii. CONDUCTED EMISSIONS TEST DESCRIPTION

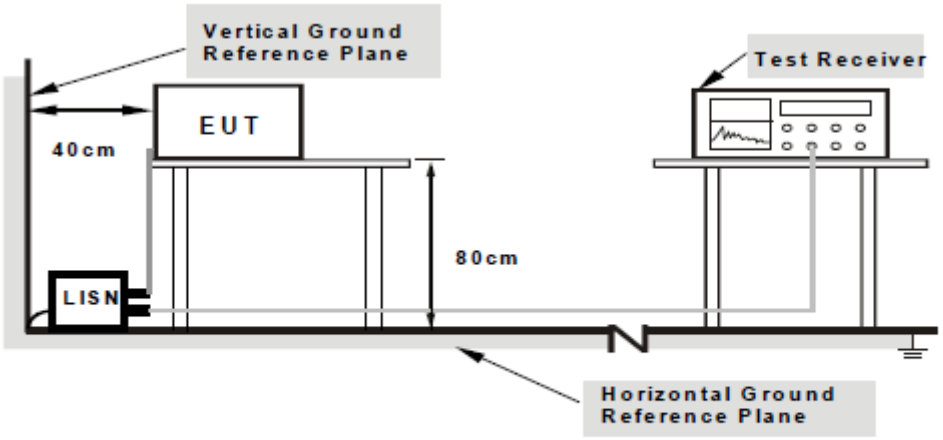
Test Set-up

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table, as shown in Annex B.

2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.

3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.

4. All other supporting equipments were powered separately from another main supply.



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration1.

Test Method

1. The EUT was switched on and allowed to warm up to its normal operating condition.

2. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.

3. High peaks, relative to the limit line, were then selected.

4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made.

5. Steps 2 to 4 were then repeated for the LIVE line (for AC mains) or DC line (for DC power).

Description of Conducted Emission Program

This EMC Measurement software run Lab View automation software and offers a common user interface for electromagnetic interference (EMI) measurements. This software is a modern and powerful tool for controlling and monitoring EMI test receivers and EMC test systems. It guarantees reliable collection, evaluation, and documentation of measurement results. Basically, this program will run a pre-scan measurement before it proceeds with the final measurement. The pre-scan routine will run the common scan range from 150 kHz to 30 MHz; the program will first start a peak and average scan on selectable measurement time and step size. After the program complete the pre-scan, this program will perform the Quasi Peak and Average measurement, based on the pre-scan peak data reduction result.

Sample Calculation Example

At 20 MHz limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.20 dB

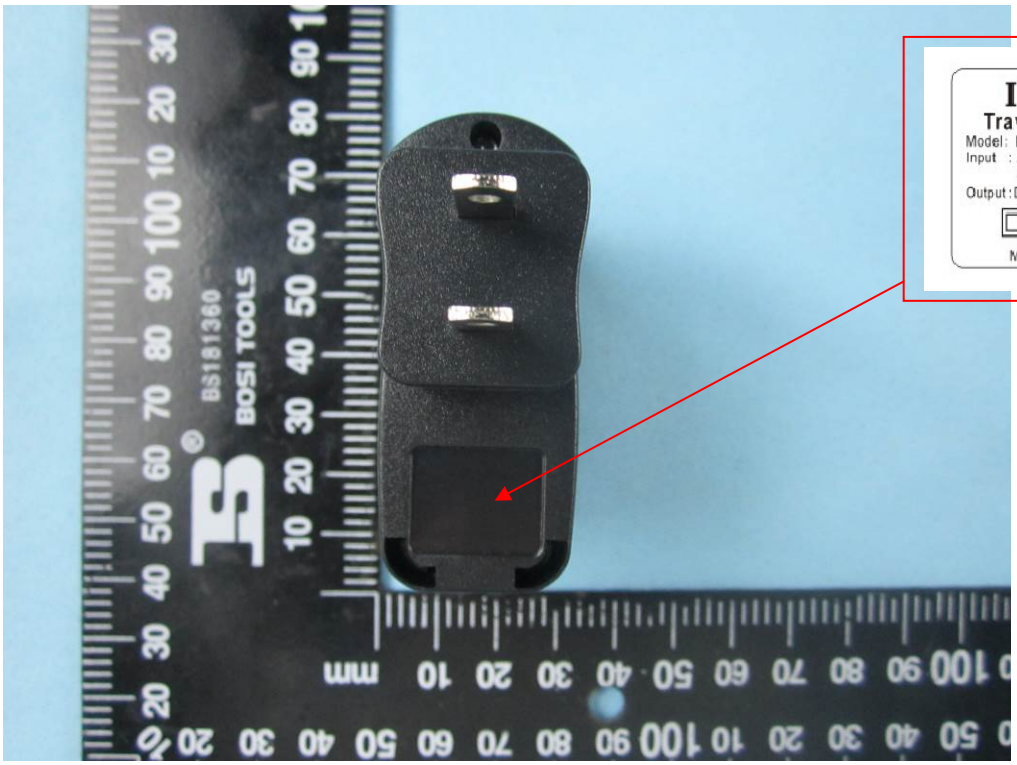
Q-P reading obtained directly from EMI Receiver = 40.00 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 47.96 – 40.00 = 7.96 i.e. **7.96 dB below limit**

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B. i. Photograph 1: EUT External Photo

Whole Package - Top View



Adapter – Front View

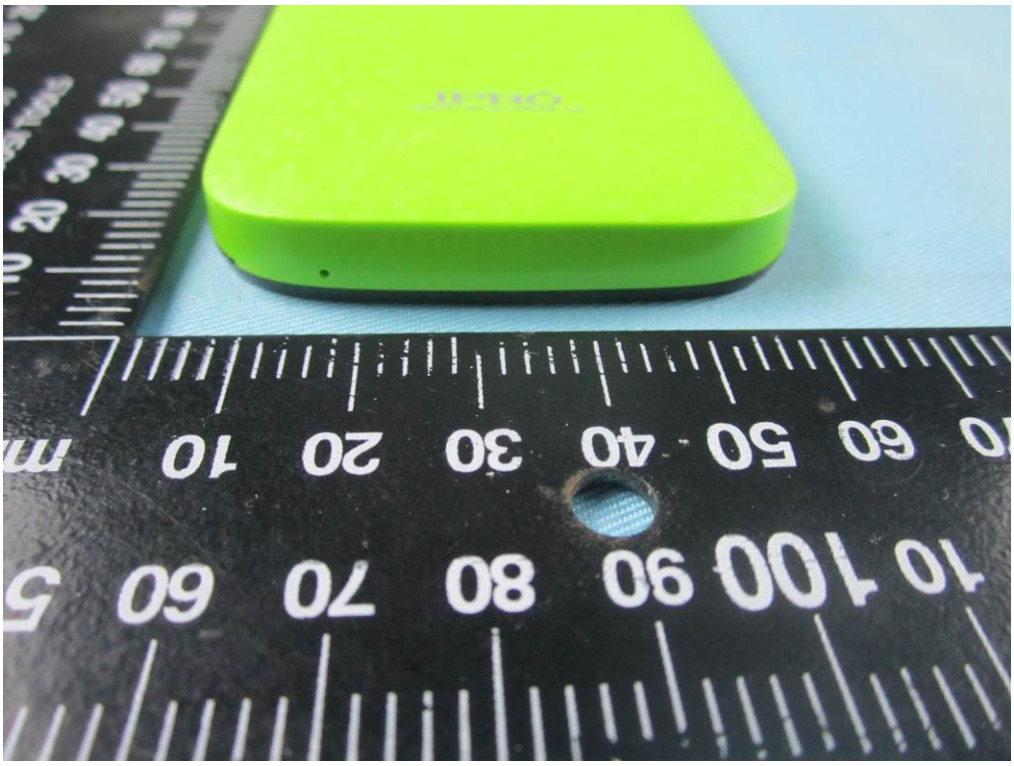
EUT - Front View

EUT - Rear View

EUT - Top View

EUT - Bottom View

EUT - Left View

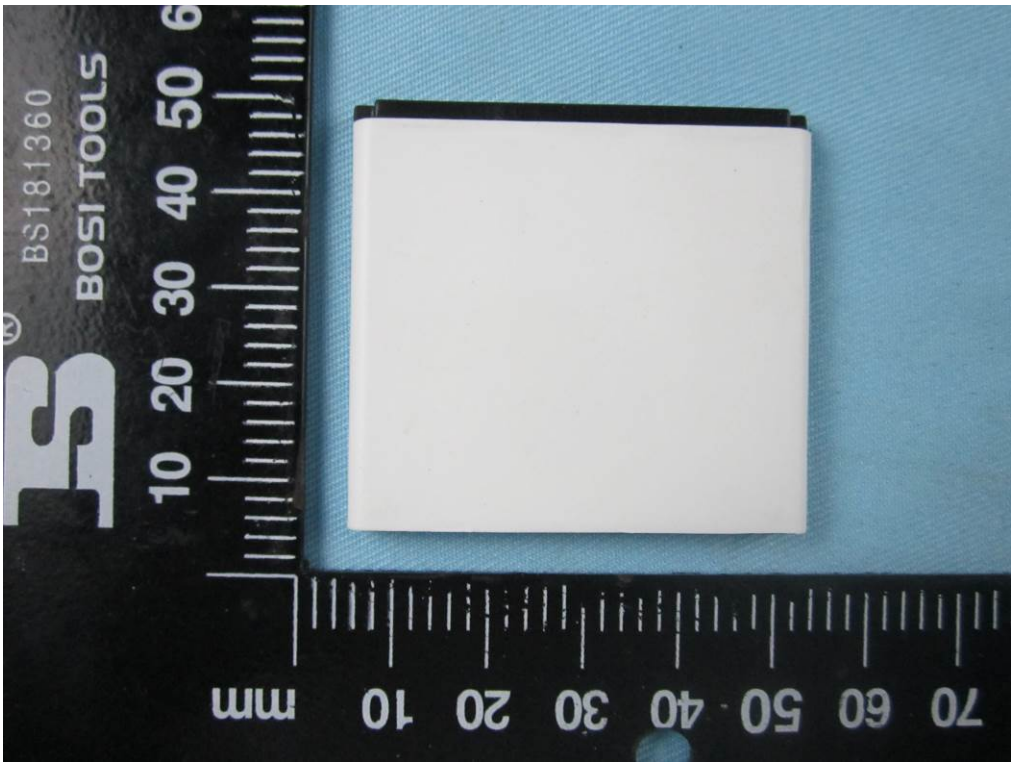


EUT - Right View

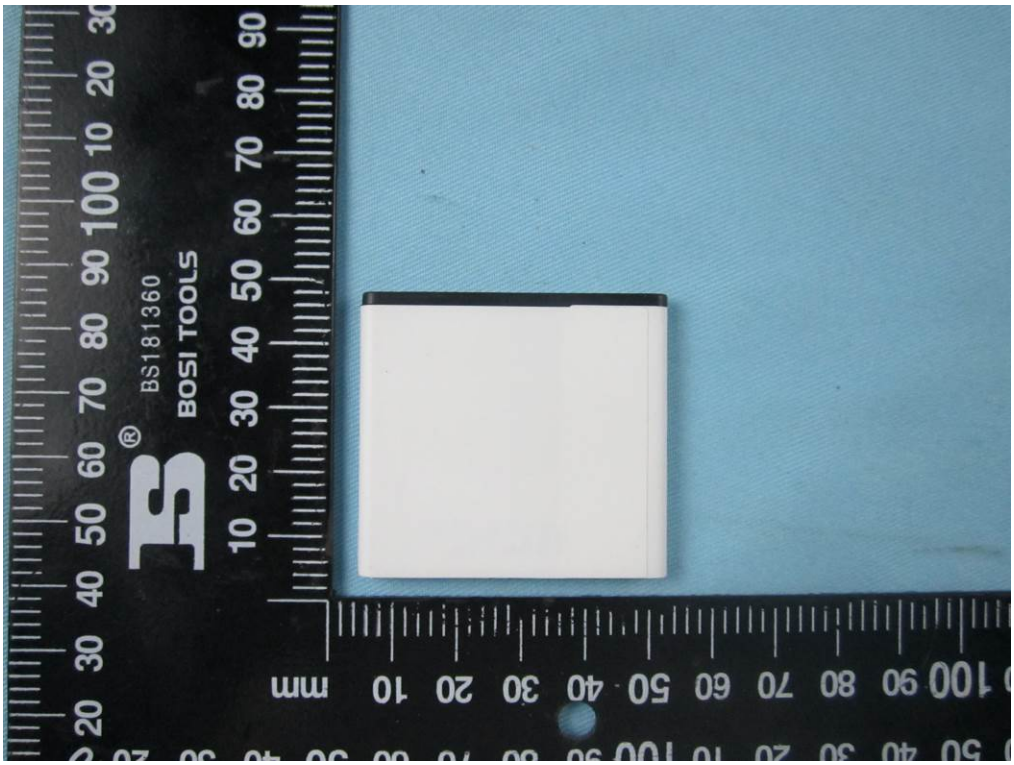
Annex B. ii. Photograph 2: EUT Internal Photo

Cover Off - Top View 1

Cover Off - Top View 2

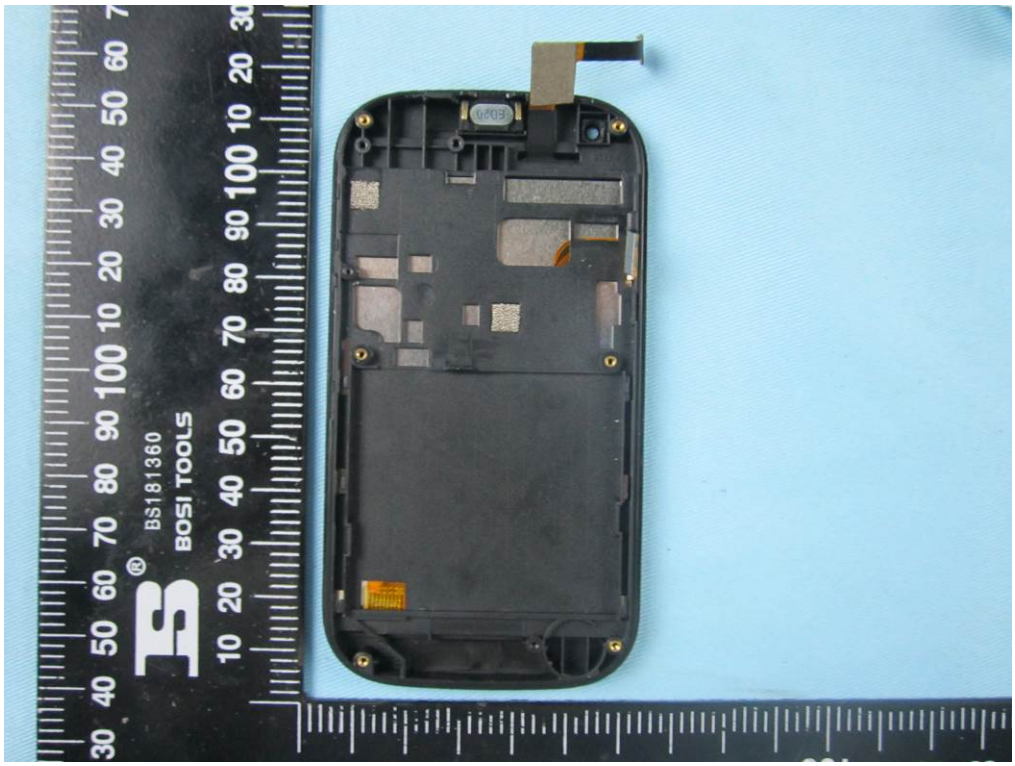


Battery - Top View

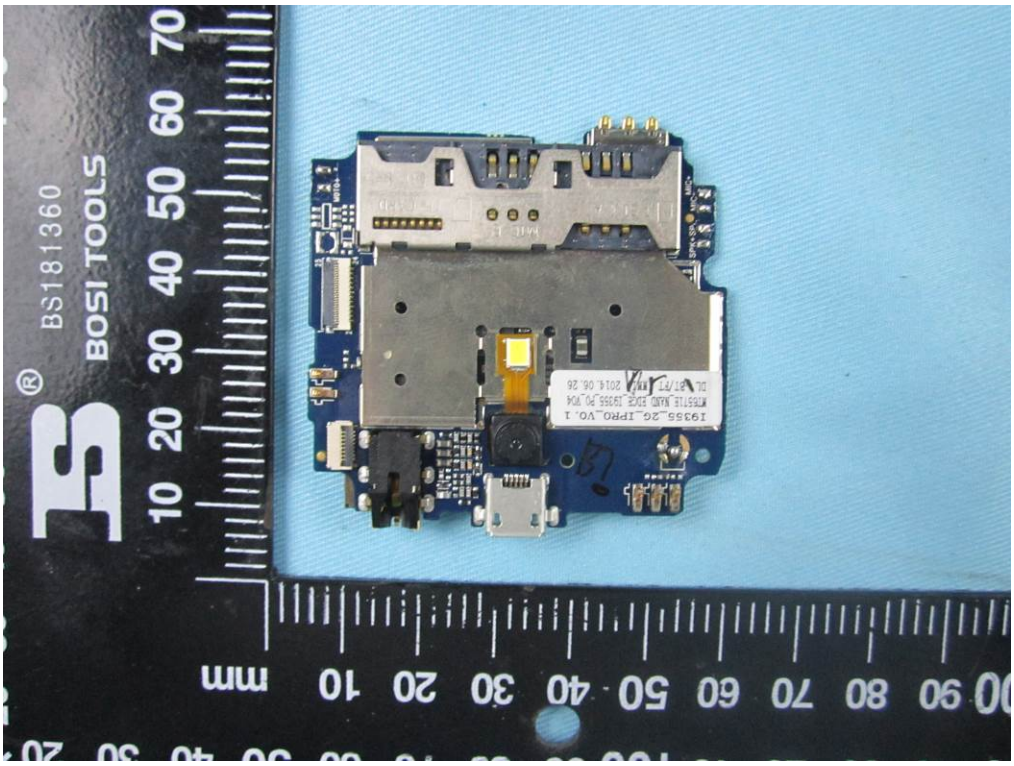


Battery - Bottom View

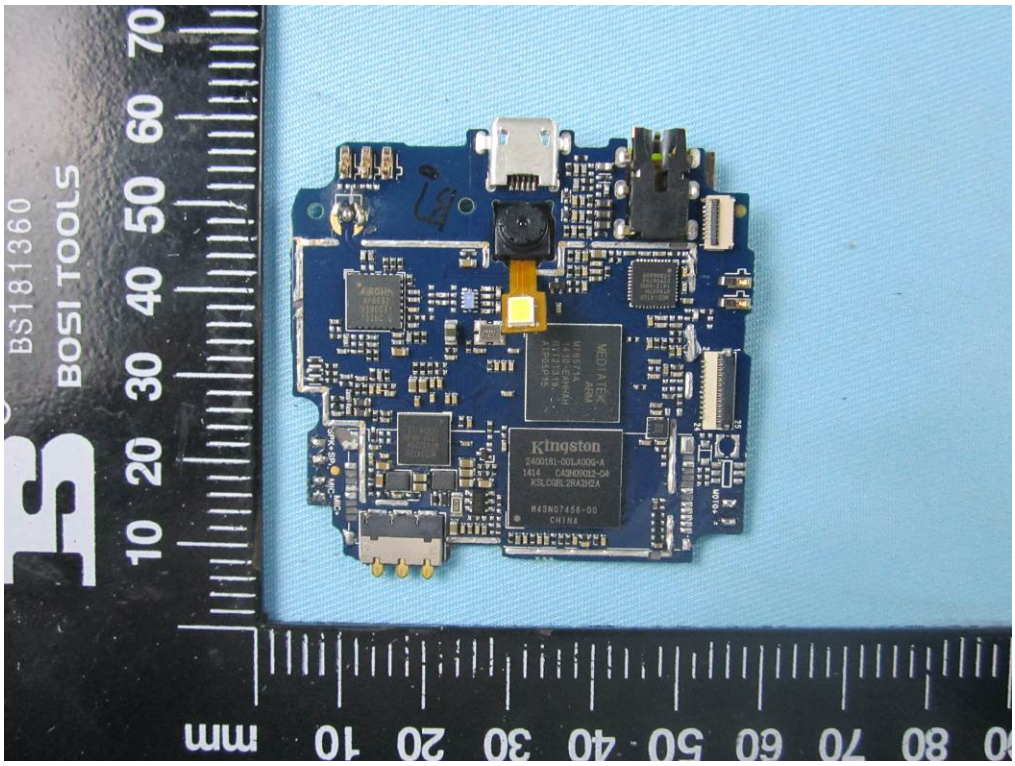
LCD – Front View



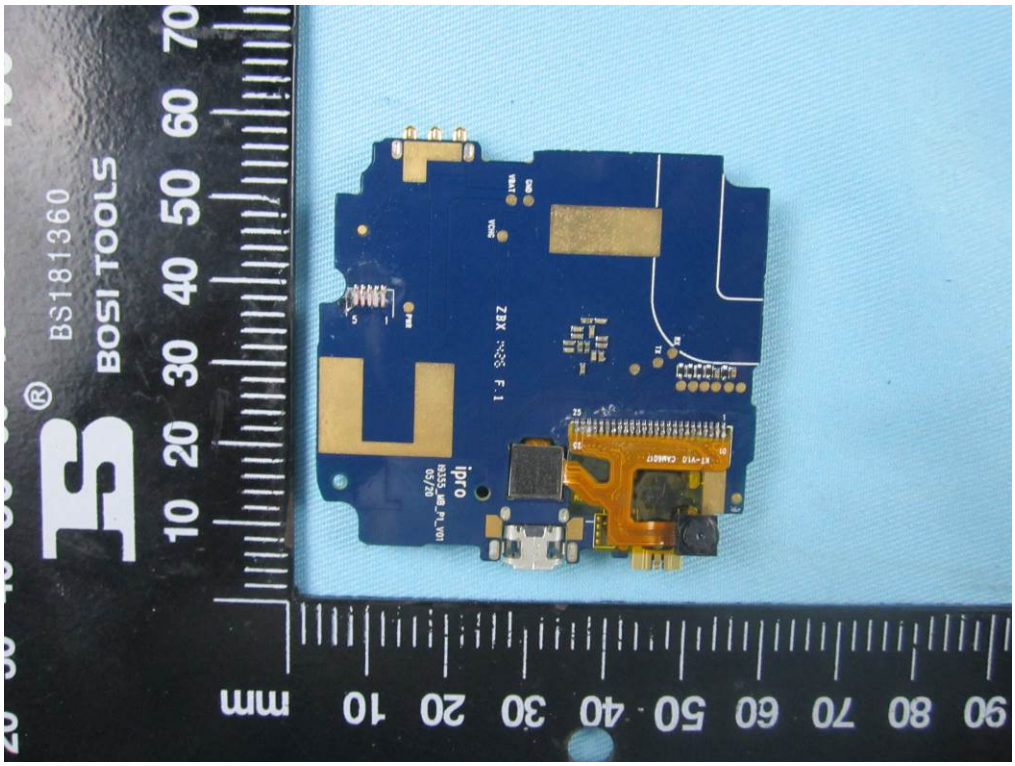
LCD – Rear View



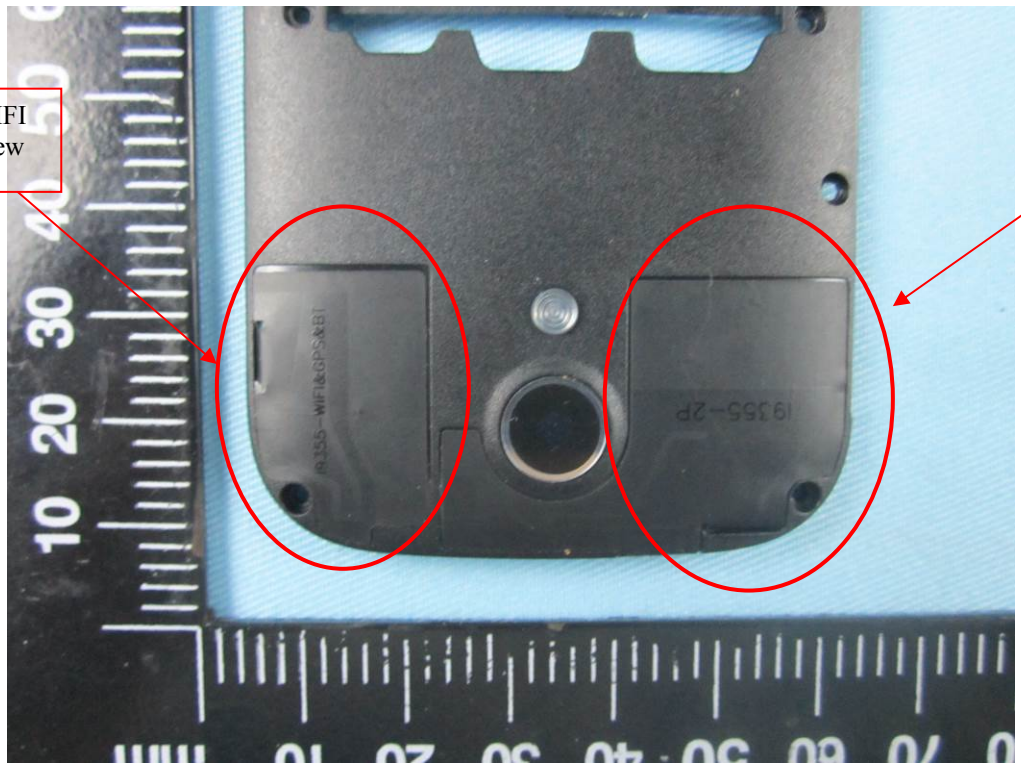
Mainborad With Shielding - Front View



Mainborad Without Shielding - Front View



Mainborad – Rear View

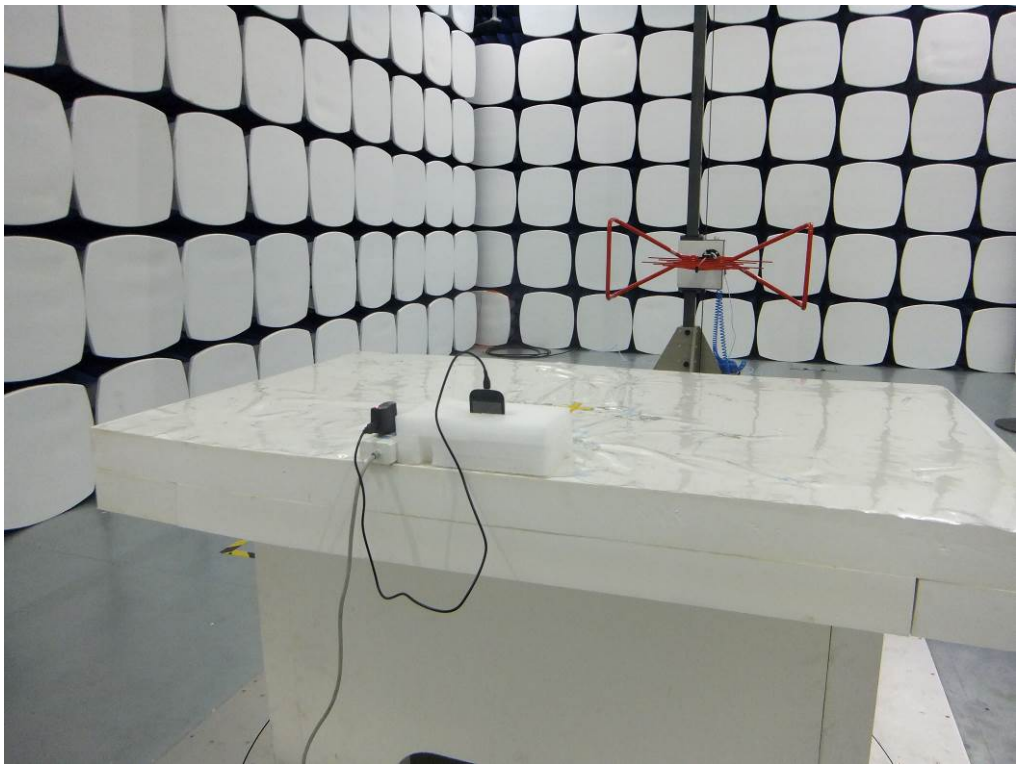


BT/BLE/WIFI/GSM/PCS/UMTS-FDD Antenna View

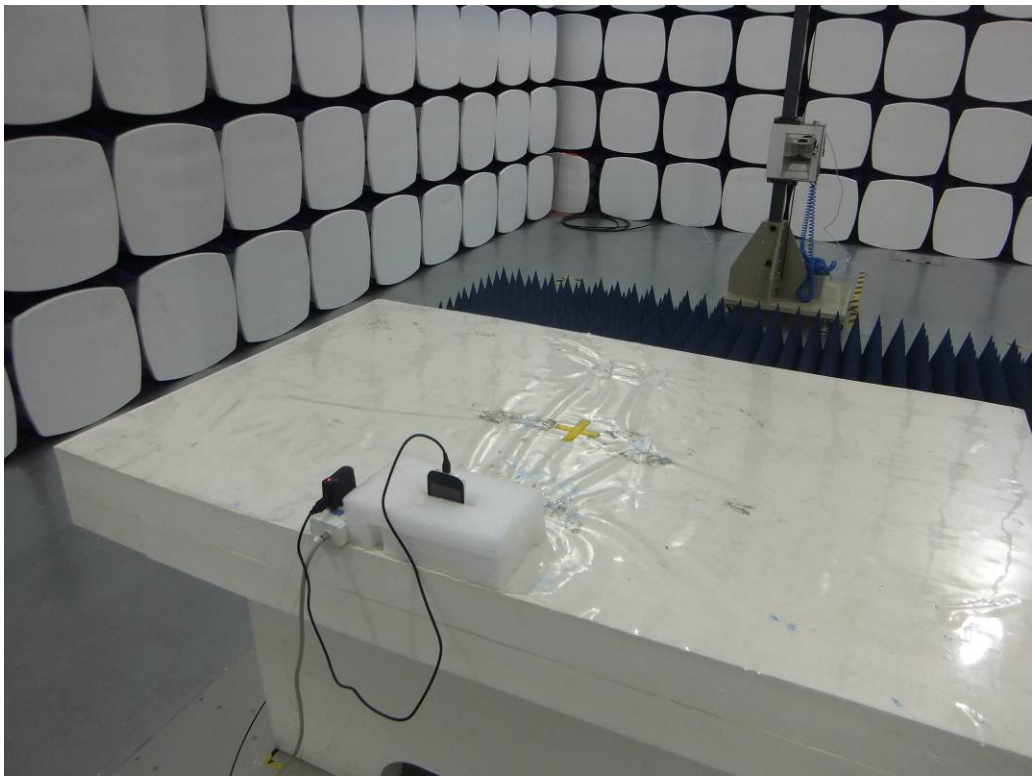
Annex B.iii. Photograph 3: Test Setup Photo

Conducted Emissions Test Setup Front View

Conducted Emissions Test Setup Side View



Radiated Spurious Emissions Test Setup Below 1GHz - Front View



Radiated Spurious Emissions Test Setup Above 1GHz –Front View

Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

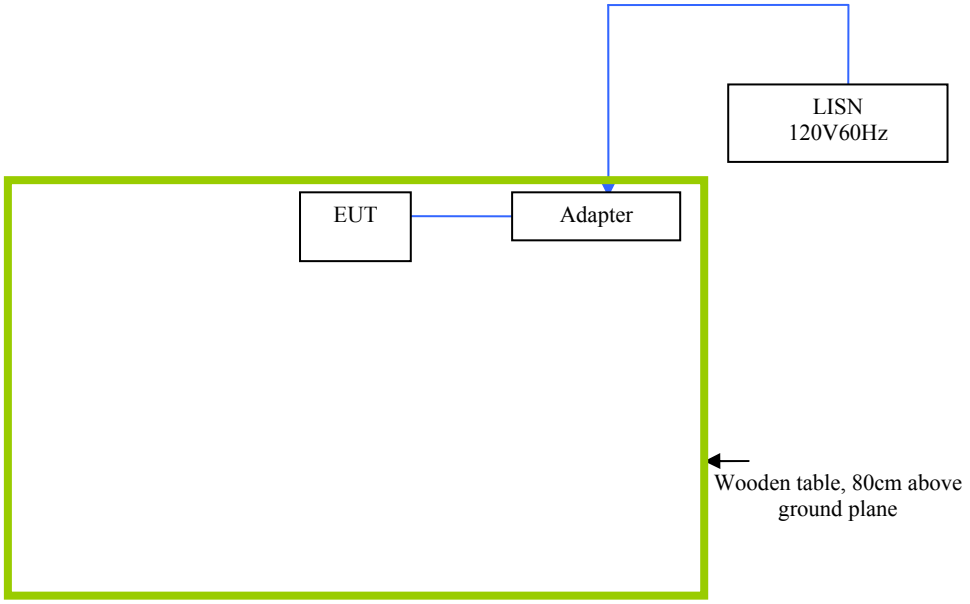
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

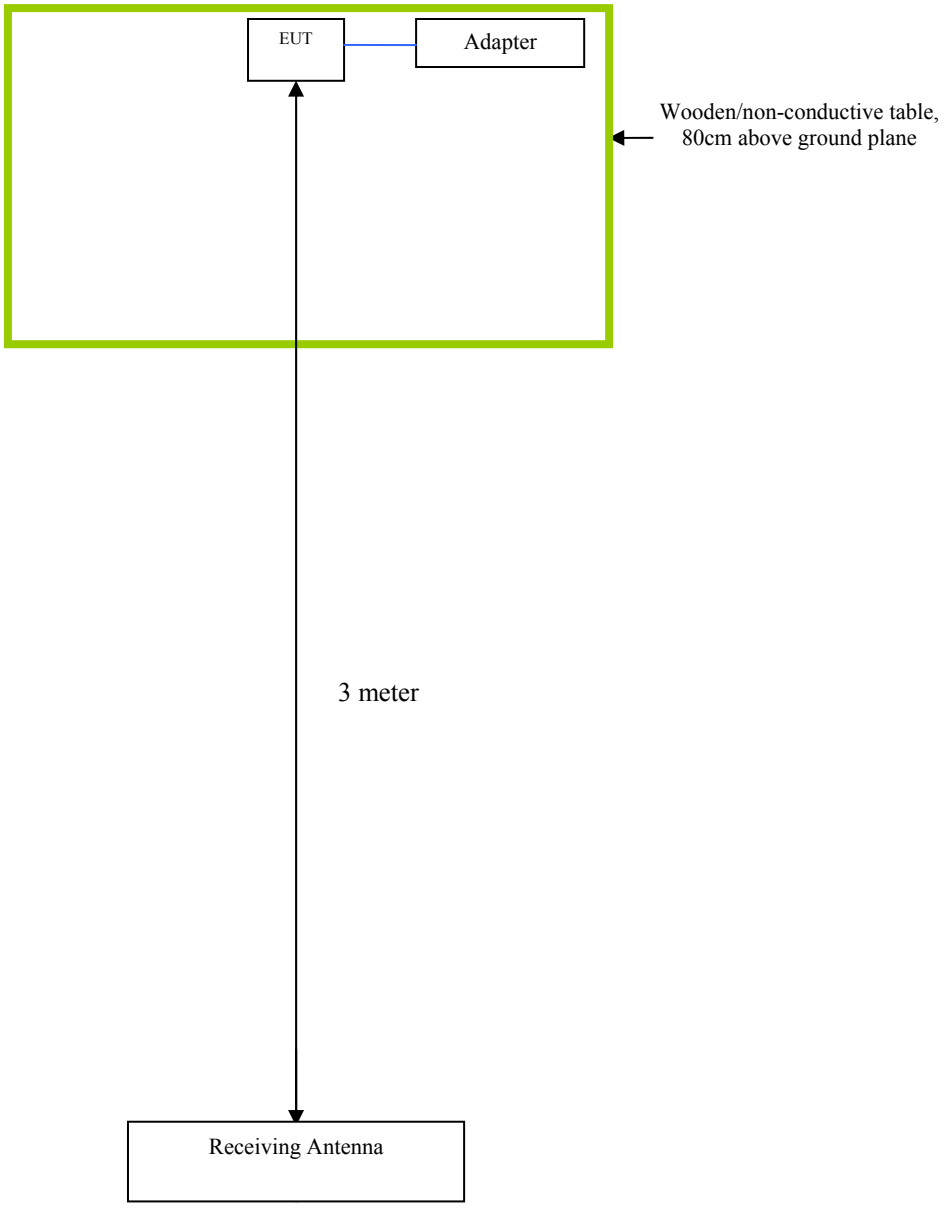
The following is a description of supporting equipment and details of cables used with the EUT.

Manufacturer	Equipment Description (Including Brand Name)	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A

Block Configuration Diagram for AC Line Conducted Emissions



Block Configuration Diagram for Radiated Emissions



Annex C. ii. EUT OPERATING CONDITIONS

The following is the description of how the EUT is exercised during testing.

Test	Description Of Operation
Emissions Testing	The EUT was continuously transmitting to stimulate the worst case.

Annex D. USER MANUAL / BLOCK DIAGRAM / SCHEMATICS / PART LIST

Please see attachment

Annex E. DECLARATION OF SI

N/A