Verykool USA Inc

GSM Mobile Phone

Main Model: S400
Serial Model: N/A

July 05, 2013

Report No.: 13070137-FCC-R3

(This report supersedes none)

Modifications made to the product : None

This Test Report is Issued Under the Authority of:		
Back Huang	Alex Liu	
Back Huang **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

FCC Part 15.247: 2012, ANSI C63.4: 2009

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety

Accreditations for Product Certifications

Country/Region	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC, (RCB 208)	RF , Telecom
Hong Kong	OFTA (US002)	RF , Telecom

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CONTENTS

1 EXECUTIVE SUMMARY & EUT INFORMATION

The purpose of this test programme was to demonstrate compliance of the Verykool USA Inc, GSM Mobile Phone and model: S400 against the current Stipulated Standards. The GSM Mobile Phone has demonstrated compliance with the FCC Part 15.247: 2012, ANSI C63.4: 2009.

EUT Information

EUT Description	:	**GSM Mobile Phone**
Main Model	:	**S400**
Serial Model	:	**N/A**
Antenna Gain	:	**UMTS-FDD Band V/GSM850: 2 dBi** **UMTS-FDD Band II/PCS1900: 2 dBi** **Bluetooth: 1.5 dBi** **WIFI: 1.5 dBi**
Input Power	:	**Battery:** **Model: BH-L5V** **Spec: 3.7V 1400mAh 5.18Wh** **Limited charger voltage: 4.2V** **Adapter:** **Model: CYSK05-050050** **Input: AC 100-240V 50/60Hz 0.15A** **Output: DC 5V 500mAh**
Classification Per Stipulated Test Standard	:	**FCC Part 15.247: 2012, ANSI C63.4: 2009**

2 TECHNICAL DETAILS

Purpose	**Compliance testing of GSM Mobile Phone with stipulated standard**
Applicant / Client	**Verykool USA Inc 3636 Nobel Drive, Suite 325,San Diego,California,United States**
Manufacturer	**Wingtech Group 1-3F,Yinfeng,Mansion,No.5097,LuoSha Road,LuoHu district,Shenzhen,518003**
Laboratory performing the tests	**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	**13070137-FCC-R3**
Date EUT received	**June 05, 2013**
Standard applied	**FCC Part 15.247: 2012, ANSI C63.4: 2009**
Dates of test (from – to)	**July 02,2013 to July 05, 2013**
No of Units :	**#1**
Equipment Category :	**Spread Spectrum System/Device**
Trade Name :	**Verykool**
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 UMTS-FDD Band VTX : 826.4 ~ 846.6 MHz; RX : 871.4 ~ 891.6 MHz UMTS-FDD Band Ⅱ TX :1852.4 ~ 1907.6 MHz; RX : 1932.4 ~ 1987.6 MHz 802.11b/g/n: 2412-2462 MHz Bluetooth & BLE: 2402-2480 MHz**
Number of Channels	**299CH (PCS1900) and 124CH (GSM850) UMTS-FDD Band V: 102CH UMTS-FDD Band Ⅱ: 277CH Bluetooth: 79CH 802.11b/g/n: 11CH BLE: 40CH**
Modulation	**GSM / GPRS: GMSK UMTS-FDD: QPSK 802.11b/g/n: DSSS/OFDM Bluetooth: GFSK&π/4DQPSK&8DPSK BLE: GFSK**
GPRS Multi-slot class	**8/10/12**
FCC ID	**WA6S400**

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	*N/A
§15.205, §15.209, §15.247(d)	Radiated Spurious Emissions & Unwanted Emissions into Restricted Frequency Bands	Compliance

Note:"*N/A" means that the EUT can only use the battery power supply.

5 MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

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

Test Result: Pass

The EUT is a portable device.
Please refer to SIEMIC RF Exposure Evolution Report: 13070137-FCC-H.

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 4 antennas: . a monopole antenna for Bluetooth, the gain is 1.5 dBi;
a monopole antenna for WIFI, the gain is 1.5 dBi
.a PIFA antenna for GSM, the gain are 2 dBi for GSM, 2 dBi for PCS
.a PIFA antenna for WCDMA the gain are 2 dBi for Band Ⅴ, 2 dBi for Band Ⅱ
which in accordance to section 15.203, please refer to the internal photos.

Result: Complianance.

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	26°C
Relative Humidity	56%
Atmospheric Pressure	1019mbar

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 : July 02, 2013
   Tested By : Back Huang

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:

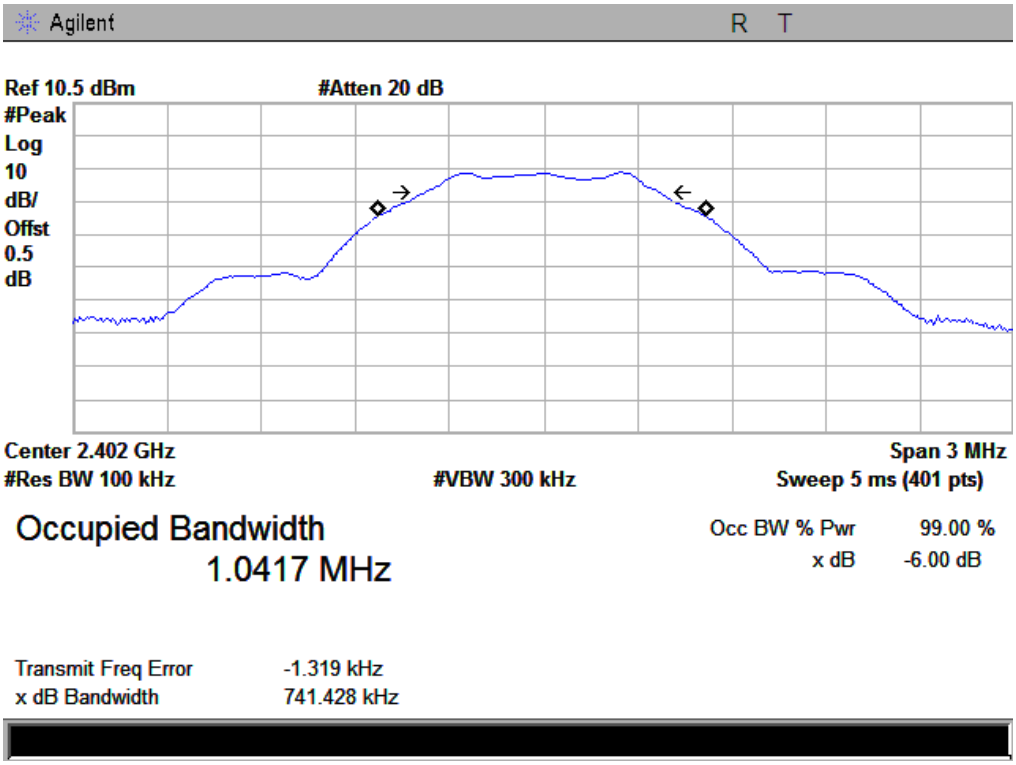
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Result: Pass.

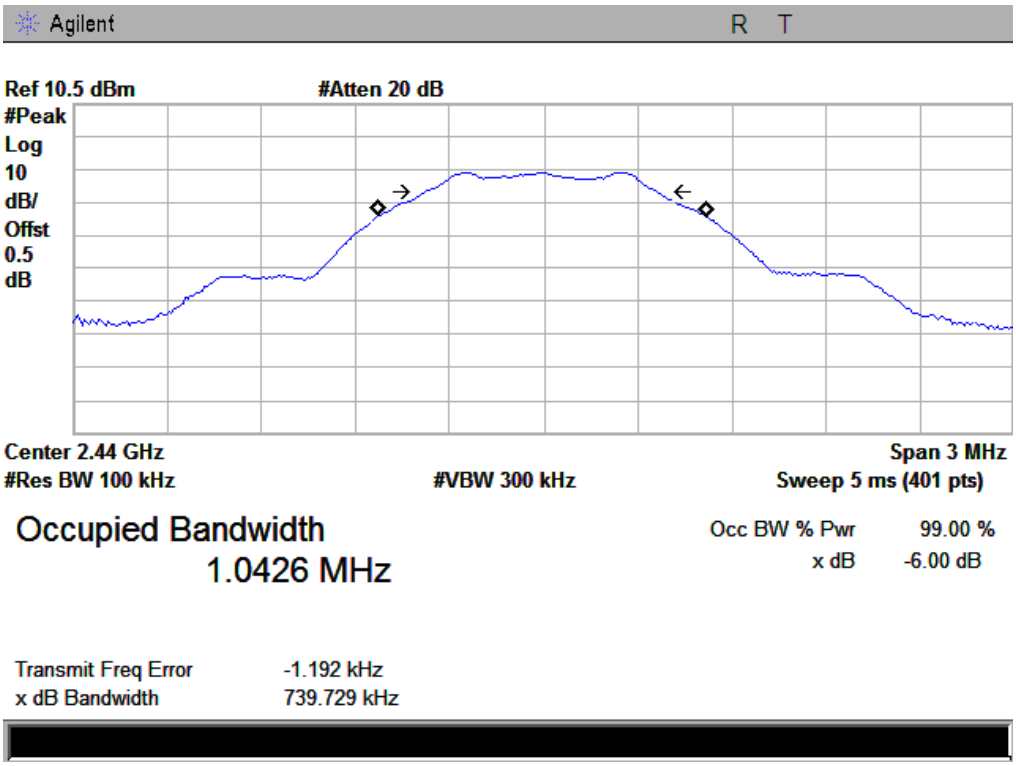
Please refer to the following tables and plots.

Channel	Channel Frequency (MHz)	Measured 6dB Bandwidth (kHz)	FCC Part 15.247 Limit (kHz)
Low	2402	741.428	＞500
Middle	2440	739.729	＞500
High	2480	739.915	＞500

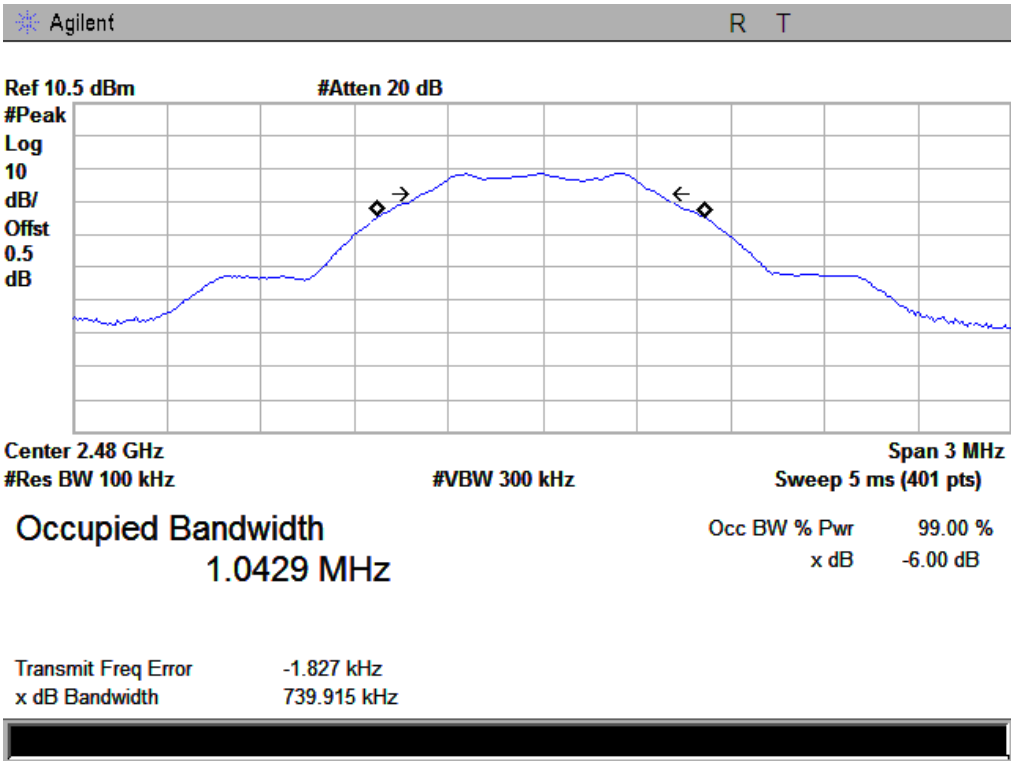
6dB DTS - Low Channel



6dB DTS - Middle Channel



6dB DTS - High Channel



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	26°C
Relative Humidity	56%
Atmospheric Pressure	1019mbar

4. Test date : July 02, 2013
   Tested By : Back Huang

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.

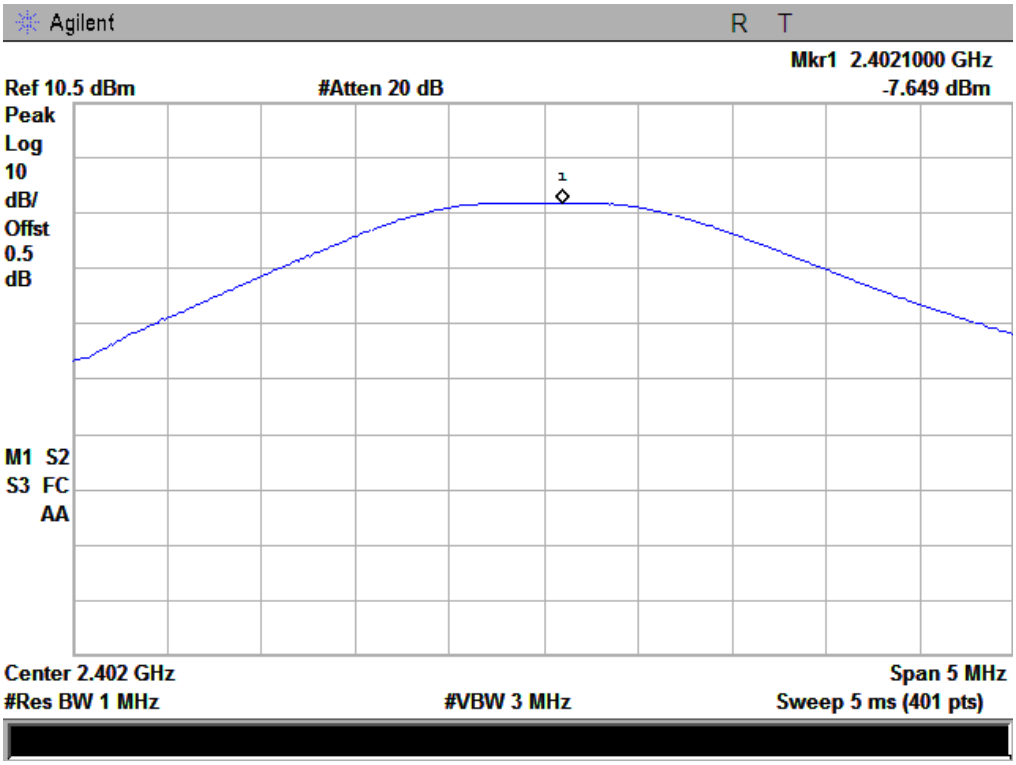
Test Result: Pass.

Please refer to the following tables and plots.

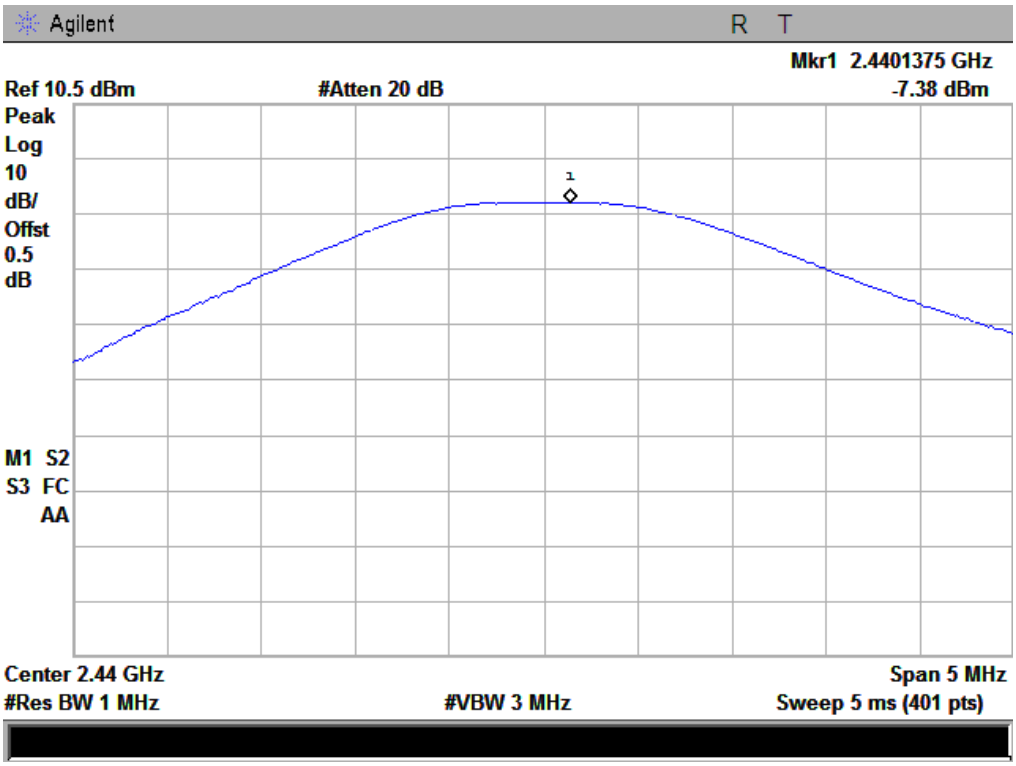
The Maximum peak conducted output power:

Channel	Channel Frequency (MHz)	PK Output Power (dBm)	Limit (dBm)
Low	2402	-7.649	30
Middle	2440	-7.380	30
High	2480	-7.176	30

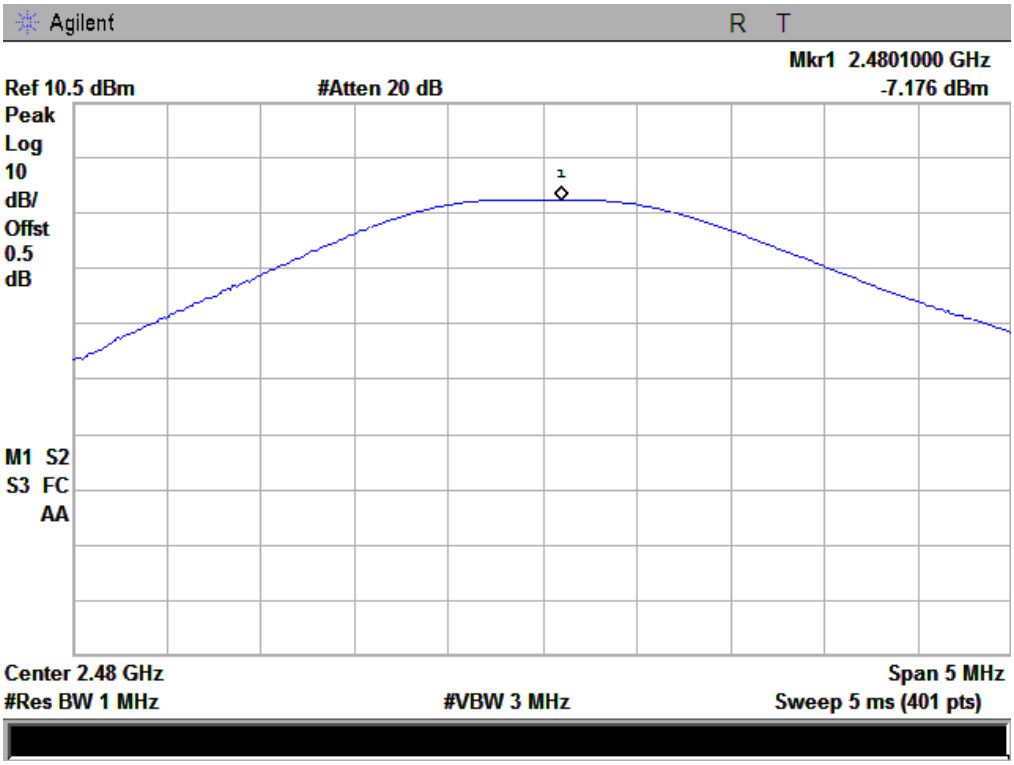
Peak Output Power - Low Channel



Peak Output Power - Middle Channel



Peak Output Power - High Channel



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	26°C
Relative Humidity	56%
Atmospheric Pressure	1019mbar

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 : July 02, 2013
   Tested By : Back Huang

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.

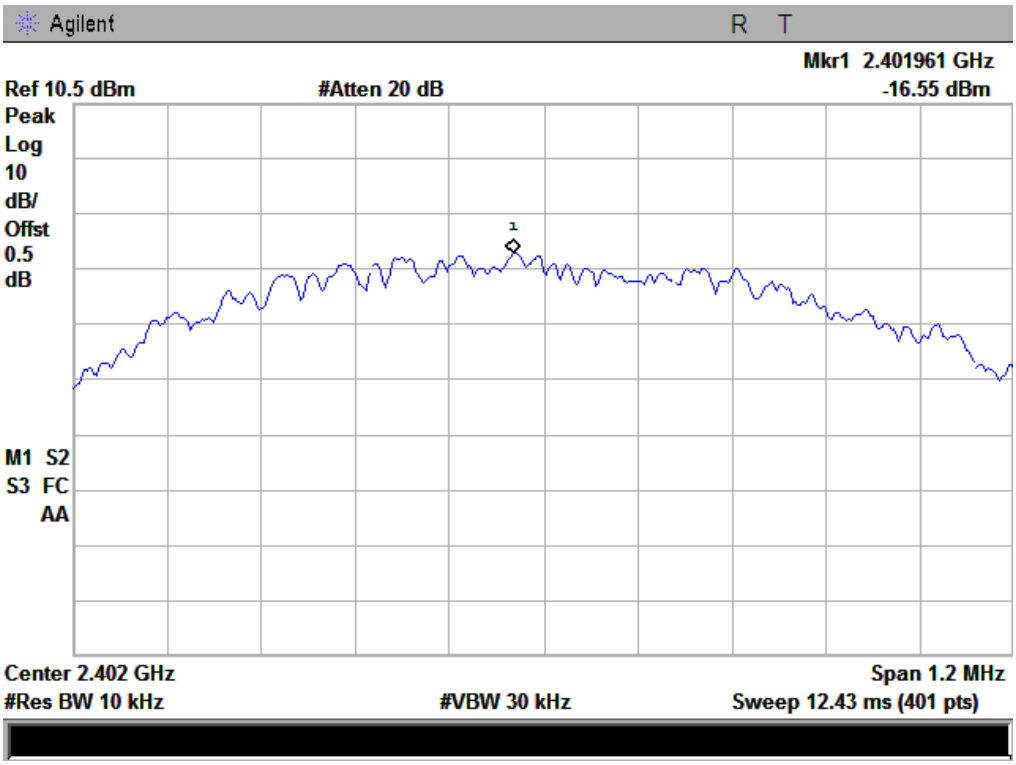
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ 3 RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the 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.

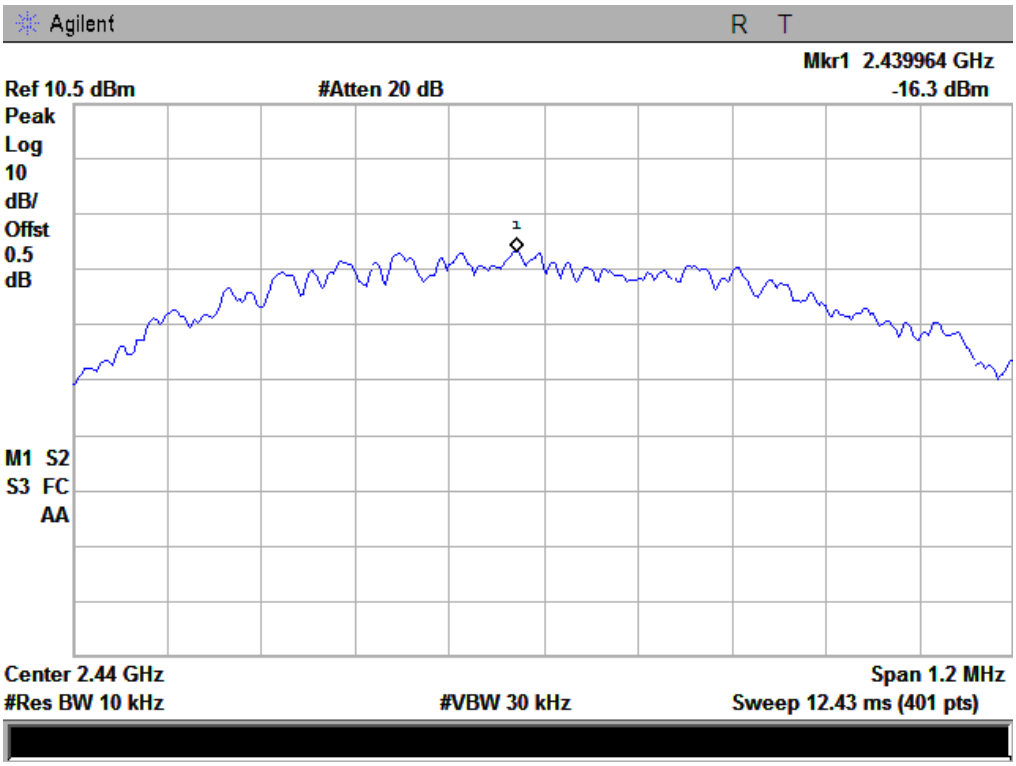
Please refer to the following tables and plots.

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)
Low	2402	-16.55	8
Middle	2440	-16.30	8
High	2480	-16.48	8

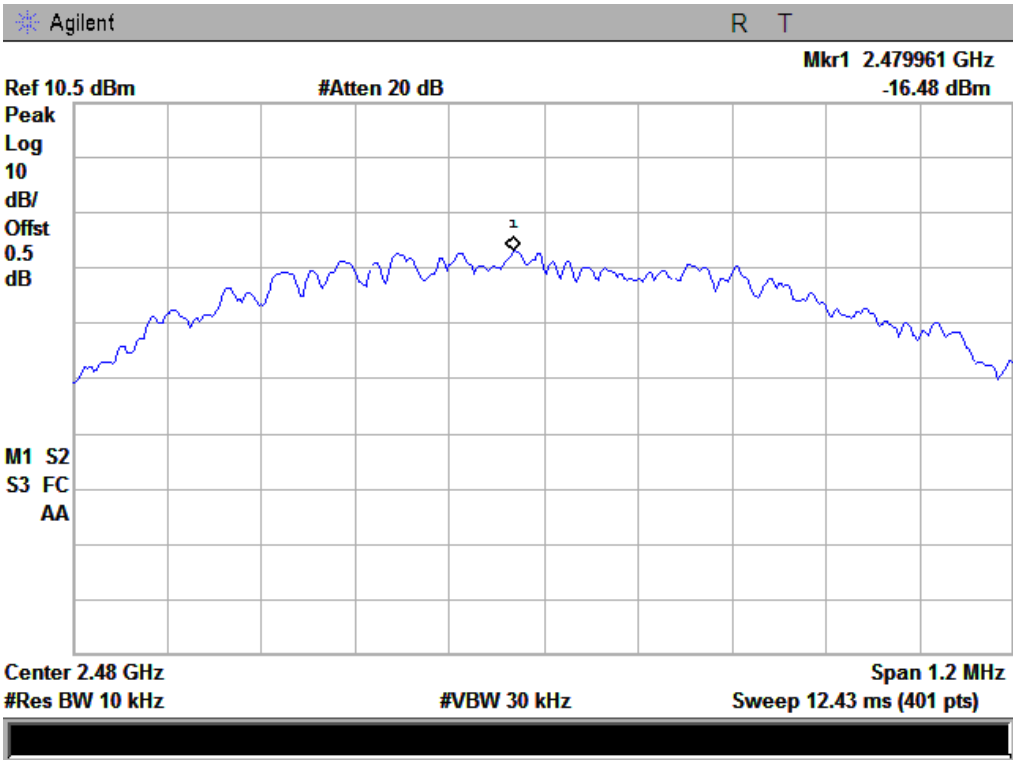
Power Spectral Density - Low Channel



Power Spectral Density - Middle Channel



Power Spectral Density - High Channel



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	25°C
		Relative Humidity	58%
		Atmospheric Pressure	1016mbar
3.	Test date : July 05, 2013		
	Tested By : Back Huang		

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.

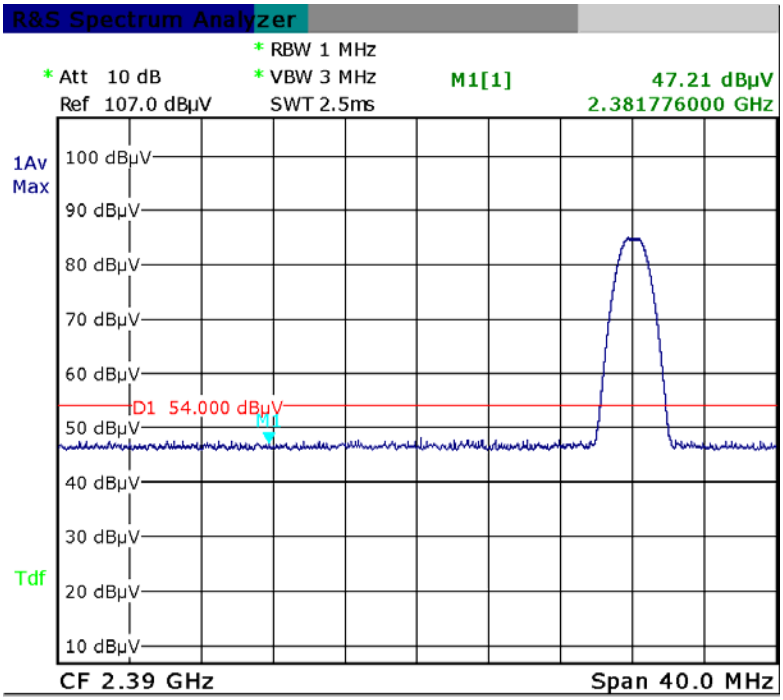
Procedures: (Radiated Method Only)

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 on the rotated table inside the anechoic chamber without connection to measurement instrument. 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. Repeat above procedures until all measured frequencies were complete.
3. Set band RBW=1MHz, VBW=3MHz with a convenient frequency span from band edge.
4. Find the highest point in edge frequency,and then calculated results.
5. Repeat above procedures until all measured frequencies were complete.

Test Result: Pass.

Please refer to the following tables and plots.

Radiated Restricted Band Edge - Low Channel (Peak)



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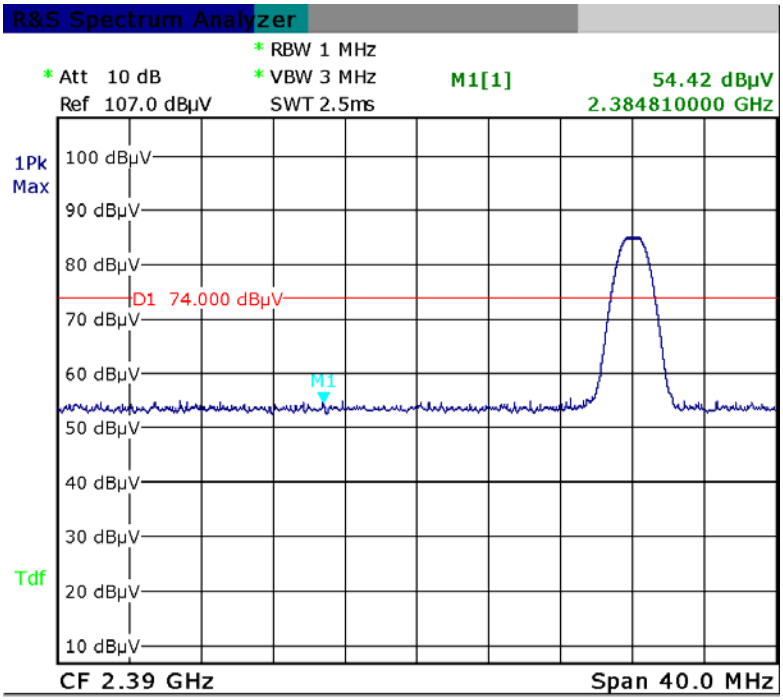
Radiated Restricted Band Edge - Low Channel (Average)



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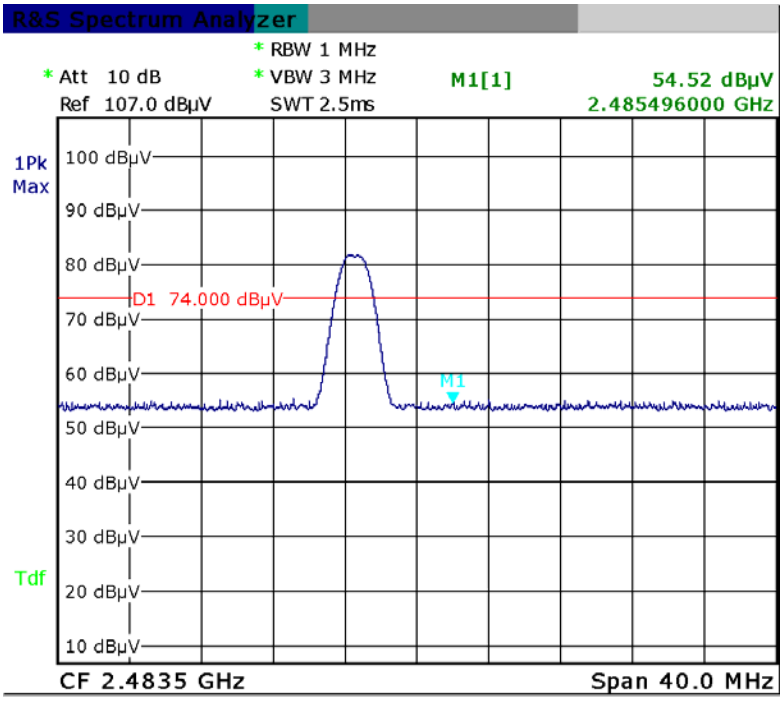
Radiated Restricted Band Edge - High Channel (Peak)



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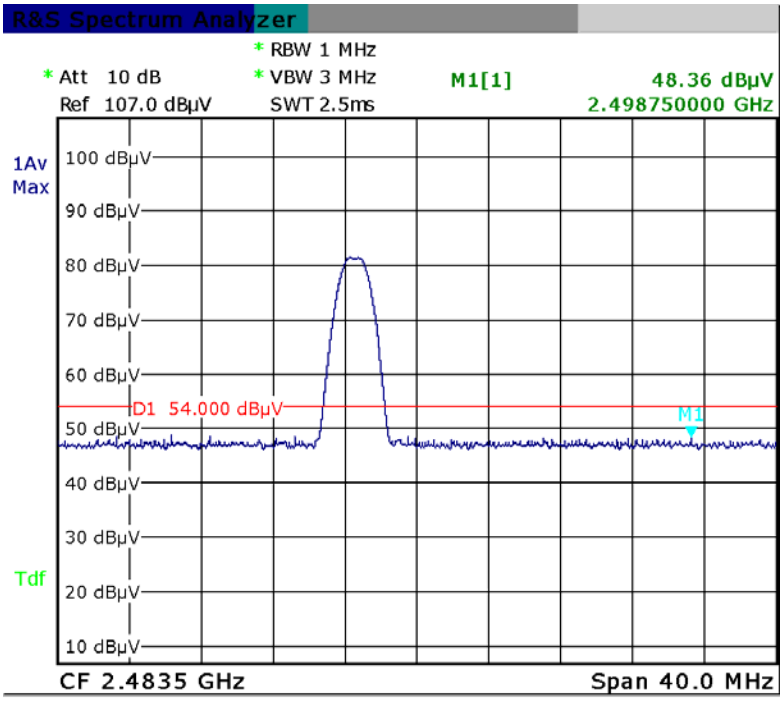
Radiated Restricted Band Edge - High Channel (Average)



Date: 5.JUL.2013 05:22:11

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.

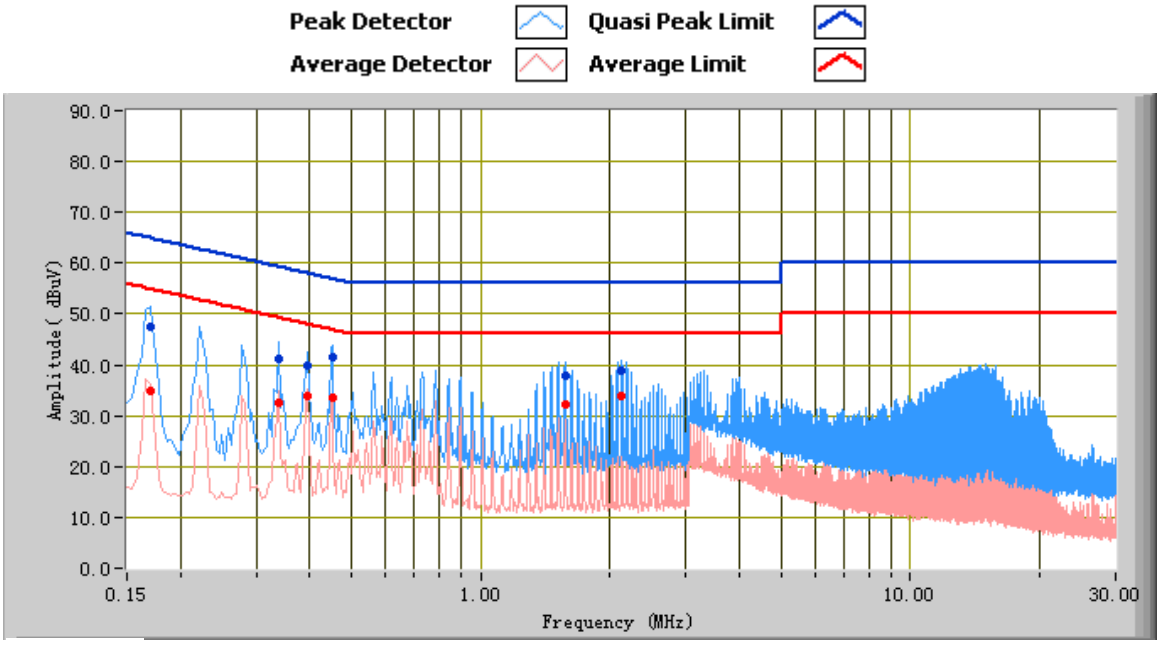
Procedures:

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	26°C
Relative Humidity	56%
Atmospheric Pressure	1019mbar

5. Test date: July 03, 2013
   Tested By : Back Huang

Test Mode:	GFSK Transmitting Mode

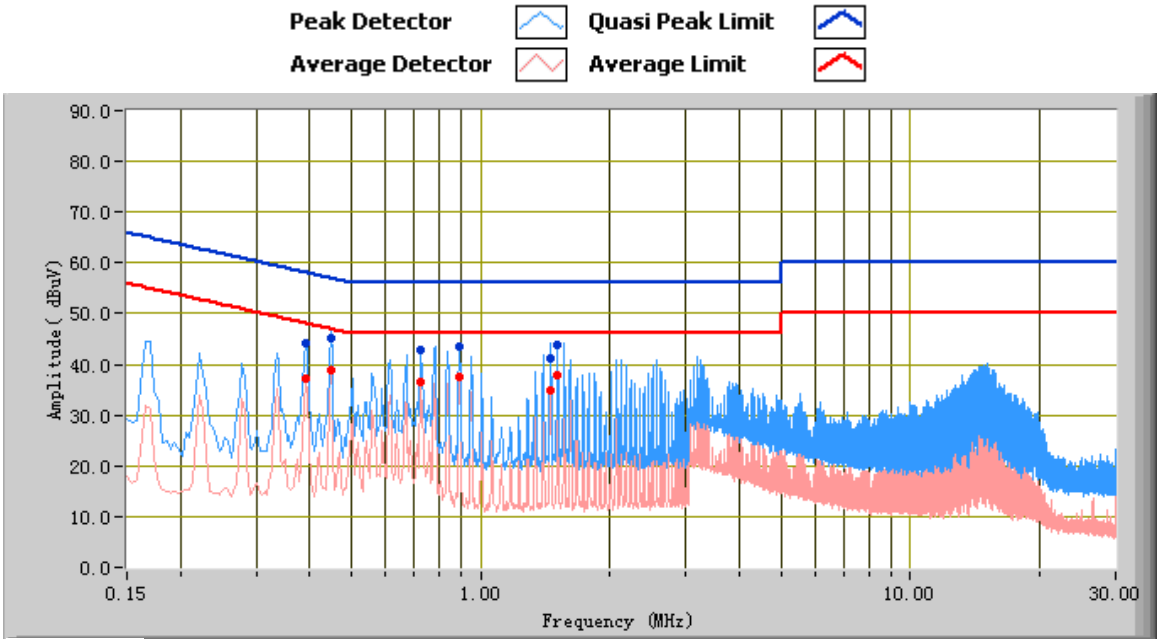


Test Data

Phase Line Plot at 110Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.45	41.52	56.87	-15.36	33.52	46.87	-13.36	11.16
0.17	47.61	64.96	-17.35	34.99	54.96	-19.97	11.93
0.34	41.18	59.25	-18.07	32.44	49.25	-16.82	11.32
2.13	38.98	56.00	-17.02	34.04	46.00	-11.96	10.88
0.39	39.94	57.98	-18.04	33.95	47.98	-14.03	11.24
1.57	37.85	56.00	-18.15	32.27	46.00	-13.73	10.79

Test Mode:	GFSK Transmitting Mode



Test Data

Phase Neutral Plot at 110Vac, 60Hz

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Factors (dB)
0.45	45.22	56.95	-11.73	38.81	46.95	-8.14	11.14
1.51	43.69	56.00	-12.31	37.70	46.00	-8.30	10.81
1.45	41.26	56.00	-14.74	34.96	46.00	-11.04	10.80
0.89	43.46	56.00	-12.54	37.38	46.00	-8.62	10.78
0.73	42.81	56.00	-13.19	36.65	46.00	-9.35	10.90
0.39	44.03	58.06	-14.04	37.08	48.06	-10.98	11.23

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	26°C
Relative Humidity	58%
Atmospheric Pressure	1018mbar

5. Test date : July 03, 2013
   Tested By : Back Huang

Requirement: §15.247(d) specifies that emissions which fall in the restricted bands, as defined in **§15.205(a)**, must comply with the radiated emission limits specified in **§15.209(a)**.

Procedures:

Radiated Spurious Emissions Measurement

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 radiated spurious emission measurements the EUT transmit antenna may be replaced with a termination matching the nominal impedance of the antenna. Established procedures for performing radiated measurements shall be used (see C63.10). All detected emissions must comply with the applicable limits.

Measurement Detectors

§15.35(a) specifies that on frequencies less than and below 1000 MHz, the radiated emissions limits assume the use of a CISPR quasi-peak detector function and related measurement bandwidths. **§15.35(b)** specifies that on frequencies above 1000 MHz, the radiated emissions limits assume the use of an average detector and a minimum resolution bandwidth of 1 MHz. In addition, **§15.35(b)** that when average radiated emissions measurements are specified there is also a limit on the peak emissions level which is 20 dB above the applicable maximum permitted average emission limit. These specifications also apply to conducted emissions measurements.

1. CISPR Quasi-Peak Measurement

The specifications for the measuring instrument using the CISPR quasi-peak detector can be found in Publication 16 of the International Special Committee on Radio Frequency Interference (CISPR) of the International Electrotechnical Commission.

As an alternative to CISPR quasi-peak measurement, compliance can be demonstrated to the applicable emission limits using a peak detector.

2. Peak Power Measurement Procedure

Utilize the peak power measurement procedure specified in Section 8.1.1 with the following modifications:

Set analyzer center frequency to the frequency associated with the restricted band emission under examination.

Set RBW = 1 MHz.

Note that if the peak measured value complies with the average limit, it is not necessary to perform a separate average measurement. If this option is exercised, it should be so noted in the test report.

3. Average Power Measurement Procedures

The average restricted band emission levels must be measured with the EUT transmitting continuously (≥ 98% duty cycle) at its maximum power control level. Optionally, video triggering/signal gating can be used to ensure that measurements are performed only when the EUT is transmitting at its maximum power control level.

The average power measurement procedures described in Section 8.2 shall be used with the following modifications:

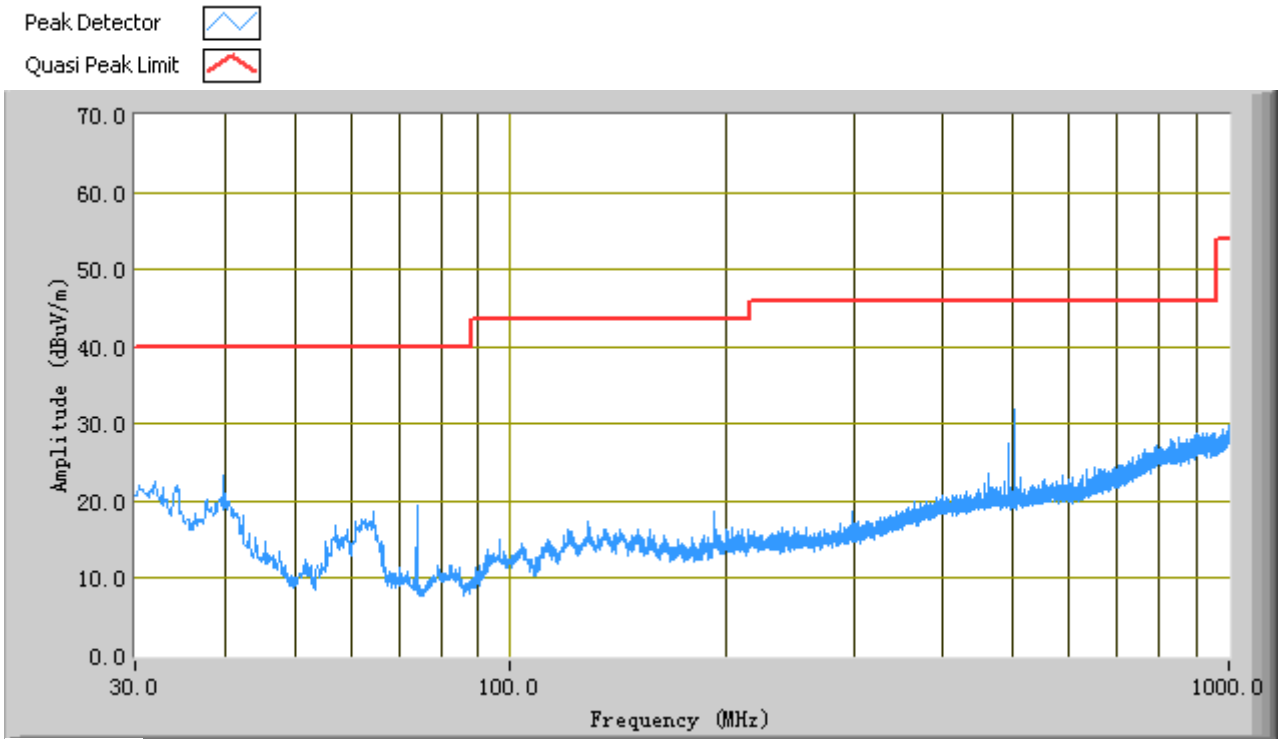
Set analyzer center frequency to the frequency associated with the restricted band emission.

Set span to at least 1 MHz.

Use peak marker function to determine the highest amplitude within the RBW (1 MHz).

Test Result: Pass

Test Mode:	GFSK Transmitting Mode



Test Data

Frequency (MHz)	Peak (dBuV/m)	Azimuth	Polarity (H/V)	Height (cm)	Factors (dB)	Limit (dBuV)	Margin (dB)
504.09	31.99	340.00	H	100.00	-1.92	46.00	-14.01
39.82	23.44	360.00	V	100.00	-7.38	40.00	-16.56
955.26	28.75	112.00	H	300.00	5.64	46.00	-17.25
930.16	28.72	315.00	V	200.00	5.24	46.00	-17.28
917.79	28.71	15.00	V	300.00	5.05	46.00	-17.29
899.48	28.68	296.00	H	300.00	4.76	46.00	-17.32

Above 1 GHz:

Test Mode: Transmitting

Low Channel (2402 MHz)

Frequency (MHz)	Substituted level (dBμV/m)	Detector (PK/AV)	Direction (degree)	Height (m)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	34.39	AV	268	1.5	V	33.83	3.3	24	47.52	54	-6.48
4804	36.77	AV	74	1.6	H	33.83	3.3	24	49.90	54	-4.10
4804	44.65	PK	268	1.5	V	33.83	3.3	24	57.78	74	-16.22
4804	47.25	PK	74	1.6	H	33.83	3.3	24	60.38	74	-13.62
5589.5	34.06	AV	221	1.4	V	34.29	3.8	24	48.15	54	-5.85
5589.5	35.76	AV	178	1.5	H	34.29	3.8	24	49.85	54	-4.15
5589.5	44.14	PK	221	1.4	V	34.29	3.8	24	58.23	74	-15.77
5589.5	44.25	PK	178	1.5	H	34.29	3.8	24	58.34	74	-15.66

Middle Channel (2440 MHz)

Frequency (MHz)	Substituted level (dBμV/m)	Detector (PK/AV)	Direction (degree)	Height (m)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	34.21	AV	281	1.5	V	33.86	3.3	24	47.37	54	-6.63
4880	36.42	AV	82	1.4	H	33.86	3.3	24	49.58	54	-4.42
4880	43.87	PK	281	1.5	V	33.86	3.3	24	57.03	74	-16.97
4880	46.79	PK	82	1.4	H	33.86	3.3	24	59.95	74	-14.05
5552.2	34.23	AV	215	1.5	V	34.32	3.8	24	48.35	54	-5.65
5552.2	35.52	AV	302	1.6	H	34.32	3.8	24	49.64	54	-4.36
5552.2	44.38	PK	215	1.5	V	34.32	3.8	24	58.5	74	-15.5
5552.2	44.46	PK	302	1.6	H	34.32	3.8	24	58.58	74	-15.42

High Channel (2480 MHz)

Frequency (MHz)	Substituted level (dBμV/m)	Detector (PK/AV)	Direction (degree)	Height (m)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	34.16	AV	288	1.6	V	33.90	3.3	24	47.36	54	-6.64
4960	36.38	AV	85	1.6	H	33.90	3.3	24	49.58	54	-4.42
4960	43.81	PK	288	1.6	V	33.90	3.3	24	57.01	74	-16.99
4960	46.82	PK	82	1.6	H	33.90	3.3	24	60.02	74	-13.98
5593.5	34.31	AV	221	1.5	V	34.35	3.8	24	48.46	54	-5.54
5593.5	35.38	AV	308	1.6	H	34.35	3.8	24	49.53	54	-4.47
5593.5	44.18	PK	221	1.5	V	34.35	3.8	24	58.33	74	-15.67
5593.5	44.24	PK	308	1.6	H	34.35	3.8	24	58.39	74	-15.61

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	ESL6	100262	11/19/2012	11/18/2013
Line Impedance Stabilization Network	LI-125A	191106	11/14/2012	11/13/2013
Line Impedance Stabilization Network	LI-125A	191107	11/14/2012	11/13/2013
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	071259	11/20/2012	11/19/2013
Transient Limiter	LIT-153	531118	3/03/2013	3/02/2014
RF conducted test				
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	CFG038	10/25/2012	10/24/2013
Power Splitter	1#	1#	02/02/2013	02/01/2014
Temperature/Humidity Chamber	1007H	N/A	01/07/2013	01/06/2014
DC Power Supply	E3640A	MY40004013	03/22/2013	03/21/2014
Radiated Emissions				
EMI test receiver	ESL6	100262	11/19/2012	11/18/2013
Positioning Controller	UC3000	MF780208282	11/19/2012	11/18/2013
OPT 010 AMPLIFIER(0.1-1300MHz)	8447E	2727A02430	11/19/2012	11/18/2013
Microwave Preamplifier(0.5～18GHz)	PAM-118	443008	11/08/2012	11/07/2013
Bilog Antenna (30MHz~6GHz)	JB6	A110712	01/27/2013	01/26/2014
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	071283	11/20/2012	11/19/2013

Annex A.ii. CONDUCTED EMISSIONS TEST DESCRIPTION

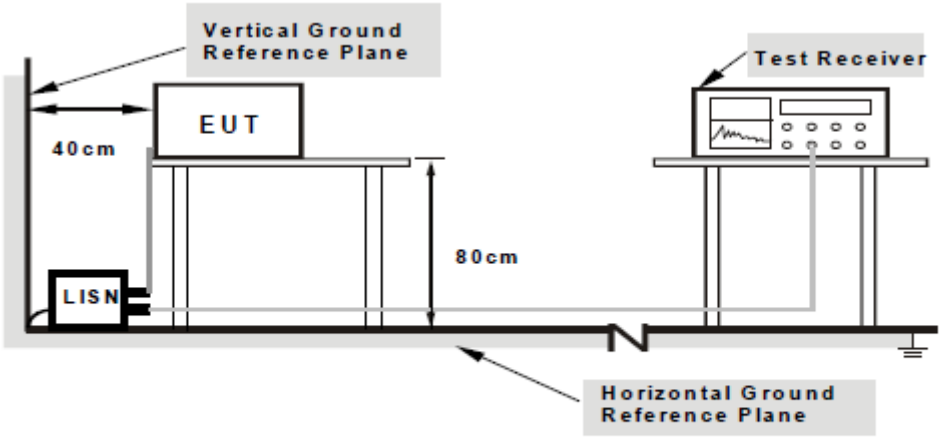
Test Set-up

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 LabView 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 A. iii RADIATED EMISSIONS TEST DESCRIPTION

EUT Characterisation

EUT characterisation, over the frequency range from 30MHz to 10th Harmonic , was done in order to minimise radiated emissions testing time while still maintaining high confidence in the test results.

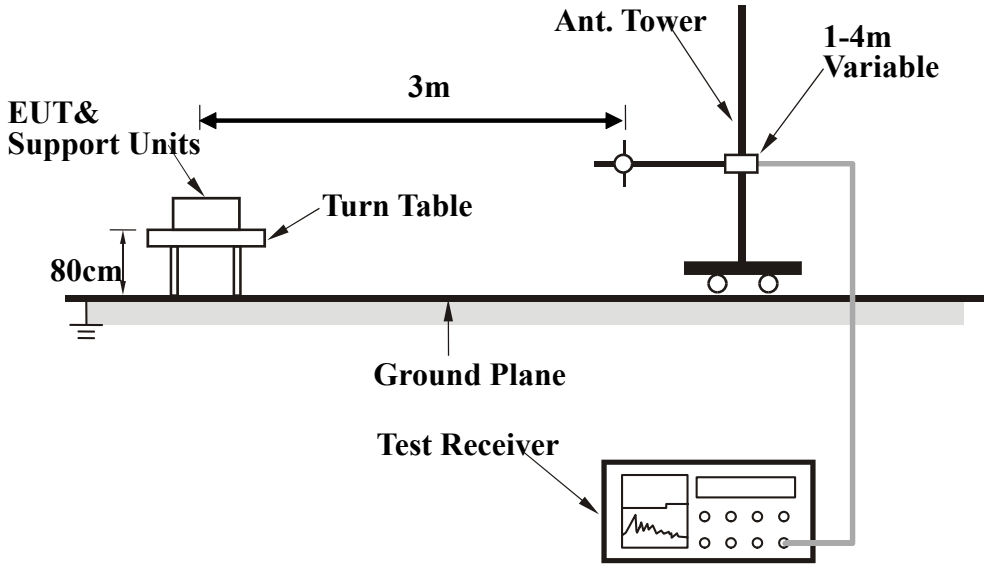
The EUT was placed in the chamber, at a height of about 0.8m on a turntable. Its radiated emissions frequency profile was observed, using a spectrum analyzer /receiver with the appropriate broadband antenna placed 3m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer / receiver. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at the Open Area Test Site (OATS).

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 1.0m X 0.8m high, non-metallic table.

2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.

3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.



Test Method

The following procedure was performed to determine the maximum emission axis of EUT:
1. With the receiving antenna is H polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
2. With the receiving antenna is V polarization, rotate the EUT in turns with three orthogonal axes to determine the axis of maximum emission.
3. Compare the results derived from above two steps. So, the axis of maximum emission from EUT was determined and the configuration was used to perform the final measurement.

Final Radiated Emission Measurement
1. Setup the configuration according to figure 1. Turn on EUT and make sure that it is in normal function.

2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a shielded chamber to determine the accurate frequencies of higher emissions will be checked on a open test site. As the same purpose, for emission frequencies measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.

3. For emission frequencies measured below and above 1 GHz, set the spectrum analyzer on a 100 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.

4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ◦ to 360 ◦ with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.

5. Repeat step 4 until all frequencies need to be measured was complete.

6. Repeat step 5 with search antenna in vertical polarized orientations.

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Peak	100 kHz	100 kHz
Above 1000	Peak	1 MHz	1 MHz
	Average	1 MHz	10 Hz

Sample Calculation Example

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. For the limit is employed average value, therefore the peak value can be transferred to average value by subtracting the duty factor. The basic equation with a sample calculation is as follows:

Peak = Reading + Corrected Factor

where
Corr. Factor = Antenna Factor + Cable Factor - Amplifier Gain (if any)
And the average value is

Average = Peak Value + Duty Factor or
Set RBW = 1MHz, VBW = 10Hz.

Note :
If the measured frequencies are fall in the restricted frequency band, the limit employed must be quasi peak value when frequencies are below or equal to 1 GHz. And the measuring instrument is set to quasi peak detector function.

Annex B. EUT AND TEST SETUP PHOTOGRAPHS

Annex B.i. Photograph 1: EUT External Photo

Whole Package - Top 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

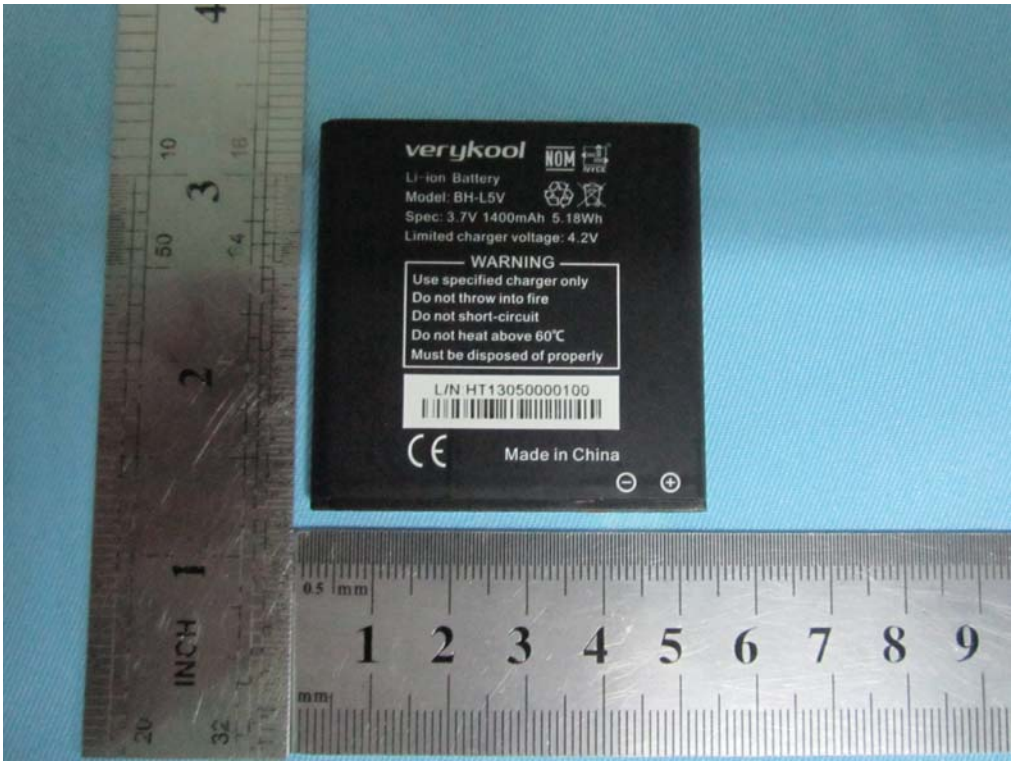
Cover Off - Top View

Cover Off - Front Housing View

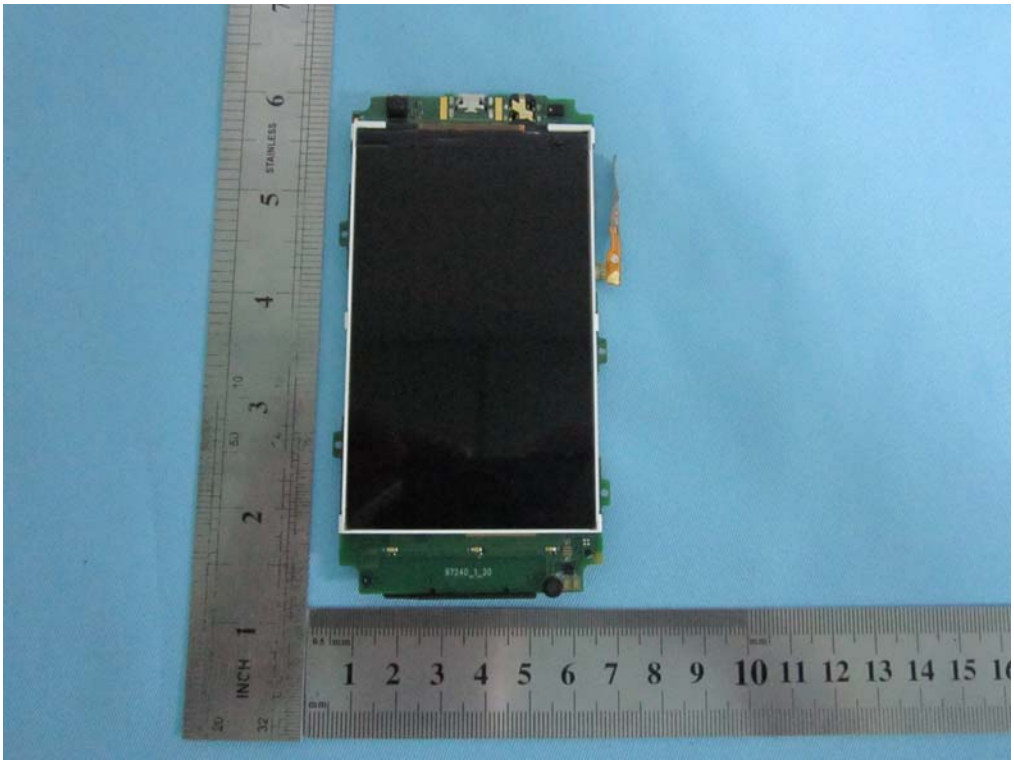
Cover Off - Rear Housing View

Adapter View

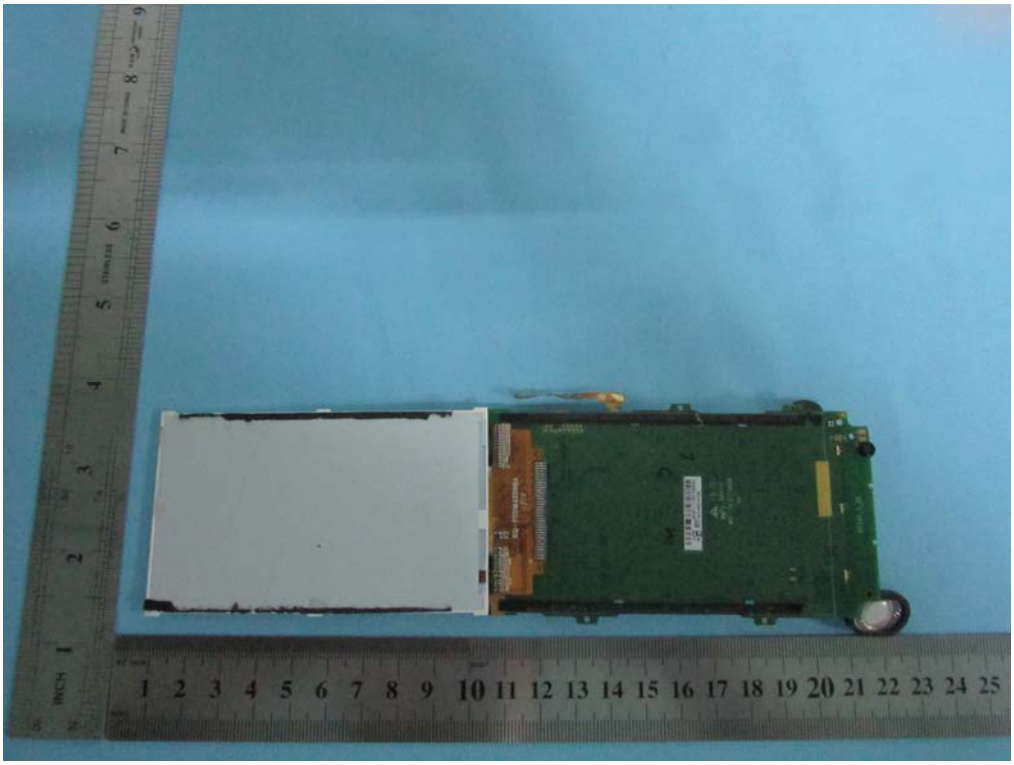
Battery - Top View



Battery - Bottom View



Mainborad - Top View

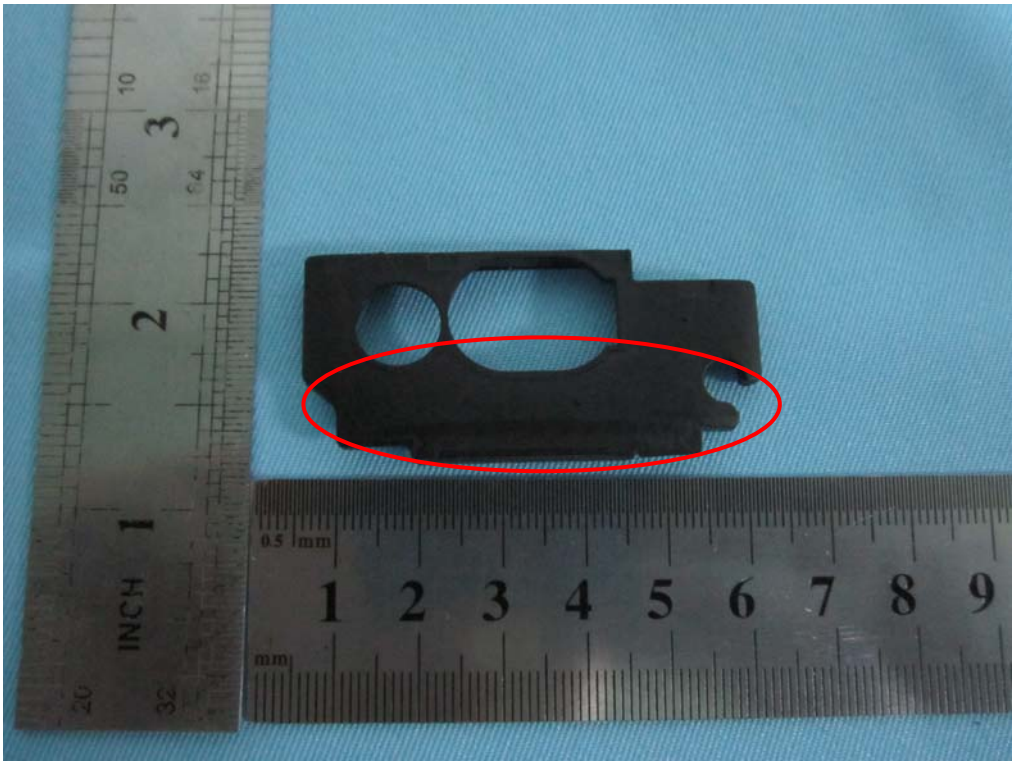


Mainborad Uncover - Top View

Mainborad - Bottom View

Mainborad Without Shielding - Bottom View

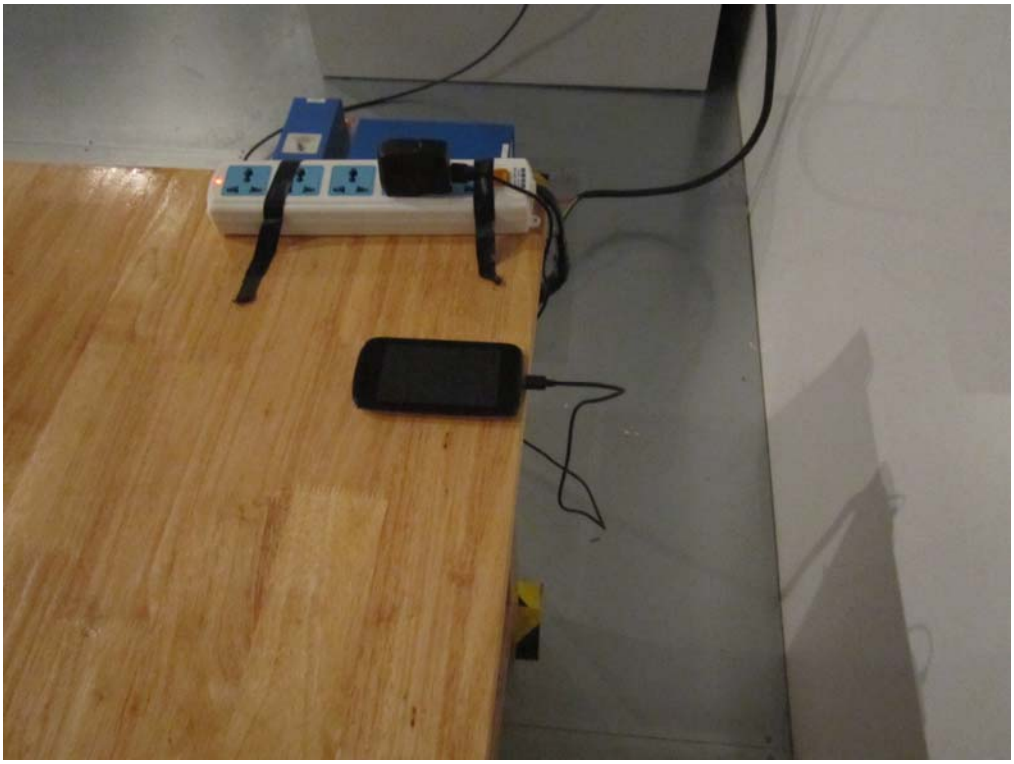
Bluetooth / BLE / WIFI Antenna View



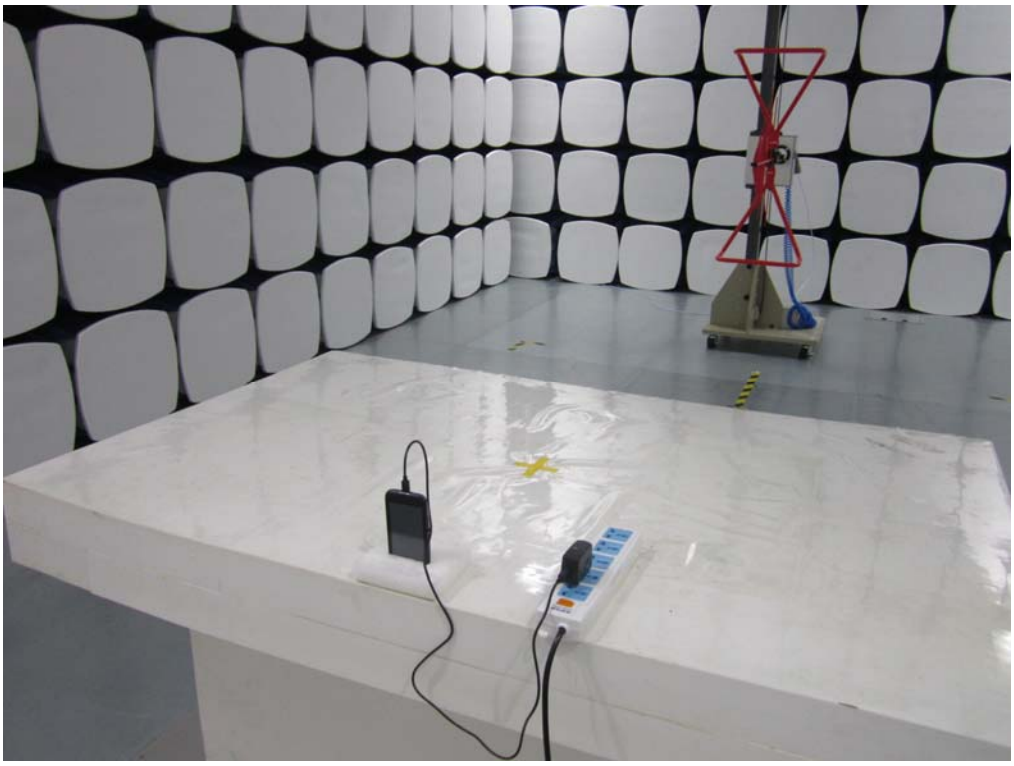
GSM / PCS/ UMTS Antenna View

Annex B.iii. Photograph 3: Test Setup Photo

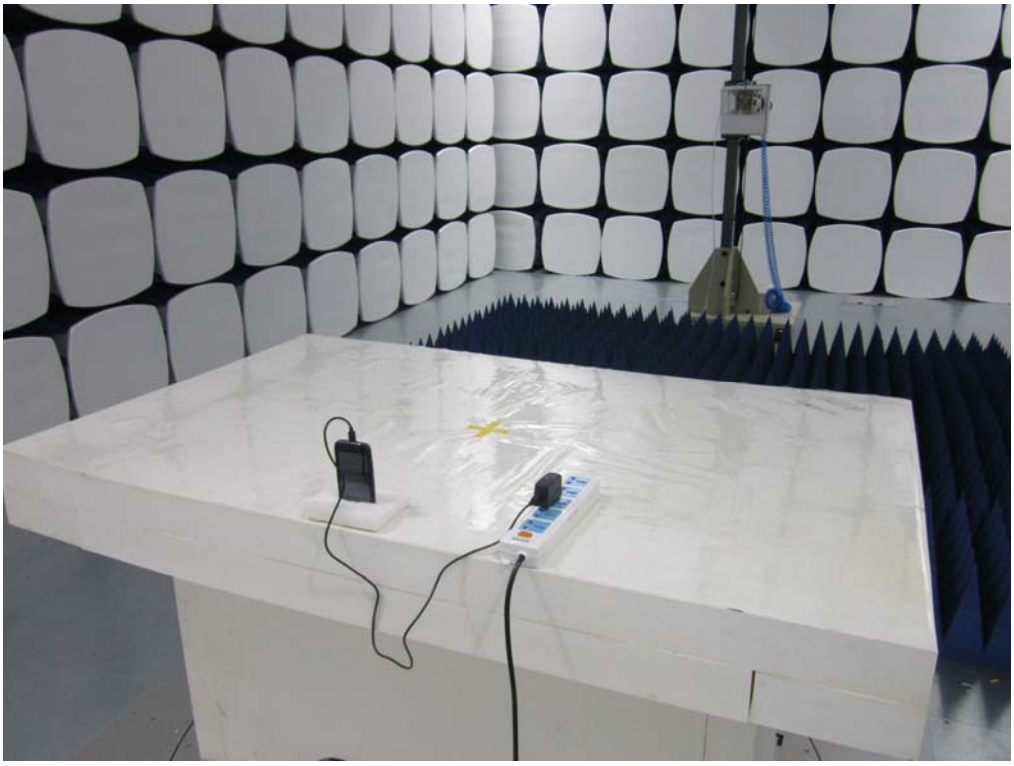
Conducted Emissions Test Setup Front View



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

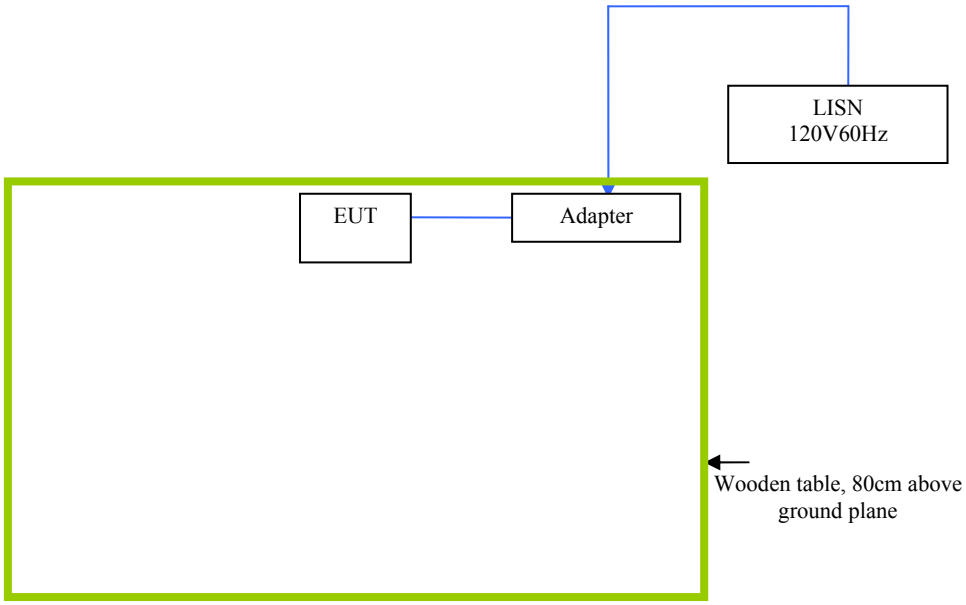
EUT TEST CONDITIONS

Annex C. i. SUPPORTING EQUIPMENT DESCRIPTION

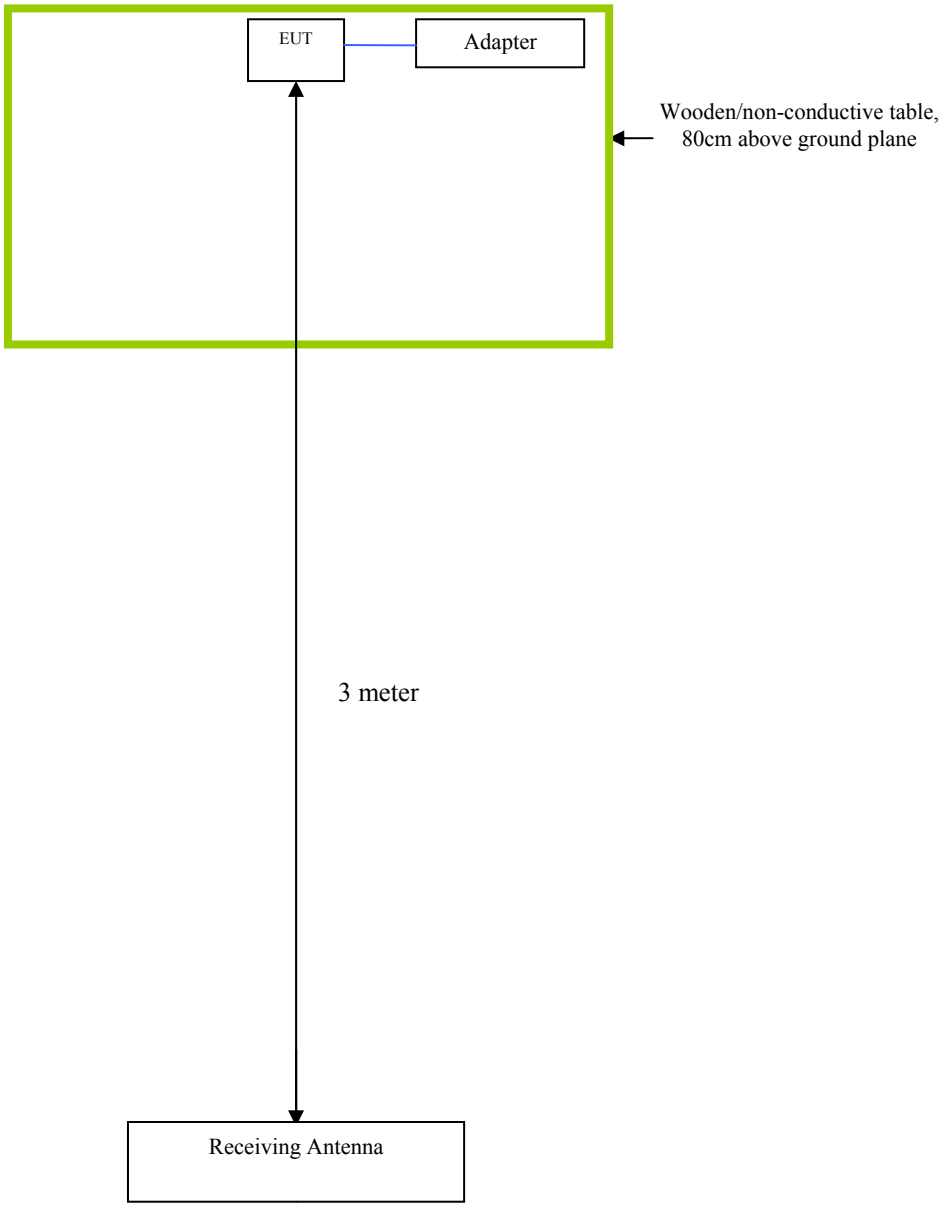
The following is a description of supporting equipment and details of cables used with the EUT.

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

NONE