

# **FCC EMC TEST REPORT**

No. 150701-EMC

For

Bullitt Group

Product Name: Smartphone

Model Name: SP4

Trade Name: Kodak

Issued Date: 2015-08-04

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of GCCT.

**Test Laboratory:**

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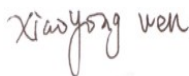
## GENERAL SUMMARY

<b>Product Name</b>	Smartphone
<b>Model Name</b>	SP4
<b>Trade Name</b>	Kodak
<b>Applicant</b>	Bullitt Group
<b>Manufacturer</b>	CK Telecom Limited
<b>Test Laboratory</b>	GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center
<b>Reference Standards</b>	FCC Part 15, Subpart B "Radio frequency devices". ANSI C63.4-2014: "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
<b>Test Conclusion</b>	This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in annex B of this test report are below limits specified in the relevant standards.  General Judgment: <b>Pass</b>  Date of issue:2015.08.04
<b>Comment</b>	The test results in this report apply only to the tested sample of the stated device/equipment.

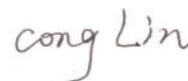
Approved by:

Luo Jian  
Manager

Reviewed by:

Wen Xiaoyong  
Deputy Manager

Tested by:

Lin Cong  
Test Engineer

## 1. Test Laboratory

### 1.1 Testing Location

Company Name:	GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center
Address:	Technology Road, High-tech Zone, Heyuan, Guangdong Province, PR.China
FCC Registration No.	303878
CNAS Registration No.	L4992
Postal Code:	517001
Telephone:	+86-762-3607221
Fax:	+86-762-3603336

### 1.2 Testing Environment

**Control room and Power Amplifier room** did not exceed following limits along the EMC testing:

Project	Control room	Power Amplifier room
Temperature	15℃~35℃	15℃~35℃
Relative humidity	20% ~80%	20% ~80%
Shielding effectiveness	>110dB	>110dB
Electrical insulation	>2MΩ	>2MΩ
Ground system resistance	<1Ω	<1Ω

**Semi-anechoic chamber** (9.73 meters×6.70meters×6.12meters) did not exceed following limits along the EMC testing:

Temperature	15℃~30℃
Relative humidity	35% ~60%
Shielding effectiveness	>110dB
Electrical insulation	>10kΩ
Ground system resistance	<1Ω
Normalised site attenuation (NSA)	<±3.5dB, 3m distance, from 30 to 1000 MHz
voltage standing-wave ratio (VSWR)	<±6dB, 3m distance, above 1 GHz
Uniformity of field strength(FU)	80MHz ~6000MHz, 0 ~6dB

**EMC(1) room** did not exceed following limits along the EMC testing:

Temperature	15℃～35℃
Relative humidity	30%～60%

### 1.3 Project Data

Project Leader:	Wen Xiaoyong
Testing Start Date:	2015-07-06
Testing End Date:	2015-07-04

## 2. Client Information

### 2.1 Applicant Information

<b>Company Name</b>	Bullitt Group
<b>Address</b>	4 The Aquarium, 1-7 King Street, Reading, RG1 2AN, UK
<b>City</b>	/
<b>Postal Code</b>	/
<b>Country</b>	UK

### 2.2 Manufacturer Information

<b>Company Name</b>	CK Telecom Limited
<b>Address</b>	Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.
<b>City</b>	Heyuan
<b>Postal Code</b>	/
<b>Country</b>	China

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1 About EUT

<b>Model Name</b>	SP4
<b>FCC ID</b>	ZL5SP4
<b>Tx Frequency</b>	GSM850:824~848 MHz UMTS Band V : 826~846MHz PCS1900 : 1850~1909MHz UMTS Band II : 1852~1907MHz Bluetooth/BLE: 2402 ~ 2480 MHz WIFI(802.11b/g/n-20): 2412 ~ 2462 MHz WIFI(n-40): 2422 ~ 2452 MHz
<b>Rx Frequency</b>	GSM850: 869~893 MHz UMTS Band V : 871~891 MHz PCS1900 : 1930~1989 MHz UMTS Band II : 1932~1987 MHz Bluetooth/BLE: 2402 ~ 2480 MHz WIFI(802.11b/g/n-20): 2412 ~ 2462 MHz WIFI(n-40): 2422 ~ 2452 MHz
<b>Number of Channels</b>	GSM850&WCDMA Band V:25 PCS1900&WCDMA Band II: 60 Bluetooth:79 WIFI(802.11b/g/n-20):11 WIFI(n-40):7 BLE:40
<b>Modulation</b>	GSM&DCS:GMSK WCDMA:BPSK/QPSK Bluetooth: GFSK& $\pi/4$ -DQPSK&8DPSK WIFI:CCK/OFDM BLE:GFSK
<b>Antenna Type</b>	PIFA(GSM/DCS/WCDMA); MONOPOLE (Bluetooth/WIFI)
<b>Antenna Gain</b>	GSM850:-0.5dBi DCS1900: -0.5dBi WCDMA850: -1dBi WCDMA1900: -1dBi Bluetooth/BLE/WIFI: -1dBi
<b>Normal Voltage</b>	3.8V
<b>Extreme Low Voltage</b>	3.6V
<b>Extreme High Voltage</b>	4.2V
<b>Extreme Low Temperature</b>	0℃
<b>Extreme High Temperature</b>	40℃

Note: Photographs of EUT are shown in ANNEX A of this test report.

### 3.2 Internal Identification of EUT

EUT ID *	IMEI	HW Version	SW Version
150701-M03	356092022307083 356092022307091	SLFQPLUS-V1.0	SLFQPLUS13B-S29A_BULLITT _L7EN_206_150127

\*EUT ID: is used to identify the test sample in the lab internally.

### 3.3 Internal Identification of AE

AE ID *	Description	Type	SN
150701-B03	Battery	HD395759AR	/
150701-C03	Adapter	A8-510100	/

\*AE ID: is used to identify the test sample in the lab internally.



## 4. Test Mode and Performance Criteria

### 4.1 Test Mode

Frequency range was investigated: Conducted emission test: from 150 kHz to 30MHz; Radiated emission test: 30MHz to the 5th harmonic of the highest fundamental frequency or to 40GHz, whichever is lower. All test modes were pre-scanned and only shown the worst in bold.

Test Item
<b>Radiated Emission &lt; 1GHz</b>
<b>Mode 1: GSM850 Idle + WIFI+USB Cable (Charging from PC) +Earphone</b>
Mode 2: GSM1900 Idle + WIFI+USB Cable (Charging from Adapter) +Earphone
Mode 3: WCDMA Band II Idle + WIFI+USB Cable (Charging from Adapter) +Earphone
Mode 4: WCDMA Band V Idle + WIFI+ Bluetooth Idle + USB Cable (Data Link with PC) + Earphone
<b>Radiated Emission ≥ 1GHz</b>
Mode 1: GSM850 Idle + WIFI+USB Cable (Charging from Adapter) +Earphone
Mode 2: GSM1900 Idle + WIFI+ USB Cable (Charging from Adapter) +Earphone
Mode 3: WCDMA Band II Idle + WIFI+ Bluetooth Idle + USB Cable (Data Link with PC) + Earphone
<b>Mode 4: WCDMA Band V Idle + WIFI+ USB Cable (Charging from PC) +Earphone</b>
<b>AC Conducted Emission</b>
Mode 1: GSM850 Idle + WIFI+ Bluetooth Idle + USB Cable (Charging from Adapter) + Earphone
<b>Mode 2: GSM1900 Idle + WIFI+ USB Cable (Charging from Adapter) +Earphone</b>
Mode 3: WCDMA Band II Idle + WIFI+ Bluetooth Idle + USB Cable (Charging from Adapter) + Earphone
Mode 4: WCDMA Band V Idle + WIFI+ Bluetooth Idle + USB Cable (Data Link with PC) + Earphone

Remark:

1. The worst case of AC Conducted Emission is mode 2; only the test data of this mode was reported.
2. The worst case of RE < 1G is mode 3; only the test data of this mode was reported.
3. Data Link with PC means data application transferred mode between EUT and PC.

## 5. Test Results

### 5.1 Summary of Test Results

Clause (FCC Part 15B)	Test Case	Verdict
15.109(a)	Radiated Emission	Pass
15.107(a)	AC Conducted Emission	Pass

Note: Please refer to Annex B in this test report for the detailed test results.

### 5.2 Statements

GCCT has evaluated the test cases requested by the applicant/manufacture as listed in section 5.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in general summary.

## 6. Test Equipments Utilized

### 6.1 List of Measuring Equipment

**Table 1. Measurement Equipments**

Hardware						
No.	Name	Model	SN	Manufacturer	CAL. DATE	CAL. Due DATE
1	Spectrum Analyzer	E4440A	MY48250641	Agilent	2014-8-14	2015-8-13
2	RF Filter Section	N9039A	MY48260024	Agilent	2014-8-14	2015-8-13
3	BiCoNilog	3142D	00110050	ETS-Lindgren	2013-10-25	2015-10-25
4	Horn Antenna	3117	00129169	ETS-Lindgren	2013-10-25	2015-10-25
5	RF Notch filter	/	/	ETS-Lindgren	/	/
6	Signal Generator	N5183A-532	MY49060563	Agilent	2014-8-14	2015-8-13
7	Signal Generator	N5181A-506	MY49061300	Agilent	2014-8-14	2015-8-13
8	Power Amplifier	AR75A250	0333065	AR	/	/
9	Power Amplifier	250W1000A	0332703	AR	/	/
10	Power Amplifier	AS0860-40/4	AS0860-40/45	Milmega	/	/
11	EMS antenna	ATL80M1G	0332624	AR	/	/
12	EMS antenna	High Gain HornAntenna	BBHA 9120 E 456	SCHWARZBE CK	/	/
13	Power Meter	N1913A	MY50000213	Agilent	2014-8-14	2015-8-13
14	Power Meter	N1913A	MY50000214	Agilent	2014-8-14	2015-8-13
15	CDN	FCC-801-M2 -16A	100230	FCC	2014-8-14	2015-8-13
16	BCI	F-120-9A	100334	FCC	2014-8-14	2015-8-13
17	LISN	LI-125	191012 191013	Com-power	2014-8-14	2015-8-13
18	Electrostatic Discharge	Dito	V0946105513	EMTEST	2014-8-16	2015-8-15
19	The ultra-compact simulator and its	UCS 500 N5	V0946105514	EMTEST	2014-8-14	2015-8-13
20	Motor driven AC source	MV2616	V0946105516	EMTEST	2014-8-14	2015-8-13

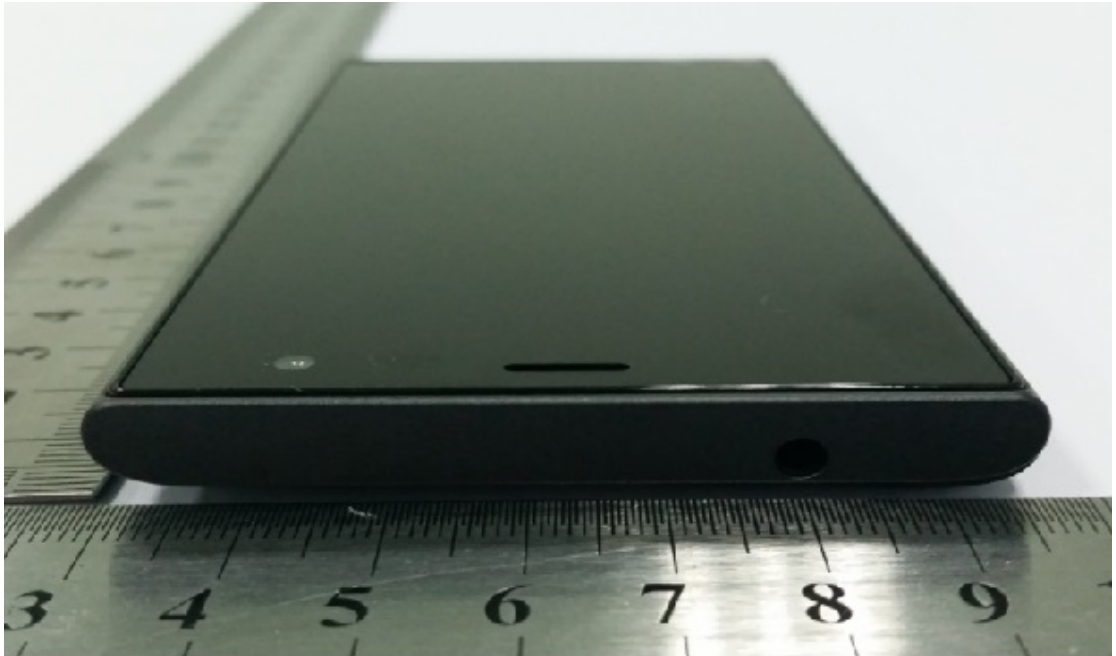
21	Universal Radio Communication Tester	CMU200	118627	R&S	2014-8-14	2015-8-13
22	Universal Radio Communication Tester	E5515C	MY48367105	Agilent	2014-8-14	2015-8-13
23	Bluetooth Tester	MT8852B	1307002	Anristu	2014-8-14	2015-8-13
24	Software	MEAS	/	ETS-Lindgren	/	/
25	PC	G450	/	LENEVO	/	/
<b>Software</b>						
1	Software	TILE4.5	/	ETS-Lindgren	/	/

## 6.2 Uncertainty

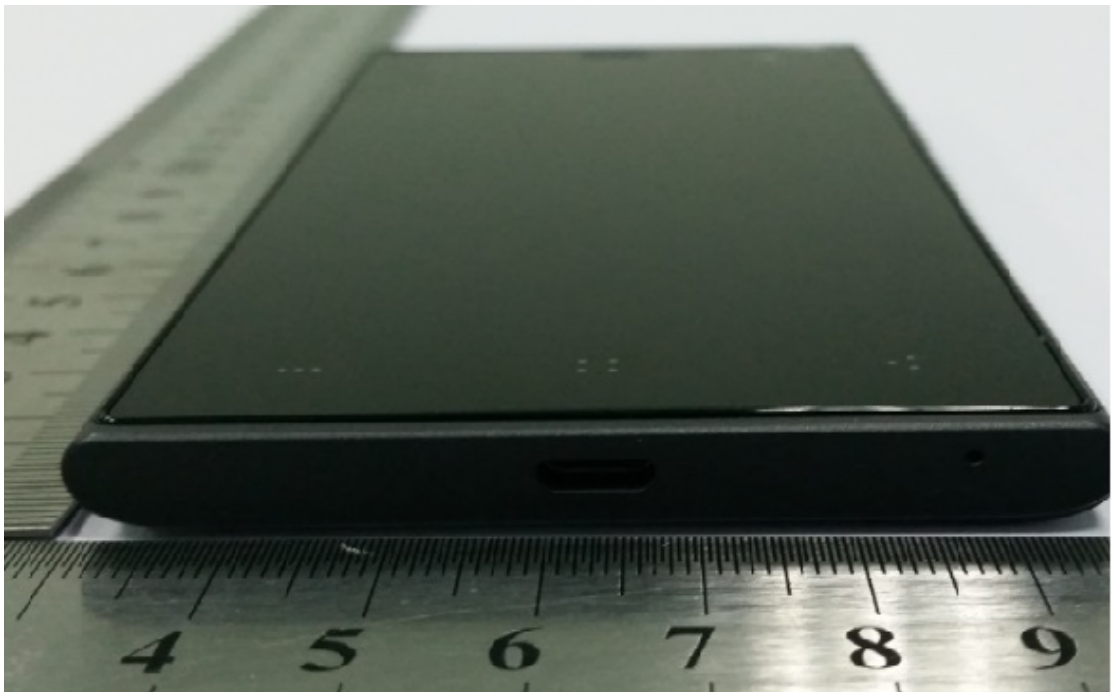
RE Uncertainty Evaluation (30MHz~1000MHz)	
Uncertainty for 95% Confidence	5.2dB
RE Uncertainty Evaluation (Above 1GHz)	
Uncertainty for 95% Confidence	5.4dB
CE Uncertainty Evaluation (150kHz~30MHz)	
Uncertainty for 95% Confidence	3.8dB

## ANNEX A: EUT Photograph

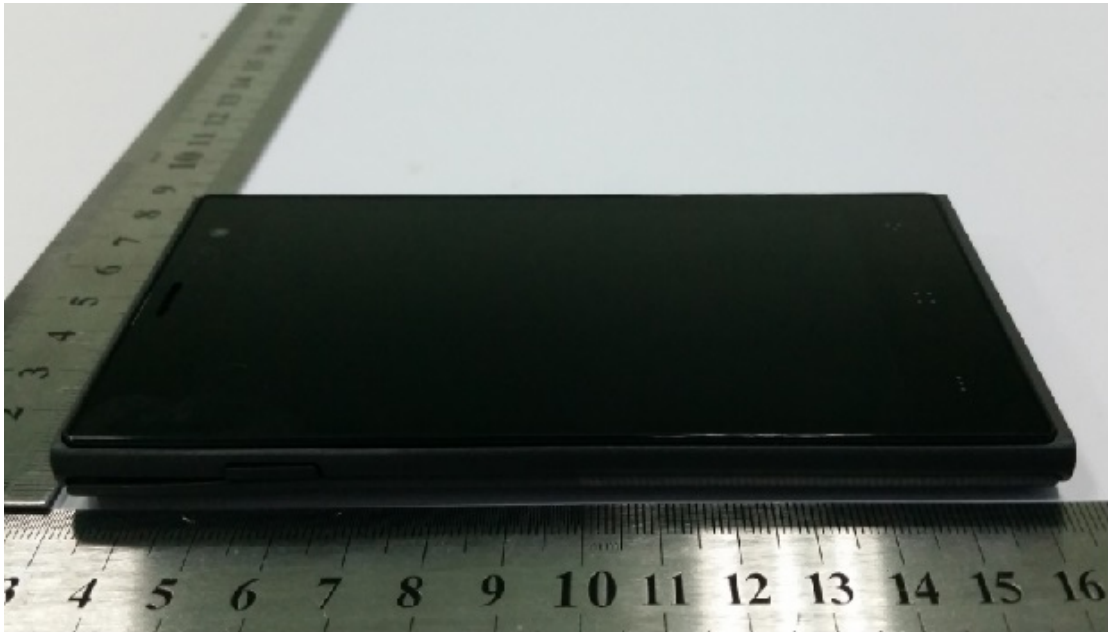
**EUT -Top View**



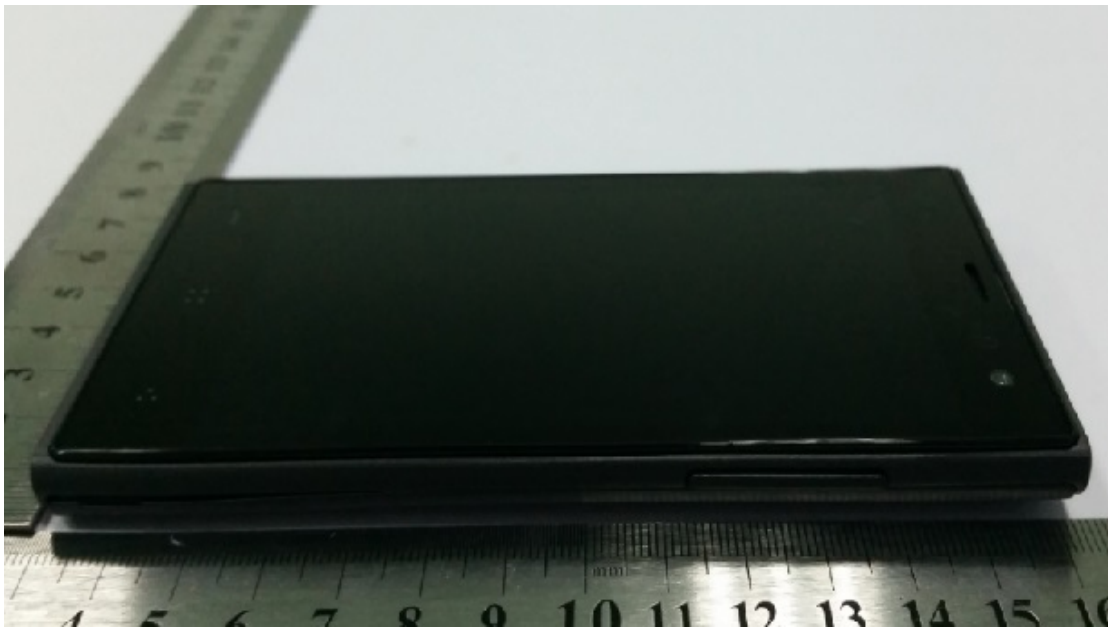
**EUT-Bottom View**



**EUT -Left View**



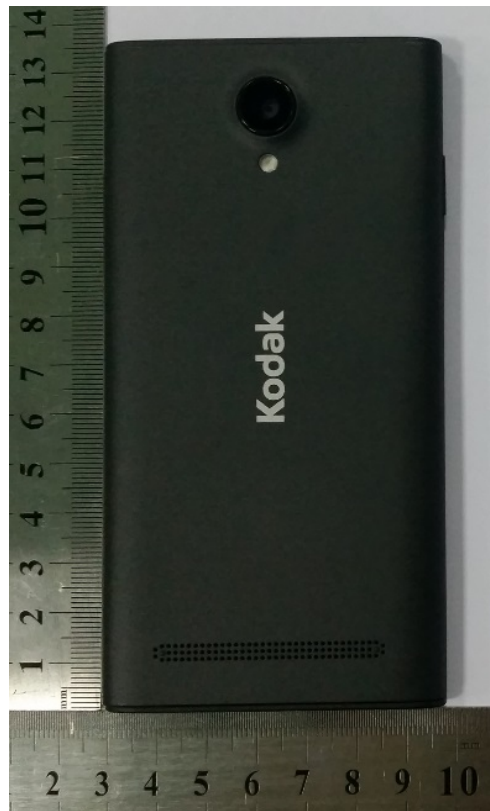
**EUT -Right View**



**EUT-Front View**



**EUT -Rear View**



Cover off-Top view

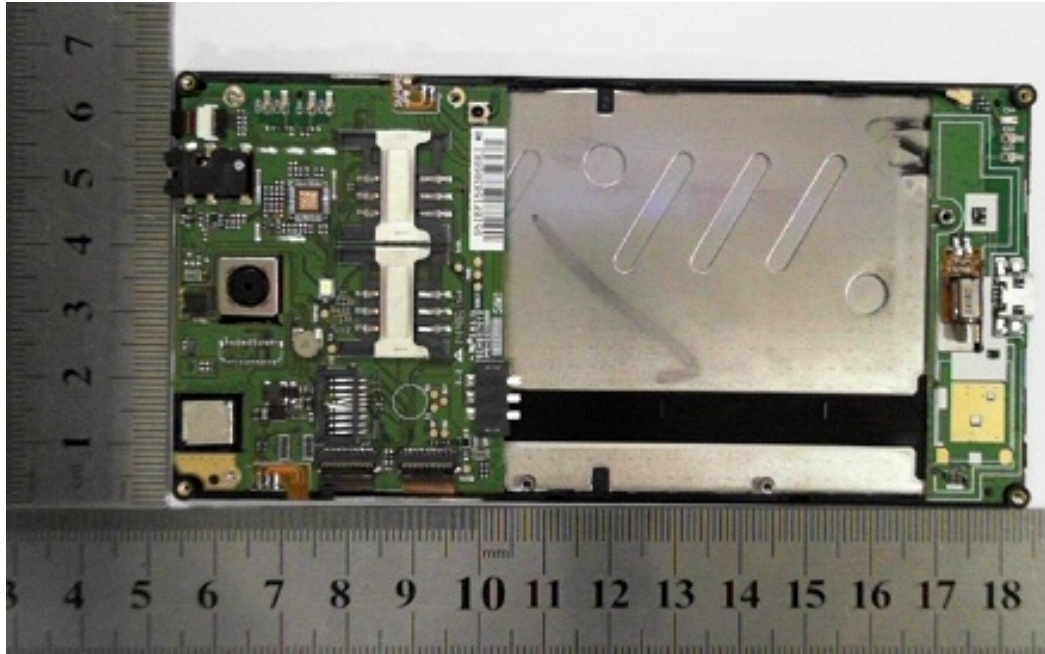


All

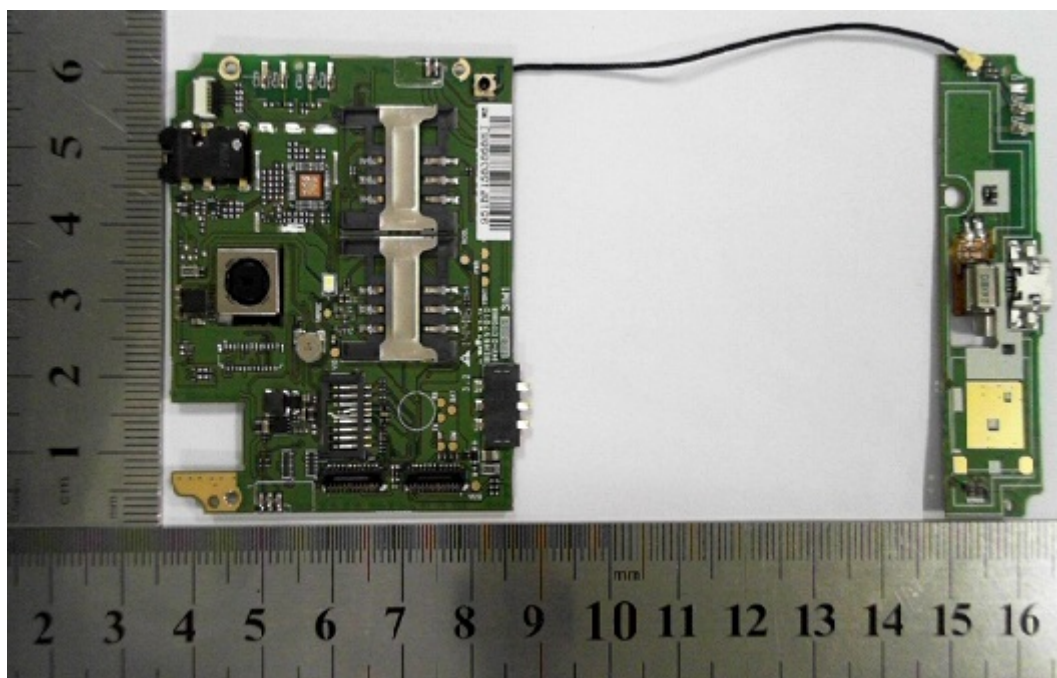




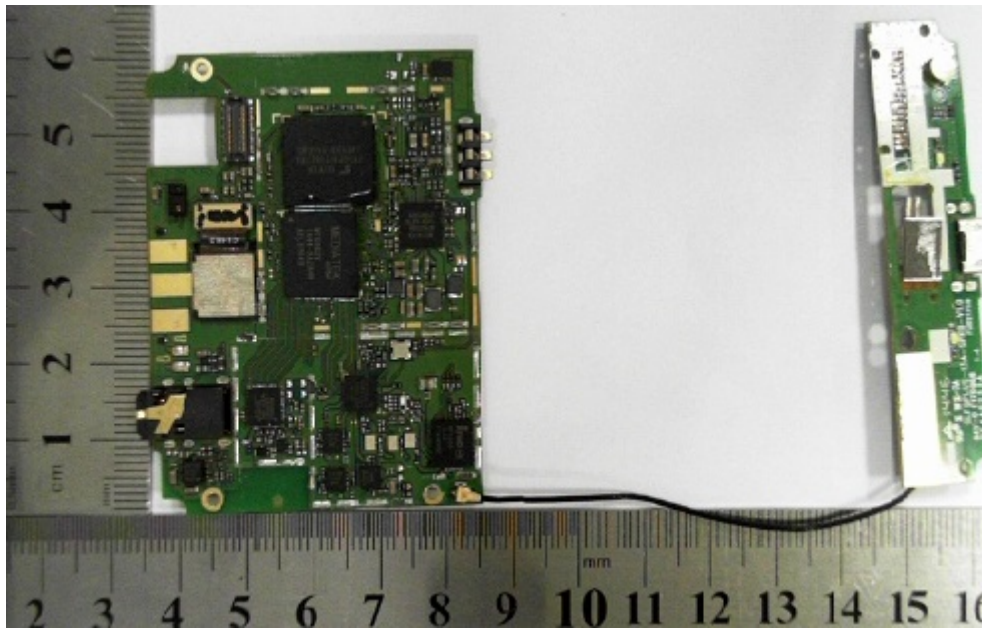
Main board With shielding -Front View



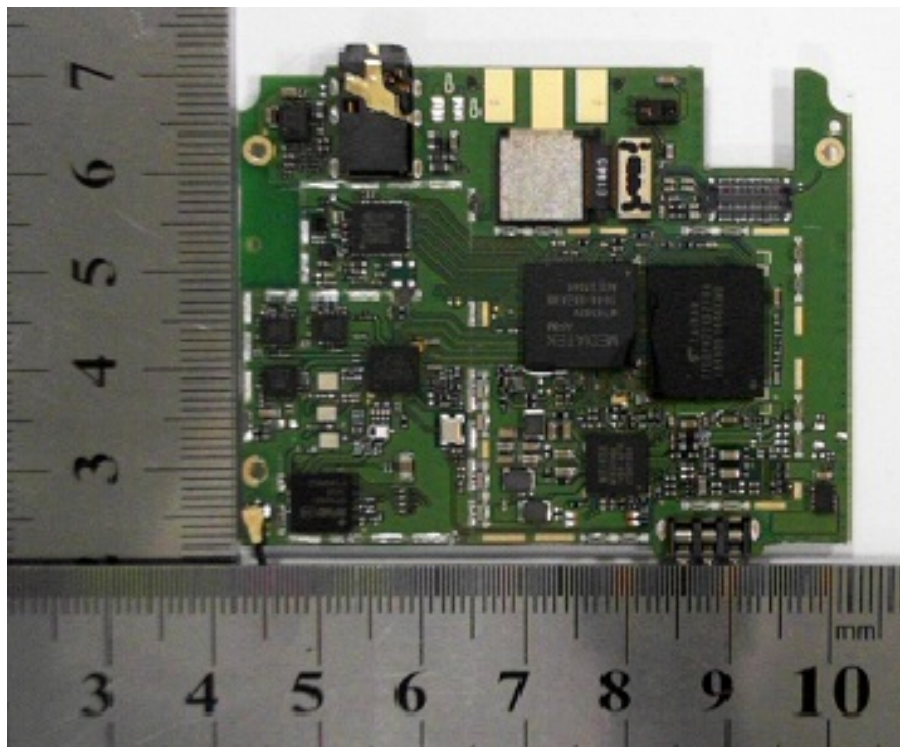
Main board Without shielding -Front View



Main board- RearView



Main board- RearView



**Headset**



**USB cable**



**GSM/DCS Antenna View**



**BT Antenna View**





## Battery View



## Adapter label view



Adapter view



## ANNEX B: EMC Emission Measurements Test Results

### B.1 Test of Radiated Emissions

#### B.1.1 Limit of Radiated Emissions (At a measuring distance of 3 m)

Frequency range (MHz)	Field Strength (microvolts/m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

#### B.1.2 Test Procedure

- ☐ a. The EUT was placed on a turntable with 1.5 meter above ground.
- ☐ b. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- ☐ c. The table was rotated 360 degrees to determine the position of the highest radiation.
- ☐ d. The height of the antenna is varied between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- ☐ e. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower(from 1 m to 4 m)and turntable(from 0 degree to 360 degrees)to find the maximum reading.
- ☐ f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- ☐ g. If the emission level of the EUT in peak mode was 20dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the quasi-peak method and reported.
- ☐ h. Emission level (dBμV/m) = 20 log Emission level (μV/m).
- ☐
- ☐ During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

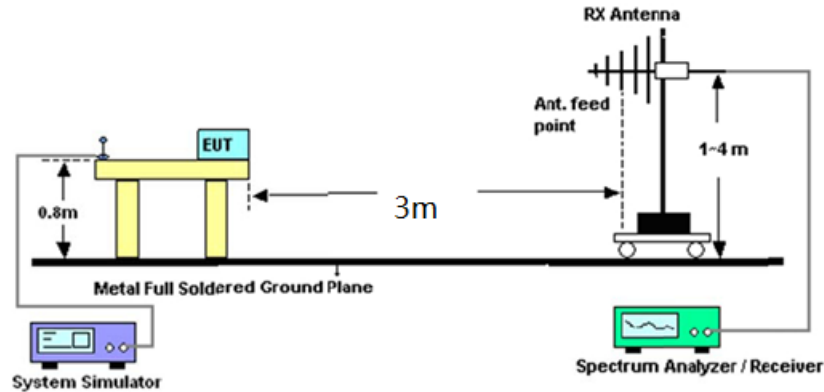
Frequency Band(MHz)	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	Peak	100kHz	100kHz
Above 1000	Peak	1MHz	1MHz
	Average	1MHz	10Hz

☐

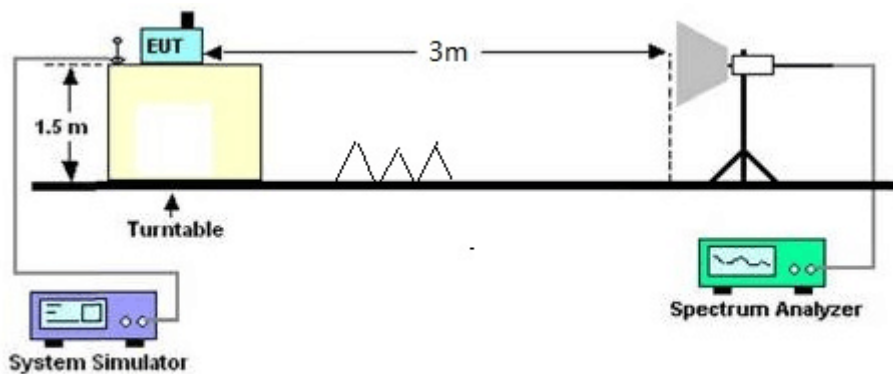
□

## B.1.3 Test Setup

### B.1.3.1 Radiated Emissions Frequency: 30MHz to 1000MHz

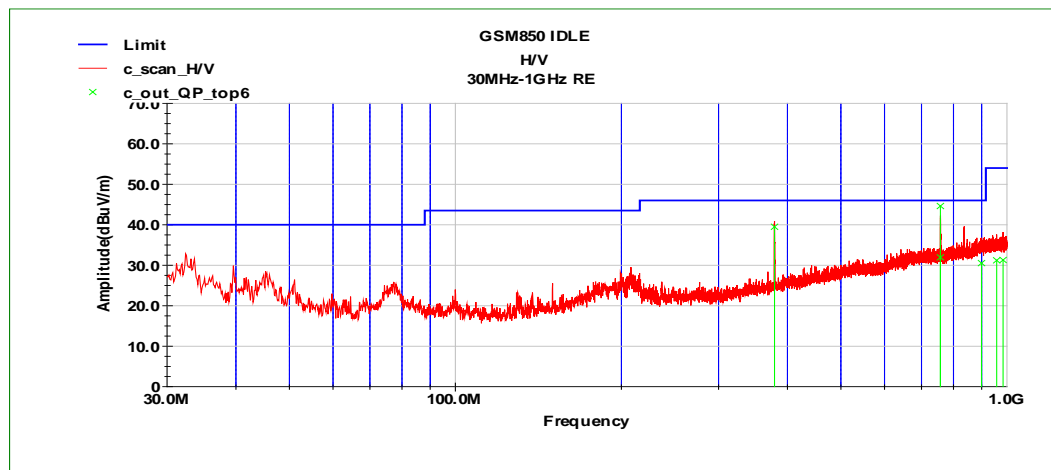


### B.1.3.2 Radiated Emissions Frequency: Above 1000 MHz



## B.1.4 Test Results

Mode 1: GSM850 Idle + USB Cable (Charging from PC) +Earphone (30MHz-1GHz)

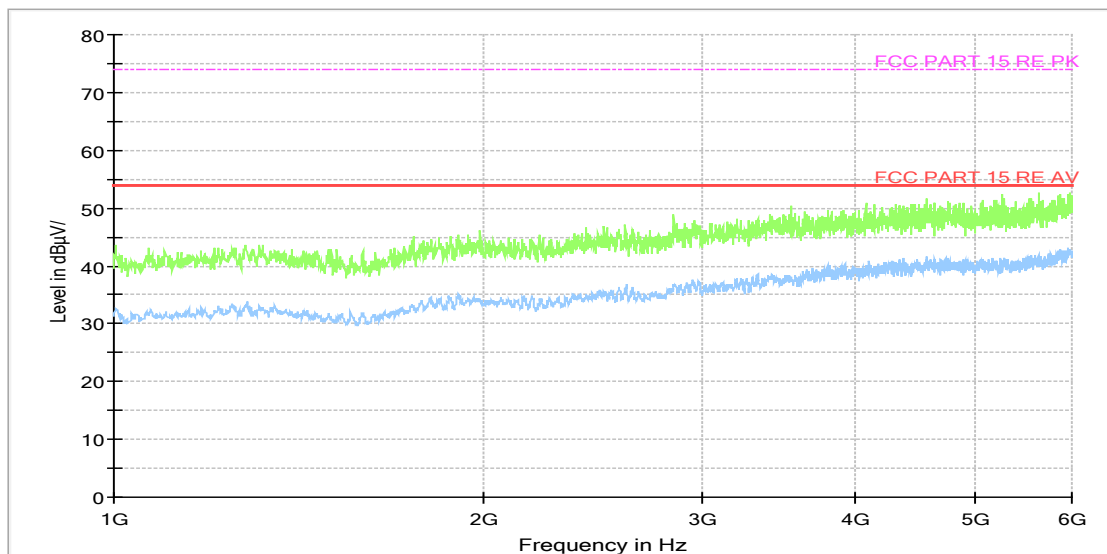




Frequency (MHz)	Polarization (H/ V)	Tower (cm)	Table ( ° )	QP	
				Limit dB(μV/m)	QP dB(μV/m)
378.99	H	109.7	84	46	39.51
757.48	V	200	0	46	31.93
757.65	H	110.3	293	46	44.62
899.50	V	200	0	46	30.52
958.28	H	183	23	54	31.21
984.17	H	104	187	54	31.3

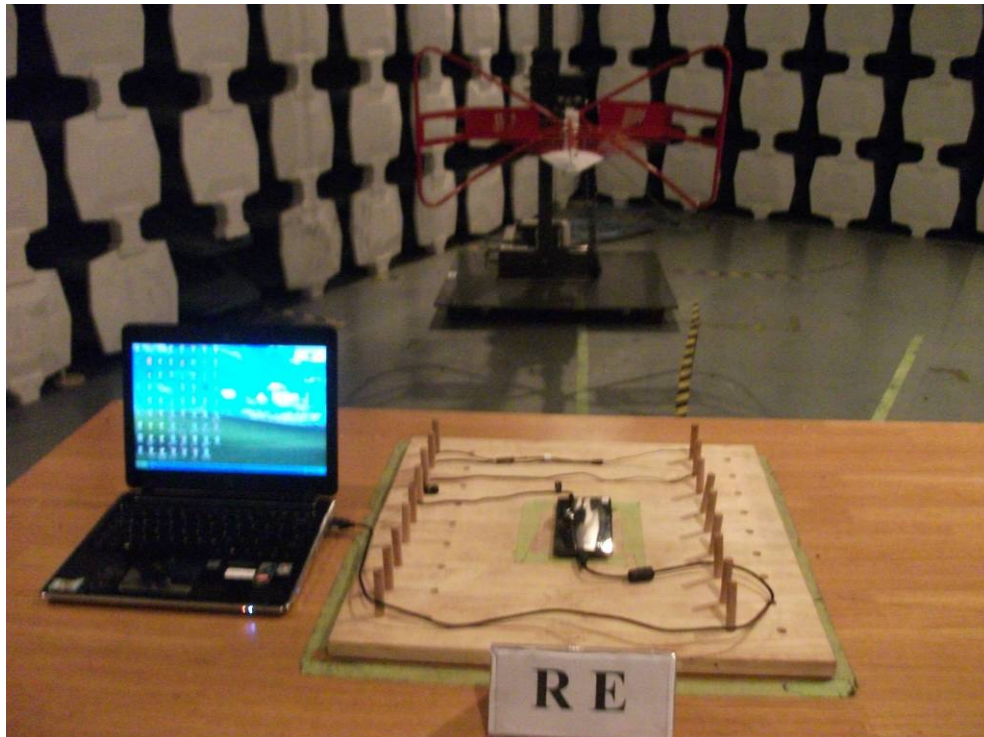
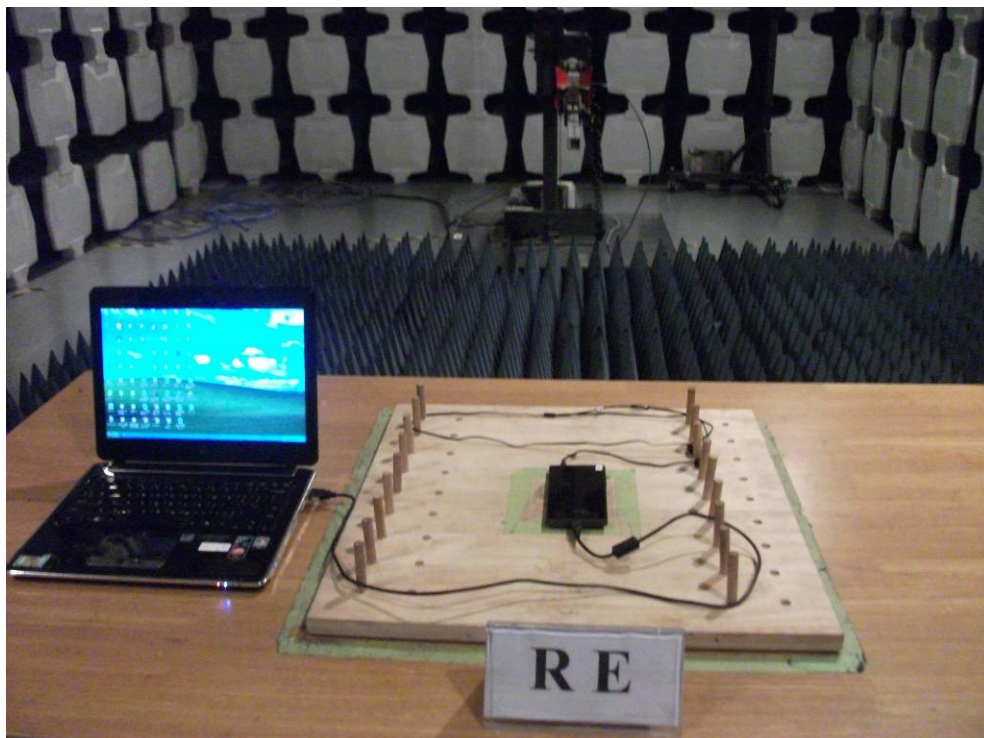
Note: only record low 6dB or measuring higher than the limit value than the limit value.

**Mode 4: WCDMA Band V Idle + USB Cable (Charging from Adapter) (Above 1000 MHz)**



Frequency (MHz)	Polarization (H/ V)	Tower (cm)	Table ( ° )	PK		AV	
				Limit dB(μV/m)	PK dB(μV/m)	Limit dB(μV/m)	AV dB(μV/m)
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/
/	/	/	/	/	/	/	/

Note: only record low 6dB or measuring higher than the limit value than the limit value.

**B.1.5 Test Setup****B.1.5.1 Radiated Emissions Frequency: 30MHz to 1000MHz****B.1.5.2 Radiated Emissions Frequency: Above 1000 MHz**

**B.1.6 Measurement Uncertainty**

RE Uncertainty Evaluation (30MHz~1000MHz)	
Uncertainty for 95% Confidence	5.2dB
RE Uncertainty Evaluation (1GHz~6GHz)	
Uncertainty for 95% Confidence	5.4dB

**B.2 Test of AC Conducted Emission****B.2.1 Limit of AC Conducted Emission**

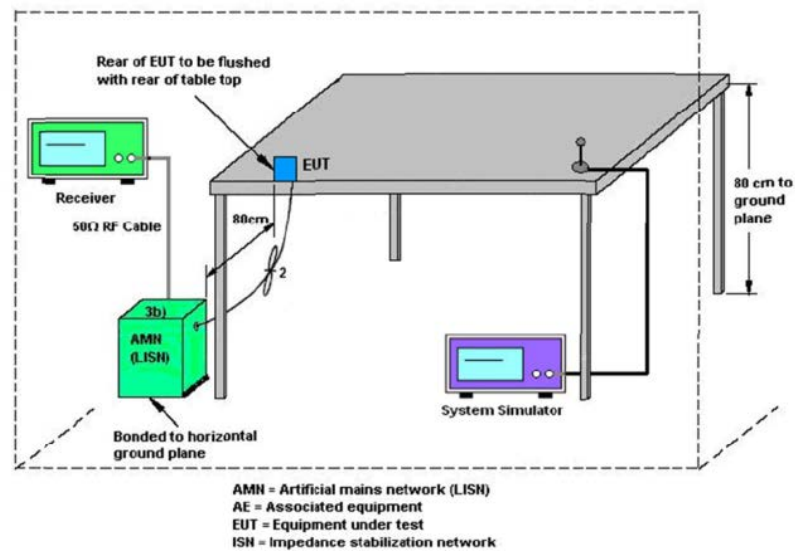
Frequency (MHz)	QP Limit (dB $\mu$ V)	AV Limit (dB $\mu$ V)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

\*Decreases with the logarithm of the frequency.

**B.2.2 Test Procedures**

- ☐ a. The EUT was placed on a desk 0.8 meters height from the metal ground plane and 0.4 meters from the conducting wall of the shielding room and it was kept at least 0.8 meters from any other grounded conducting surface.
- ☐ b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- ☐ c. All the support units are connecting to the other LISN.
- ☐ d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- ☐ e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- ☐ f. Both sides of AC line were checked for maximum conducted interference.
- ☐ g. The frequency range from 150 kHz to 30 MHz was scanned.
- ☐ h. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- ☐ i. The EMI test receiver was then turned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10kHz .For FCC test, only Quasi-peak measurements were made.

### B.2.3 Test Setup



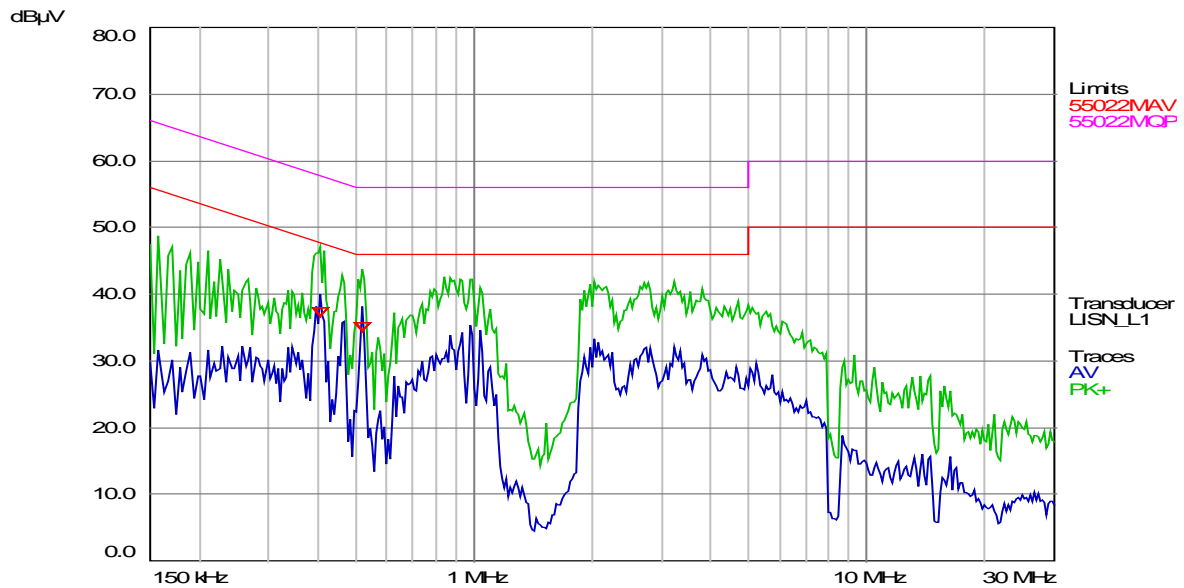
### B.2.4 Measurement Uncertainty

CE Uncertainty Evaluation (150kHz~30MHz)	
Uncertainty for 95% Confidence	3.8dB

### B.2.5 Test Results

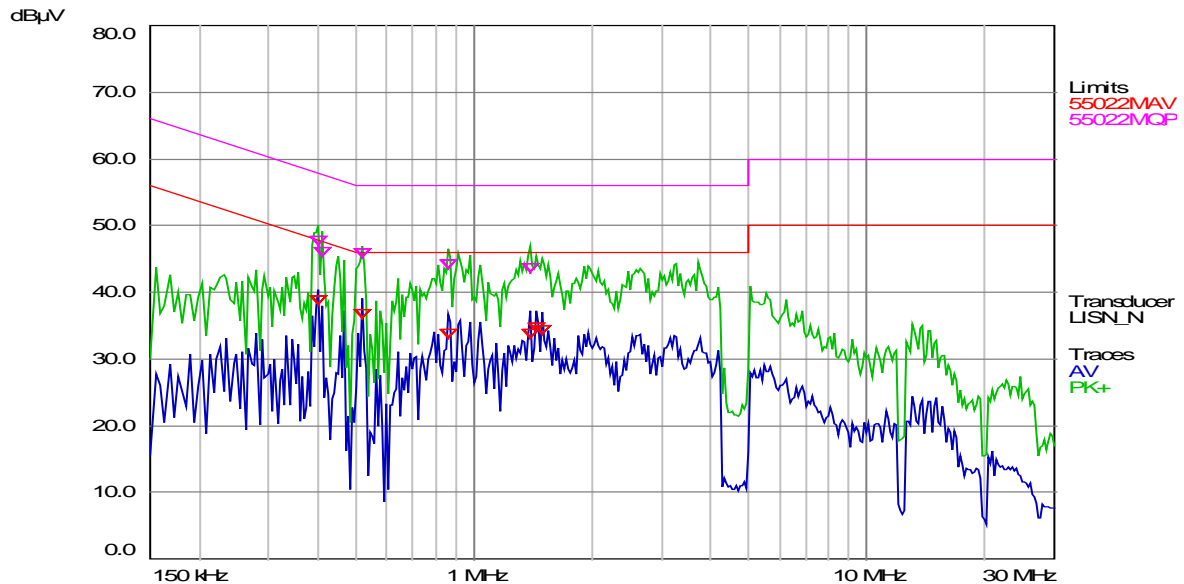
## Mode 2: GSM1900 Idle + USB Cable (Charging from Adapter) +Earphone

LINE L:



Trace	Frequency	Level	Limit	Delta Limit	Comment
	(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)	
1 AV	0.406	36.72	47.73	-11.01	L1 / on
1 AV	0.522	34.45	46.00	-11.55	L1 / on

LINE N:



Trace	Frequency	Level	Limit	Delta Limit	Comment
	(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)	
1 AV	0.402	38.20	47.81	-9.61	N / on
2 QP	0.402	47.08	57.81	-10.73	N / on
2 QP	0.411	45.35	57.63	-12.28	N / on

Trace	Frequency	Level	Limit	Delta Limit	Comment
	(MHz)	(dBμV)	(dBμV)	(dB)	
1 AV	0.519	36.10	46.00	-9.90	N / on
2 QP	0.519	45.17	56.00	-10.83	N / on
1 AV	0.861	33.18	46.00	-12.82	N / on
2 QP	0.861	43.55	56.00	-12.45	N / on
1 AV	1.3875	33.06	46.00	-12.94	N / on
2 QP	1.3875	42.98	56.00	-13.02	N / on
1 AV	1.4415	34.13	46.00	-11.87	N / on
1 AV	1.4955	33.60	46.00	-12.40	N / on

Note: only record low 6dB or measuring higher than the limit value than the limit value.

240V/60Hz

LINE L

Scan Settings (1 Range)

Frequencies			Receiver Settings			
Start	Stop	Step	Res BW	M-Time	Atten	Preamp
150 kHz	30 MHz	4 kHz	9 kHz (6dB)	15 ms	Auto	Off

#### Final Measurement

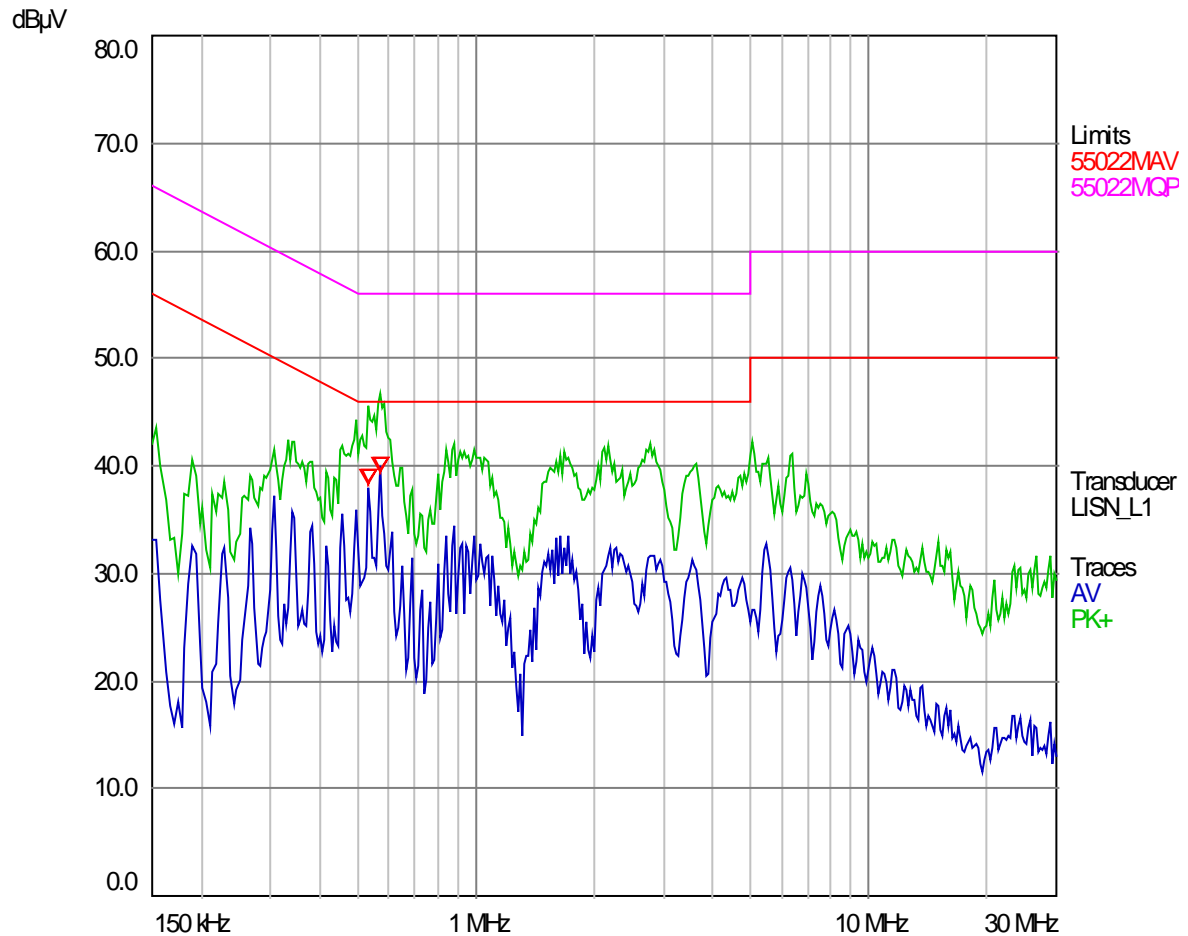
Detectors: AV, QP

Meas Time: 2 s

Peaks: 6

Acc. Margin: 10 dB

Pre-measurement Graph

**Final Measurement Results**

Trace	Frequency (MHz)	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Delta Limit (dB)	Delta Ref (dB)	Comment
1 AV	0.534	38.34	46.00	-7.66		L1 / on
1 AV	0.574	39.41	46.00	-6.59		L1 / on

\* = limit exceeded

LINE N

**Scan Settings (1 Range)**

Frequencies			Receiver Settings			
Start	Stop	Step	Res BW	M-Time	Atten	Preamp
150 kHz	30 MHz	4.5 kHz	9 kHz (6dB)	15 ms	Auto	Off

**Final Measurement**

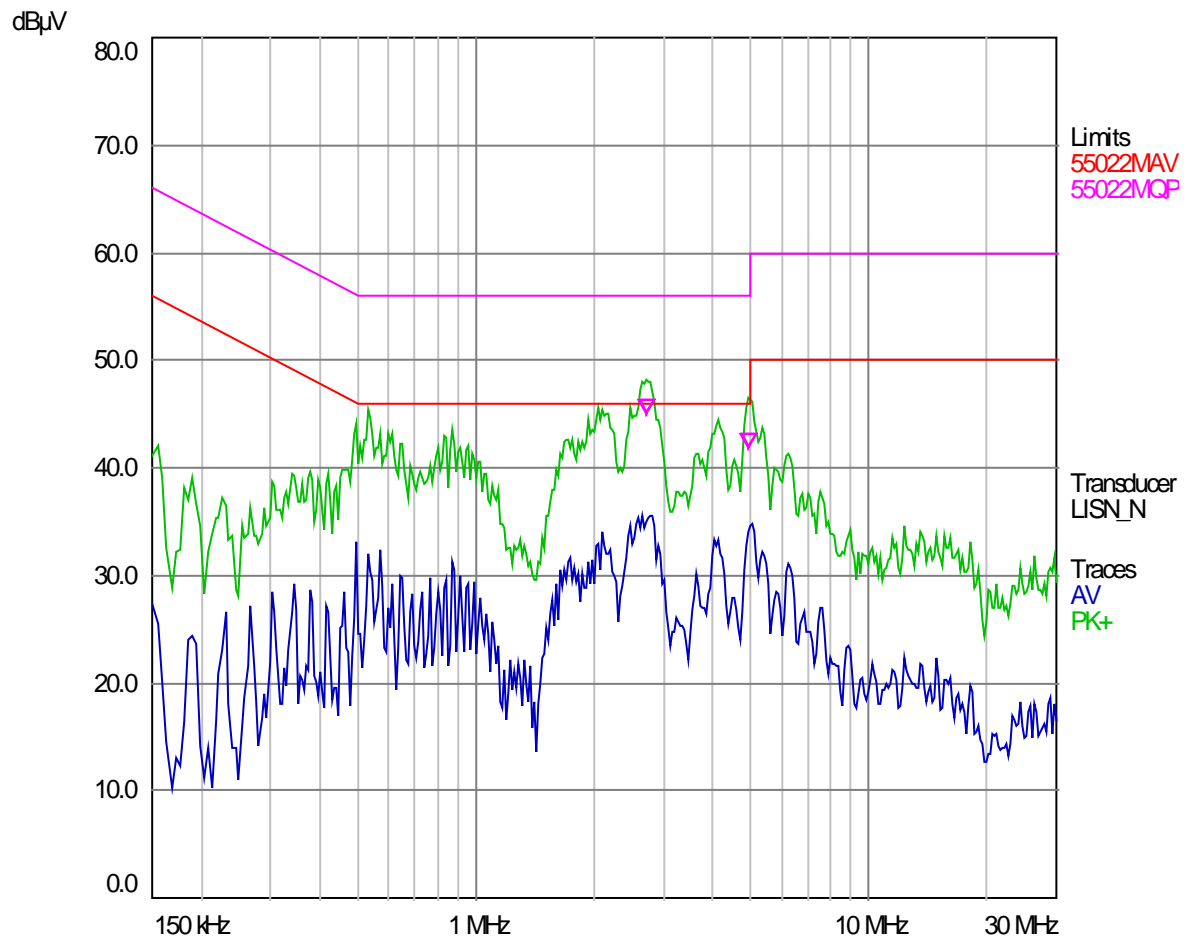
Detectors: AV, QP

Meas Time: 2 s

Peaks: 6

Acc. Margin: 10 dB

**Pre-measurement Graph**

**Final Measurement Results**

Trace	Frequency	Level	Limit	Delta Limit	Delta Ref	Comment
	(MHz)	(dB $\mu$ V)	(dB $\mu$ V)	(dB)	(dB)	
2 QP	2.7015	44.97	56.00	-11.03		N / on
2 QP	4.9425	41.92	56.00	-14.08		N / on

\* = limit exceeded



**ANNEX C: Report Revision History**

Report NO.	Report version	Description	Issue Date
150701-EMC	NONE	Original	2015.07.10

**\*\*\* END OF REPORT\*\*\***