

**GSM Voice:  
Test Plots**



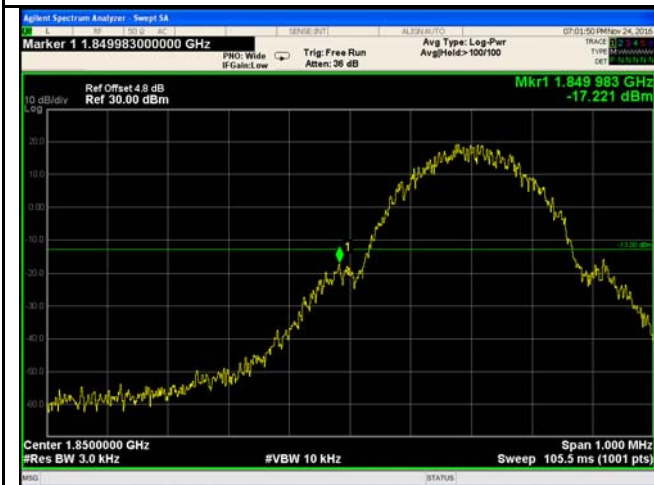
Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log  
(3.23/3)=4.0+0.3=4.3dB



Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(3.20/3)=4.0+0.3=4.3dB



PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
(3.20/3)=4.5+0.3=4.8dB



PCS Band - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(3.19/3)=4.5+0.3=4.8dB

**GPRS:**

**Test Plots**



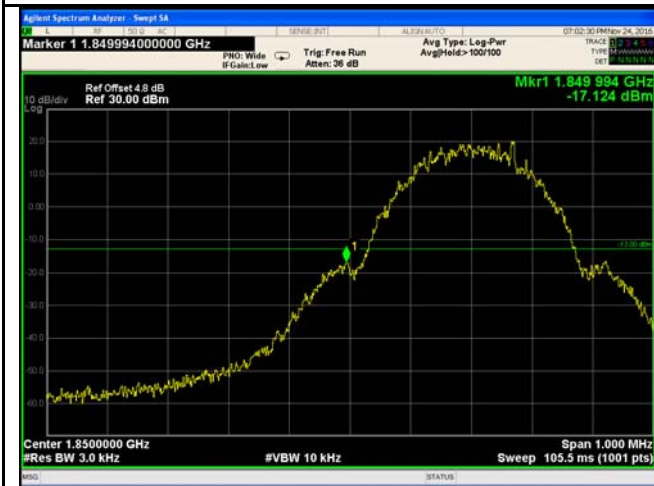
Cellular Band - Low Channel



Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(3.19/3)=4.0+0.3=4.3dB

Note: Offset=Cable loss (4.0) + 10log  
(3.19/3)=4.0+0.3=4.3dB



PCS Band - Low Channel



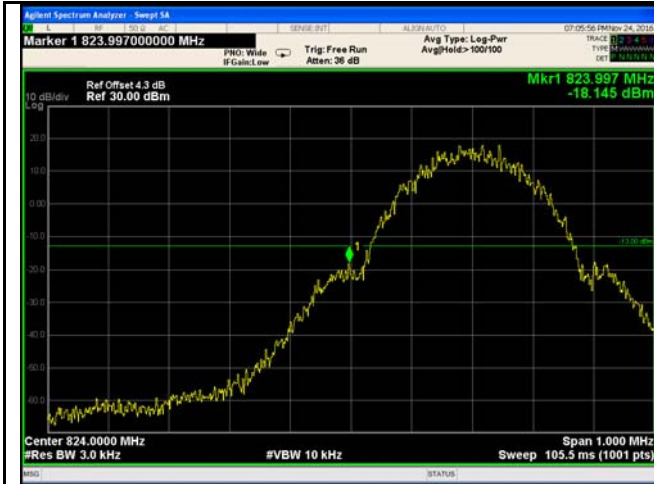
PCS Band - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(3.18/3)=4.5+0.3=4.8dB

Note: Offset=Cable loss (4.5) + 10log  
(3.19/3)=4.5+0.3=4.8dB

## EGPRS (MCS1):

### Test Plots



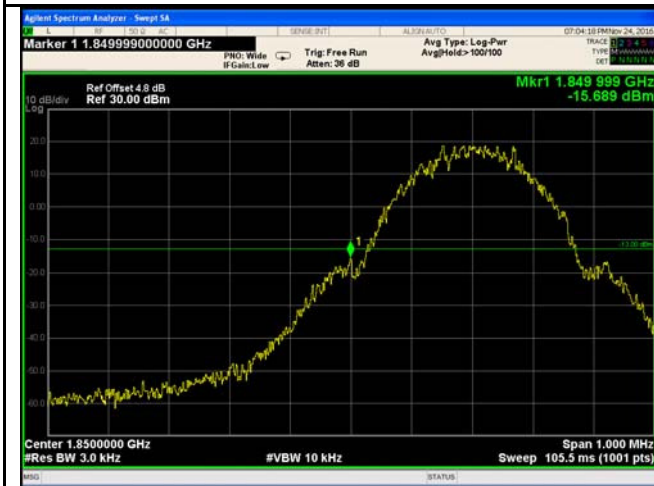
Cellular Band - Low Channel

Note: Offset=Cable loss (4.0) + 10log  
(3.21/3)=4.0+0.3=4.3dB



Cellular Band - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(3.20/3)=4.0+0.3=4.3dB



PCS Band - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
(3.22/3)=4.5+0.3=4.8dB



PCS Band - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(3.20/3)=4.5+0.3=4.8dB

RMC:



UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log  
(46.50/30)=4.0+1.9=5.9 dB



UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(46.73/30)=4.0+1.9=5.9 dB



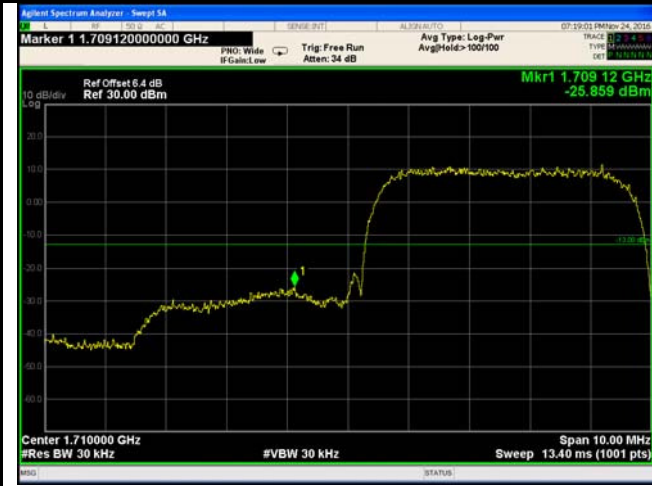
UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
(46.59/30)=4.5+1.9=6.4 dB



UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(46.86/30)=4.5+1.9=6.4dB



UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
 (46.94/30)=4.5+1.9=6.4 dB



UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.0) + 10log  
 (46.83/30)=4.5+1.9=6.4 dB

HSUPA:



UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (4.0) + 10log  
(46.81/30)=4.0+1.9=5.9 dB



UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(46.70/30)=4.0+1.9=5.9 dB



UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
(46.58/30)=4.5+1.9=6.4 dB



UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(46.86/30)=4.5+1.9=6.4 dB





UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
 (46.61/30)=4.5+1.9=6.4 dB



UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.5) + 10log  
 (46.55/30)=4.5+1.9=6.4 dB

**HSDPA:**



UMTS-FDD Band V - Low Channel



UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log  
(46.90/30)=4.0+1.9=5.9 dB

Note: Offset=Cable loss (4.0) + 10log  
(46.76/30)=4.0+1.9=5.9 dB



UMTS-FDD Band II - Low Channel



UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (4.5) + 10log  
(46.74/30)=4.5+1.9=6.4 dB

Note: Offset=Cable loss (4.5) + 10log  
(46.44/30)=4.5+1.9=6.4 dB





UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log  
 (46.71/30)=4.5+1.9=6.4 dB



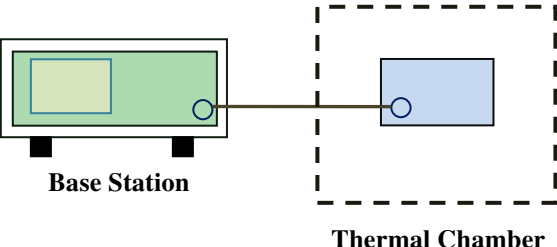
UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.5) + 10log  
 (46.85/30)=4.5+1.9=6.4 dB

## 6.8 Frequency Stability

Temperature	22°C
Relative Humidity	58%
Atmospheric Pressure	1025mbar
Test date :	November 25, 2016
Tested By :	Loren Luo

### Requirement(s):

Spec	Item	Requirement	Applicable																																
§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54	a)	According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:  Frequency Tolerance for Transmitters in the Public Mobile Services	<input checked="" type="checkbox"/>																																
		<table border="1"> <thead> <tr> <th>Frequency Range (MHz)</th> <th>Base, fixed (ppm)</th> <th>Mobile ≤ 3 watts (ppm)</th> <th>Mobile ≤ 3 watts (ppm)</th> </tr> </thead> <tbody> <tr> <td>25 to 50</td> <td>20.0</td> <td>20.0</td> <td>50.0</td> </tr> <tr> <td>50 to 450</td> <td>5.0</td> <td>5.0</td> <td>50.0</td> </tr> <tr> <td>45 to 512</td> <td>2.5</td> <td>5.0</td> <td>.0</td> </tr> <tr> <td>821 to 896</td> <td>1.5</td> <td>2.5</td> <td>2.5</td> </tr> <tr> <td>928 to 29.</td> <td>5.0</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>929 to 960.</td> <td>1.5</td> <td>N/A</td> <td>N/A</td> </tr> <tr> <td>2110 to 2220</td> <td>10.0</td> <td>N/A</td> <td>N/A</td> </tr> </tbody> </table>		Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)	25 to 50	20.0	20.0	50.0	50 to 450	5.0	5.0	50.0	45 to 512	2.5	5.0	.0	821 to 896	1.5	2.5	2.5	928 to 29.	5.0	N/A	N/A	929 to 960.	1.5	N/A	N/A	2110 to 2220	10.0	N/A	N/A
		Frequency Range (MHz)		Base, fixed (ppm)	Mobile ≤ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)																													
		25 to 50		20.0	20.0	50.0																													
		50 to 450		5.0	5.0	50.0																													
		45 to 512		2.5	5.0	.0																													
		821 to 896		1.5	2.5	2.5																													
		928 to 29.		5.0	N/A	N/A																													
929 to 960.	1.5	N/A	N/A																																
2110 to 2220	10.0	N/A	N/A																																
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.																																			
 <p style="text-align: center;"> <span>Base Station</span> <span style="margin-left: 200px;">Thermal Chamber</span> </p>																																			

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Procedure	A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage.  Limit: The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ( $\pm 2.5\text{ppm}$ ) of the center frequency.
Remark	
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail

Test Data     Yes                       N/A

Test Plot     Yes (See below)             N/A

**GSM Voice:**

**Cellular Band (Part 22H) result**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	19	0.0227	2.5
0		18	0.0215	2.5
10		15	0.0179	2.5
20		14	0.0167	2.5
30		14	0.0167	2.5
40		18	0.0215	2.5
50		19	0.0227	2.5
55		18	0.0215	2.5
25	4.2	20	0.0239	2.5
	3.5	21	0.0251	2.5

**PCS Band (Part 24E) result**

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	11	0.0059	2.5
0		12	0.0064	2.5
10		14	0.0074	2.5
20		12	0.0064	2.5
30		14	0.0074	2.5
40		15	0.0080	2.5
50		13	0.0069	2.5
55		13	0.0069	2.5
25	4.2	17	0.0090	2.5
	3.5	19	0.0101	2.5

RMC:

**UMTS-FDD Band V (Part 22H)**

Middle Channel, $f_0 = 835$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	14	0.0168	2.5
0		12	0.0144	2.5
10		13	0.0156	2.5
20		12	0.0144	2.5
30		11	0.0132	2.5
40		9	0.0108	2.5
50		16	0.0192	2.5
55		16	0.0192	2.5
25	4.2	10	0.0120	2.5
	3.5	18	0.0216	2.5

**UMTS-FDD Band II (Part 24E)**

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	19	0.0101	2.5
0		8	0.0043	2.5
10		9	0.0048	2.5
20		11	0.0059	2.5
30		13	0.0069	2.5
40		12	0.0064	2.5
50		11	0.0059	2.5
55		13	0.0069	2.5
25	4.2	14	0.0074	2.5
	3.5	17	0.0090	2.5

### UMTS-FDD Band IV (Part 27)

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0180	2.5
0		16	0.0192	2.5
10		16	0.0192	2.5
20		14	0.0168	2.5
30		17	0.0204	2.5
40		9	0.0108	2.5
50		12	0.0144	2.5
55		15	0.0180	2.5
25		4.2	9	0.0108
	3.5	15	0.0180	2.5



## Annex A. TEST INSTRUMENT

Instrument	Model	Serial #	Cal Date	Cal Due	In use
<b>RF Conducted Test</b>					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/15/2016	09/14/2017	<input checked="" type="checkbox"/>
Power Splitter	1#	1#	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	<input checked="" type="checkbox"/>
Temperature/Humidity Chamber	UHL-270	001	10/08/2016	10/07/2017	<input checked="" type="checkbox"/>
DC Power Supply	E3640A	MY40004013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
RF Power Sensor	Dare RPR3006C/P/W	AY554013	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
<b>Radiated Emissions</b>					
EMI test receiver	ESL6	100262	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/24/2016	03/23/2017	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/20/2016	09/19/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/23/2016	09/22/2017	<input checked="" type="checkbox"/>
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/16/2016	09/15/2017	<input checked="" type="checkbox"/>
Power Amplifier	SMC150D	R1553-0313	03/09/2016	03/08/2017	<input checked="" type="checkbox"/>
Power Amplifier	S41-25D	R1553-0314	05/27/2016	05/26/2017	<input checked="" type="checkbox"/>
Tunable Notch Filter	3NF-800/1000-S	AA4	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>

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Tunable Notch Filter	3NF- 1000/2000-S	AM 4	08/31/2016	08/30/2017	<input checked="" type="checkbox"/>
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**Annex B. EUT And Test Setup Photographs**

**Annex B.i. Photograph: EUT External Photo**



Whole Package View



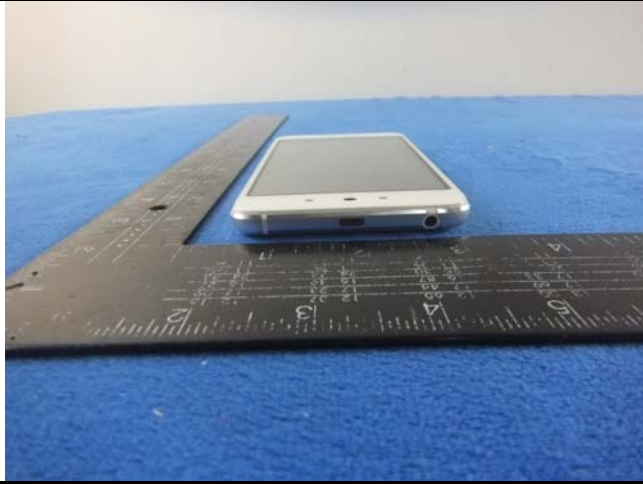
Adapter - Front View



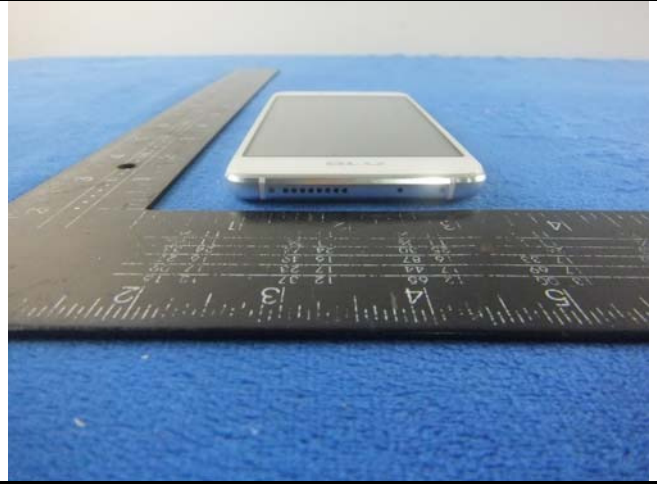
EUT - Front View



EUT - Rear View



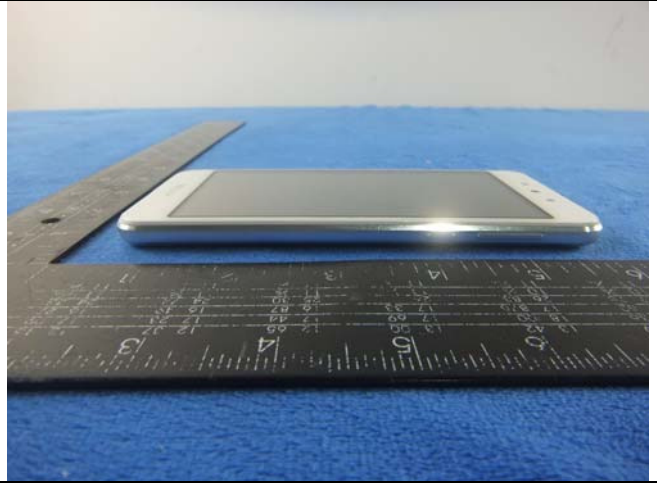
EUT - Top View



EUT - Bottom View



EUT - Left View



EUT - Right View



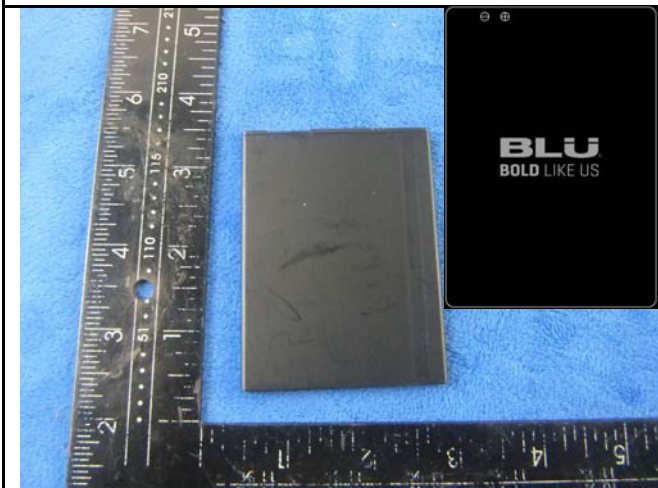
**Annex B.ii. Photograph: EUT Internal Photo**



Cover Off - Top View 1



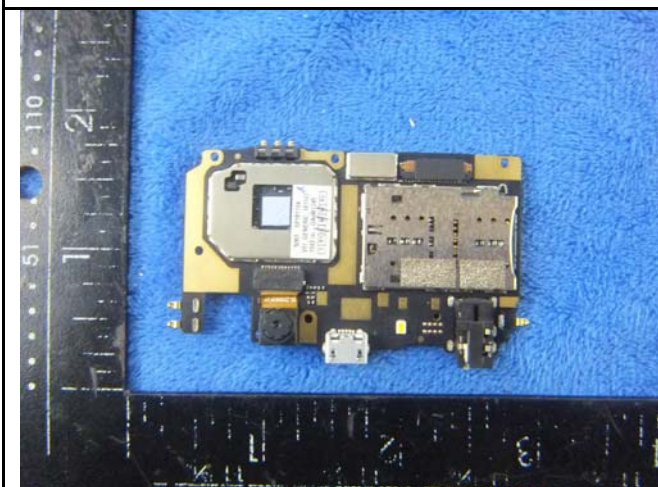
Cover Off - Top View 2



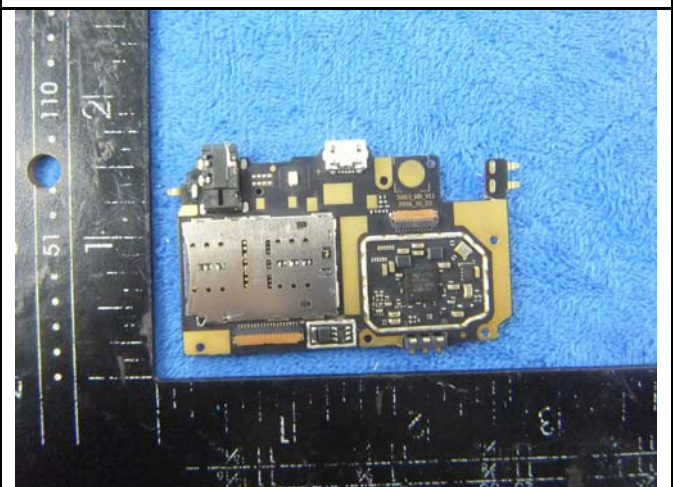
Battery - Front View



Battery - Rear View

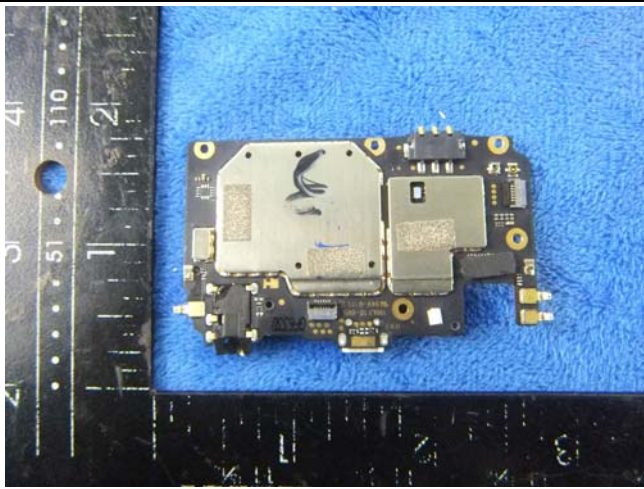


Mainboard with Shielding - Front View

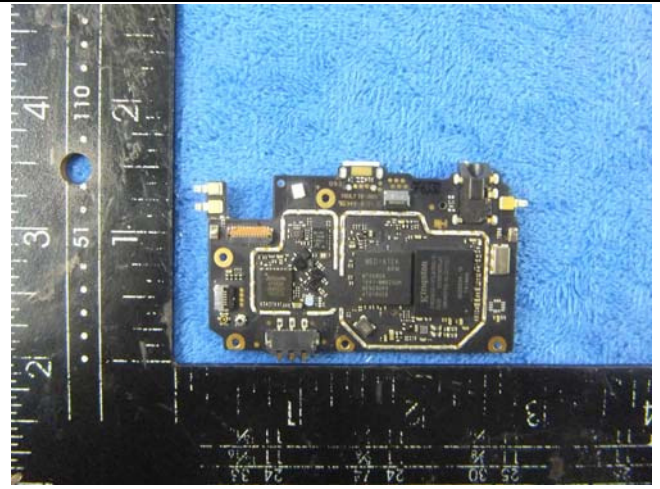


Mainboard without Shielding - Front View

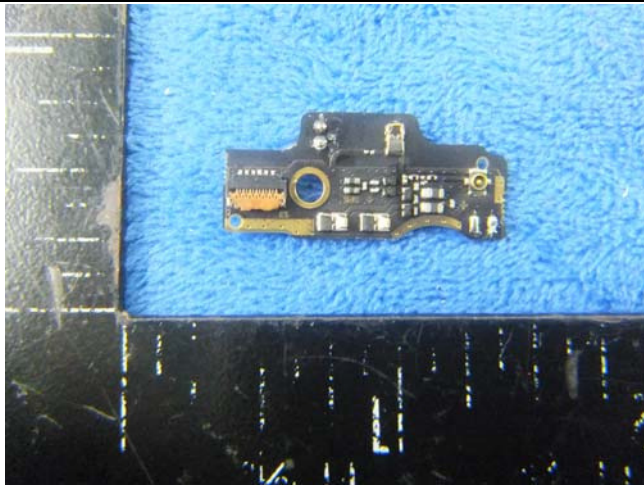




Mainboard with Shielding - Rear View



Mainboard without Shielding - Rear View



Smallboard - Front View



Smallboard - Rear View



LCD - Front View



LCD - Rear View



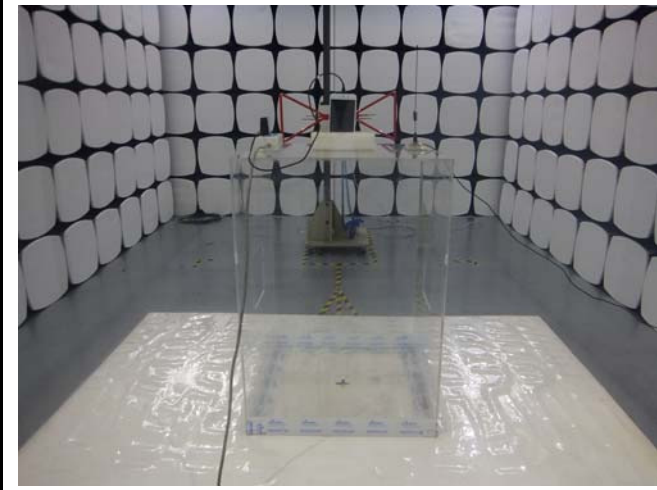


GSM/PCS/UMTS-FDD Antenna View

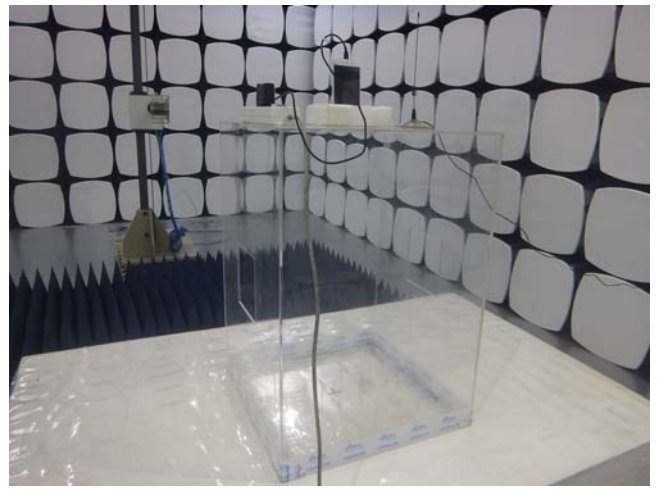


WIFI/BT/BLE/GPS - Metallic Antenna View

**Annex B.iii. Photograph: Test Setup Photo**



Radiated Spurious Emissions Test Setup Below 1GHz

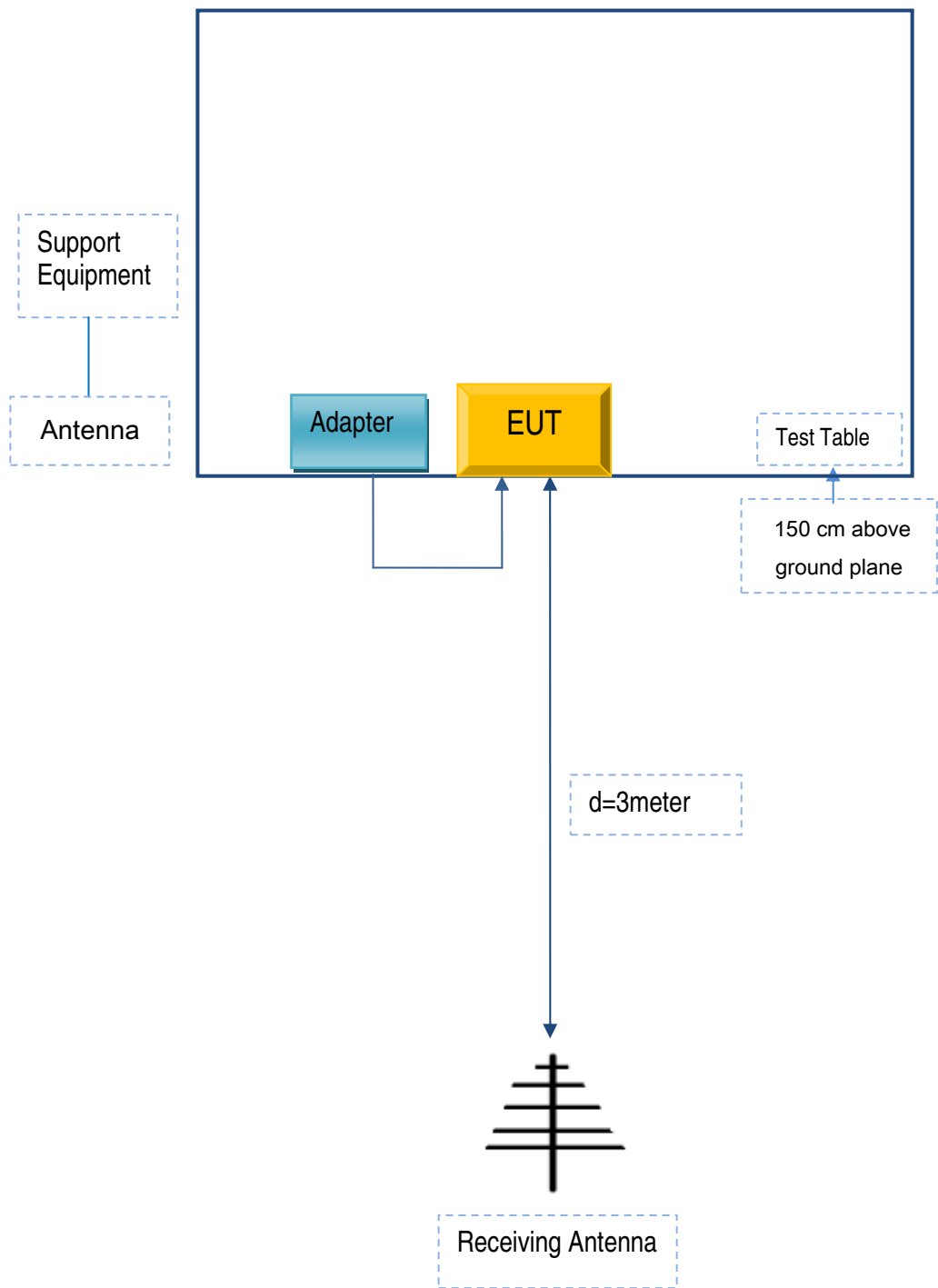


Radiated Spurious Emissions Test Setup Above  
1GHz

## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

### Annex C.ii. TEST SET UP BLOCK

#### Block Configuration Diagram for Radiated Emissions



## Annex C. ii. SUPPORTING EQUIPMENT DESCRIPTION

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

### Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
BLU Products, Inc.	Adapter	US-ZC-1005	SN057893

### Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	SN057893

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## Annex C.ii. EUT OPERATING CONKITIONS

N/A

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## Annex D. User Manual / Block Diagram / Schematics / Partlist

N/A



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## Annex E. DECLARATION OF SIMILARITY

N/A