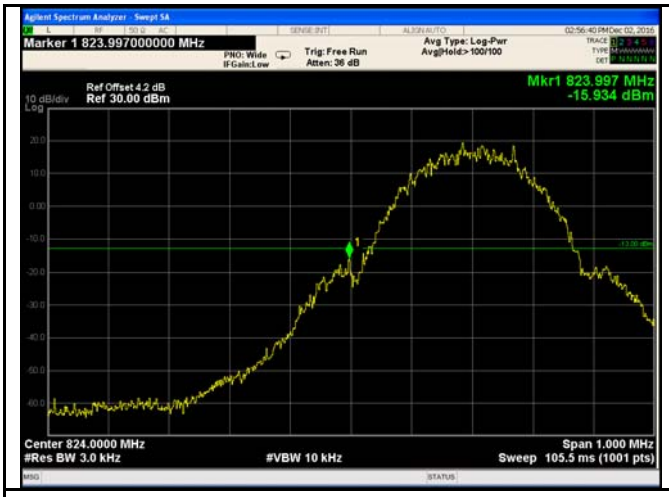
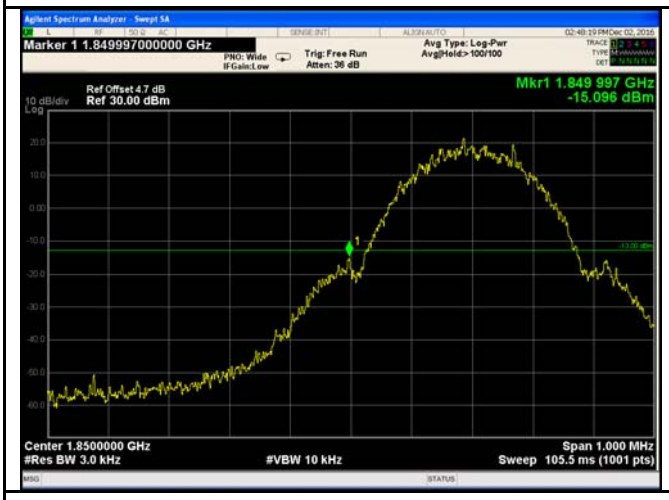
UMTS-FDD Band IV (Part 27)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1709.13	-28.036	-13
1755.84	-27.295	-13

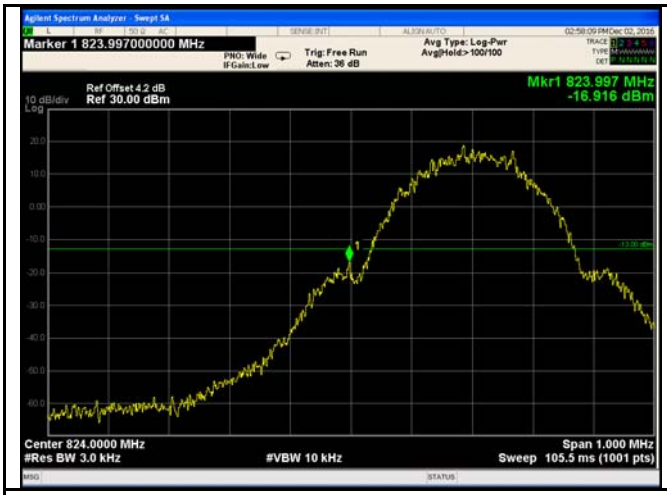
GSM Voice:

Test Plots

	
Cellular Band - Low Channel	Cellular Band - High Channel
Note: Offset=Cable loss (4.0) + 10log (3.12/3)=4.0+0.2=4.2dB	Note: Offset=Cable loss (4.0) + 10log (3.18/3)=4.0+0.3=4.3dB
	
PCS Band - Low Channel	PCS Band - High Channel
Note: Offset=Cable loss (4.0) + 10log (3.17/3)=4.5+0.2=4.7dB	Note: Offset=Cable loss (4.0) + 10log (316/3)=4.5+0.2=4.7dB

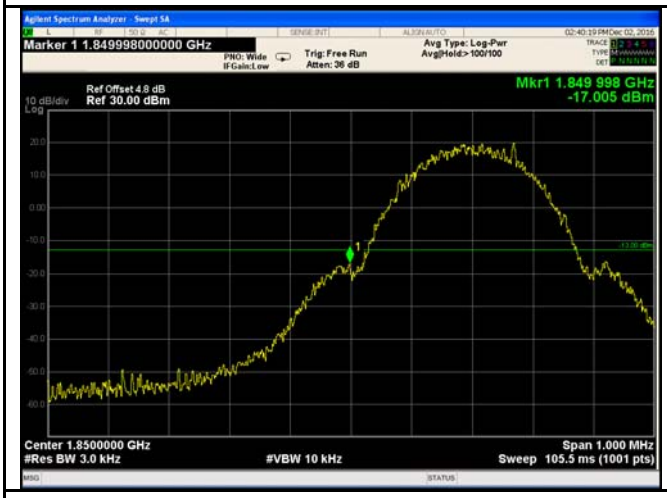
GPRS:

Test Plots



Cellular Band - Low Channel
Note: Offset=Cable loss (4.0) + 10log (3.13/3)=4.0+0.2=4.2dB

Cellular Band - High Channel
Note: Offset=Cable loss (4.0) + 10log (3.13/3)=4.0+0.2=4.2dB

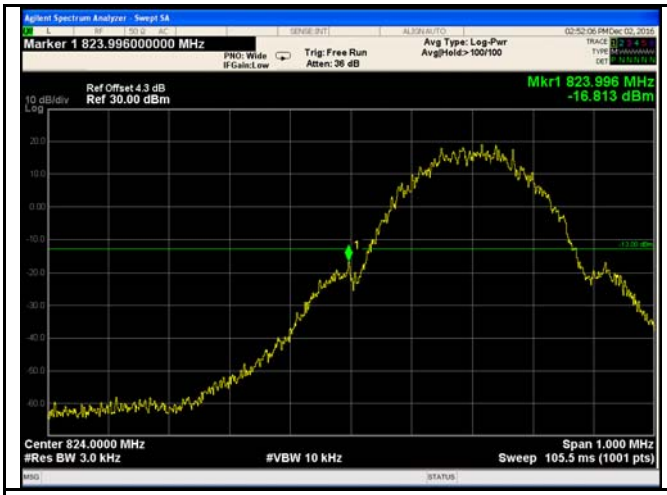
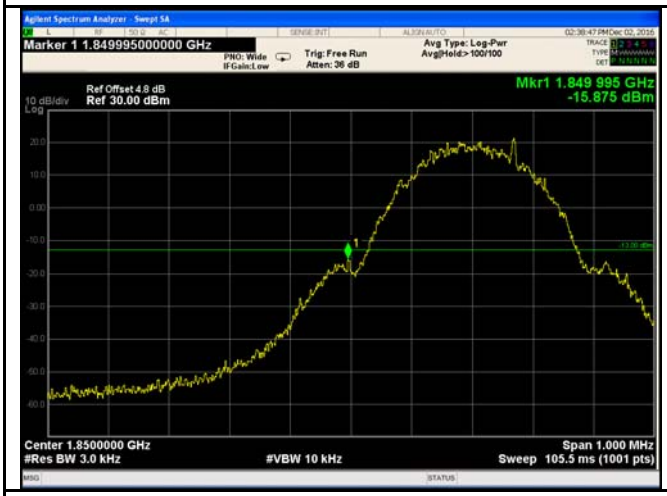


PCS Band - Low Channel
Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.3=4.8dB

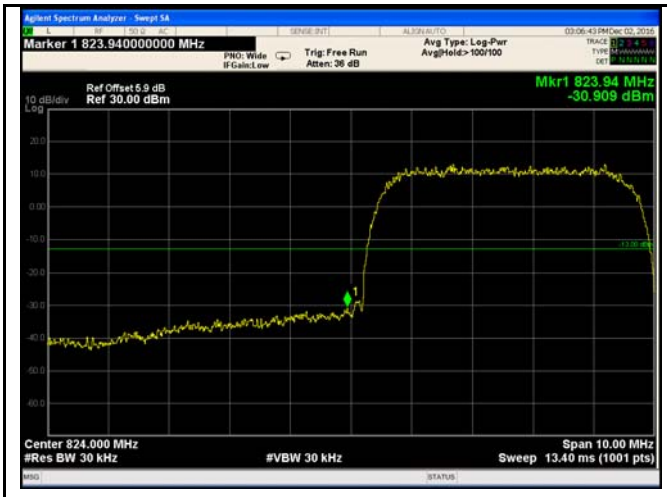
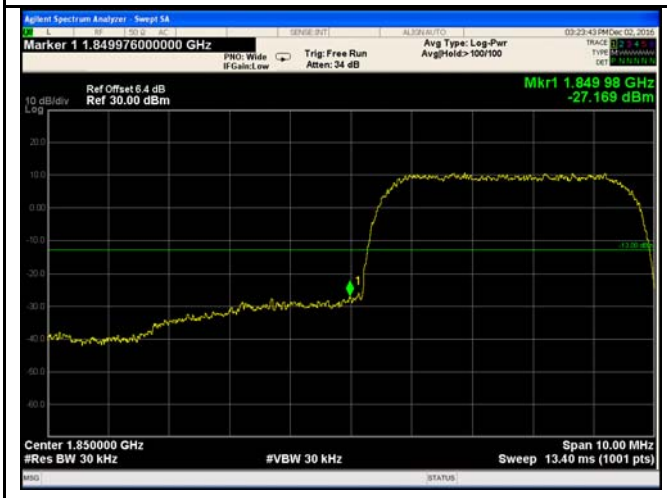
PCS Band - High Channel
Note: Offset=Cable loss (4.5) + 10log (3.16/3)=4.5+0.2=4.7dB

EGPRS (MCS1):

Test Plots

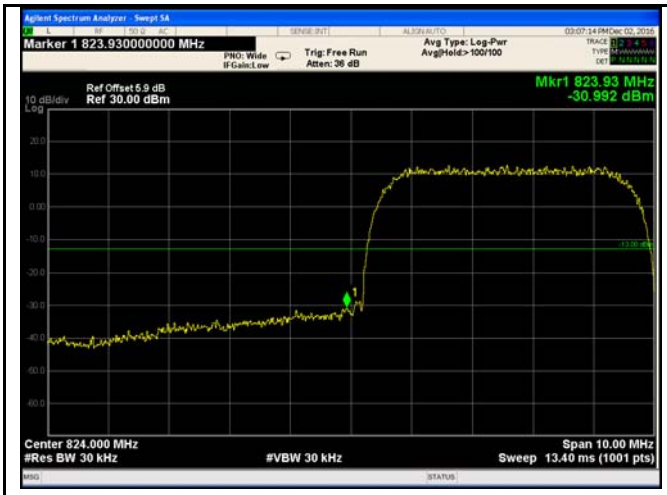
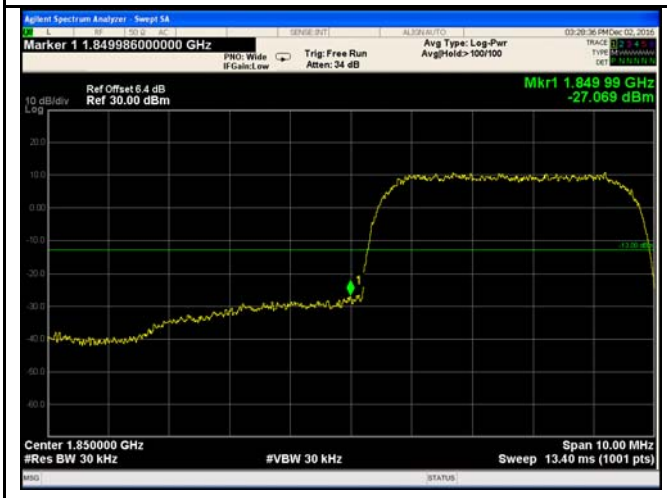
<table>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>Cellular Band - Low Channel</td><td>Cellular Band - High Channel</td></tr>
<tr><td>Note: Offset=Cable loss (4.0) + 10log (3.21/3)=4.0+0.3=4.3dB</td><td>Note: Offset=Cable loss (4.0) + 10log (3.18/3)=4.0+0.3=4.3dB</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>PCS Band - Low Channel</td><td>PCS Band - High Channel</td></tr>
<tr><td>Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.3=4.8dB</td><td>Note: Offset=Cable loss (4.5) + 10log (3.18/3)=4.5+0.3=4.8dB</td></tr>
</table>

RMC:

	
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (46.51/30)=4.0+1.9=5.9 dB	Note: Offset=Cable loss (4.0) + 10log (46.6/30)=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 (46.82/30)=4.5+1.9=6.4 dB	Note: Offset=Cable loss (4.5) + 10log (47.04/30)=4.5+2.0=6.5 dB

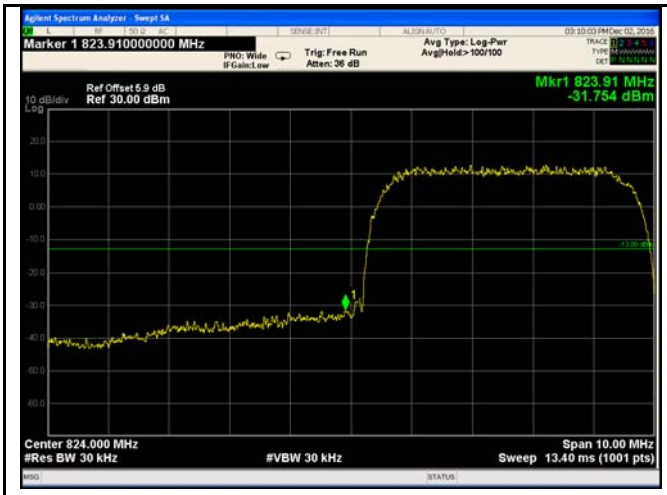
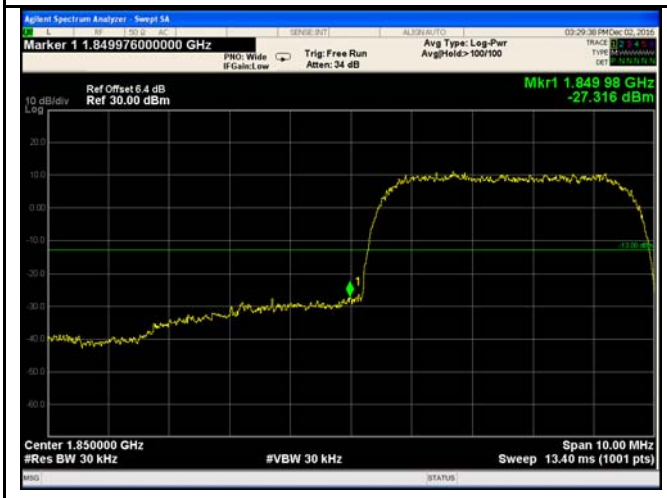
	
UMTS-FDD Band IV - Low Channel	UMTS-FDD Band IV - High Channel
Note: Offset=Cable loss (4.5) + 10log (46.54/30)=4.5+1.9=6.4 dB	Note: Offset=Cable loss (4.0) + 10log (46.52/30)=4.5+1.9=6.4 dB

HSUPA:

	
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (46.58/30)=4.0+1.9=5.9 dB	Note: Offset=Cable loss (4.0) + 10log (46.66/30)=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 (46.29/30)=4.5+1.9=6.4 dB	Note: Offset=Cable loss (4.5) + 10log (48.61/30)=4.5+1.9=6.4 dB

	
UMTS-FDD Band IV - Low Channel	UMTS-FDD Band IV - High Channel
Note: Offset=Cable loss (4.5) + 10log (46.63/30)=4.5+1.9=6.4dB	Note: Offset=Cable loss (4.5) + 10log (46.66/30)=4.5+1.9=6.4dB

HSDPA:

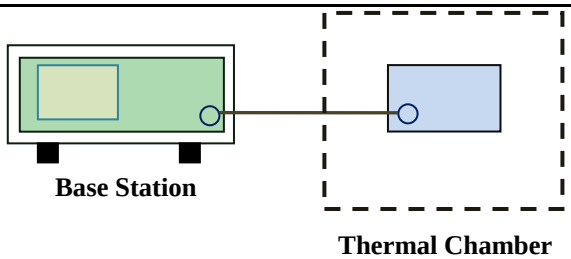
	
UMTS-FDD Band V - Low Channel	UMTS-FDD Band V - High Channel
Note: Offset=Cable loss (4.0) + 10log (46.72/30)=4.0+1.9=5.9 dB	Note: Offset=Cable loss (4.0) + 10log (46.67/30)=4.0+1.9=5.9 dB
	
UMTS-FDD Band II - Low Channel	UMTS-FDD Band II - High Channel
Note: Offset=Cable loss (4.5) + 10log (46.65/30)=4.5+1.9=6.4 dB	Note: Offset=Cable loss (4.5) + 10log (47.06/30)=4.5+2.0=6.5 dB

	
UMTS-FDD Band IV - Low Channel	UMTS-FDD Band IV - High Channel
Note: Offset=Cable loss (4.5) + 10log (46.67/30)=4.5+1.9=6.4 dB	Note: Offset=Cable loss (4.5) + 10log (46.71/30)=4.5+1.9=6.4 dB

6.8 Frequency Stability

Temperature	25℃
Relative Humidity	54%
Atmospheric Pressure	1002mbar
Test date :	December 02, 2016
Tested By :	Loren Luo

Requirement(s):

<table>
<tr><th>Spec</th><th>Item</th><th>Requirement</th><th>Applicable</th></tr>
<tr><td>§2.1055, §22.355 & §24.235 § 27.5(h); § 27.54</td><td>a)</td><td>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
<table>
<tr><th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr>
<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>
</table>
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.</td><td>☑</td></tr>
<tr><td>Test setup</td><td colspan="3"> 
</td></tr>
</table>

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 ±0.00025% (±2.5ppm) of the center frequency.
Remark	
Result	☑ Pass ☐ Fail

Test Data ☑ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☑ N/A

GSM Voice:

Cellular Band (Part 22H) result

Middle Channel, f_o = 836.6 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	20	0.0239	2.5
0		15	0.0179	2.5
10		16	0.0191	2.5
20		16	0.0191	2.5
30		14	0.0167	2.5
40		15	0.0179	2.5
50		20	0.0239	2.5
55		19	0.0227	2.5
25	4.2	19	0.0227	2.5
	3.5	20	0.0239	2.5

PCS Band (Part 24E) result

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	14	0.0074	2.5
0		15	0.0080	2.5
10		15	0.0080	2.5
20		16	0.0085	2.5
30		15	0.0080	2.5
40		15	0.0080	2.5
50		15	0.0080	2.5
55		16	0.0085	2.5
25	4.2	17	0.0090	2.5
	3.5	20	0.0106	2.5

RMC:

UMTS-FDD Band V (Part 22H)

Middle Channel, f_o = 835 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	12	0.0144	2.5
0		11	0.0132	2.5
10		13	0.0156	2.5
20		14	0.0168	2.5
30		16	0.0192	2.5
40		11	0.0132	2.5
50		20	0.0240	2.5
55		15	0.0180	2.5
25	4.2	15	0.0180	2.5
	3.5	16	0.0192	2.5

UMTS-FDD Band II (Part 24E)

Middle Channel, f_o = 1880 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0080	2.5
0		15	0.0080	2.5
10		16	0.0085	2.5
20		10	0.0053	2.5
30		8	0.0043	2.5
40		11	0.0059	2.5
50		10	0.0053	2.5
55		13	0.0069	2.5
25	4.2	13	0.0069	2.5
	3.5	15	0.0080	2.5

UMTS-FDD Band IV (Part 27)

Middle Channel, f_o = 1733 MHz				
Temperature (℃)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	15	0.0180	2.5
0		16	0.0192	2.5
10		12	0.0144	2.5
20		15	0.0180	2.5
30		15	0.0180	2.5
40		10	0.0120	2.5
50		14	0.0168	2.5
55		13	0.1581	2.5
25	4.2	9	0.0108	2.5
	3.5	15	0.0180	2.5

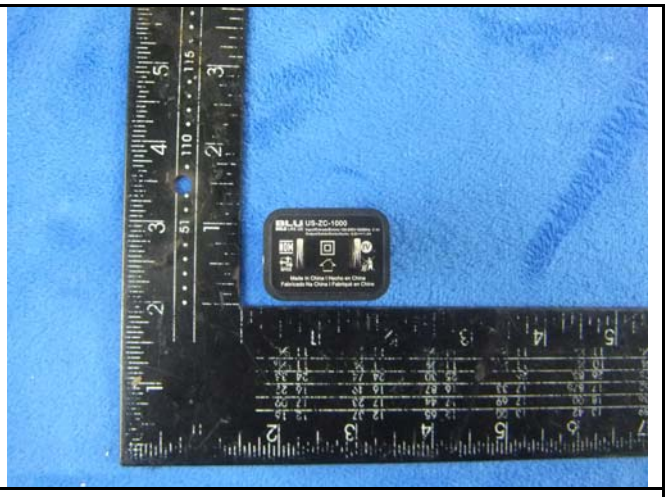
Annex A. TEST INSTRUMENT

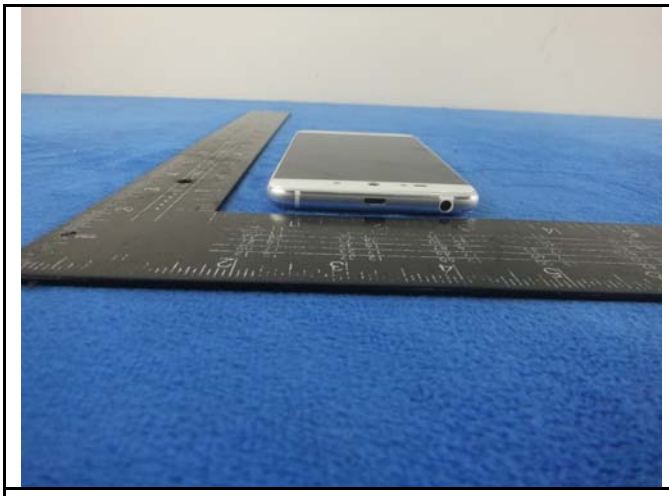
Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF Conducted Test					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/15/2016	09/14/2017	☑
Power Splitter	1#	1#	08/31/2016	08/30/2017	☑
Universal Radio Communication Tester	CMU200	121393	09/24/2016	09/23/2017	☑
Temperature/Humidity Chamber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

Tunable Notch Filter	3NF-1000/2000-S	AM 4	08/31/2016	08/30/2017	☑

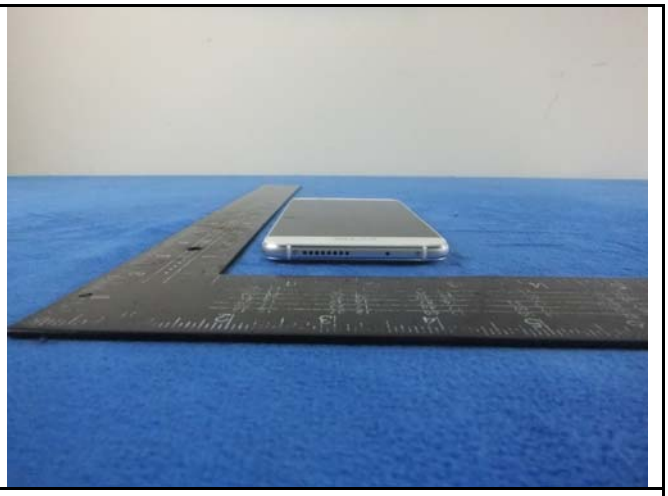
Annex B. EUT And Test Setup Photographs

Annex B.i. Photograph: EUT External Photo

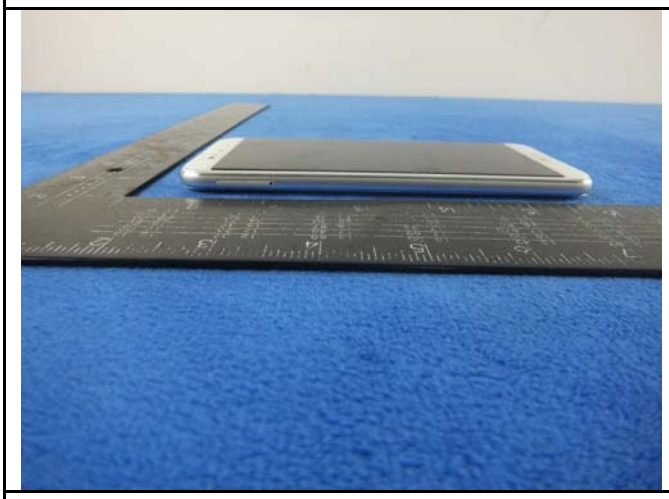
	
Whole Package View	Adapter - Front View
	
EUT - Front View	EUT - Rear View



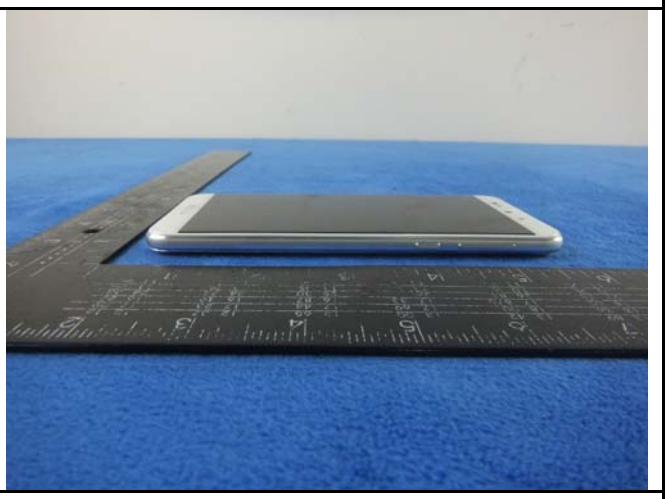
EUT - Top View



EUT - Bottom View



EUT - Left View

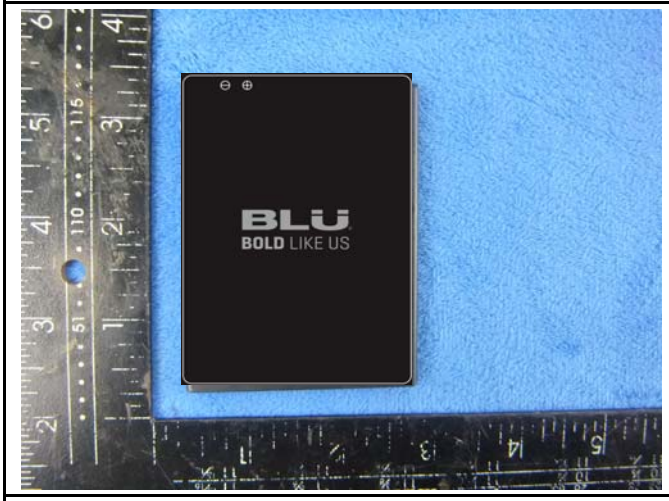


EUT - Right View

Annex B.ii. Photograph: EUT Internal Photo

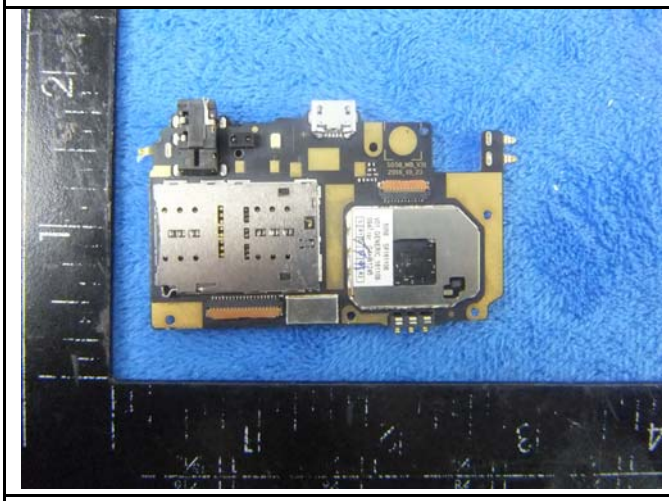
Cover Off - Top View 1

Cover Off - Top View 2

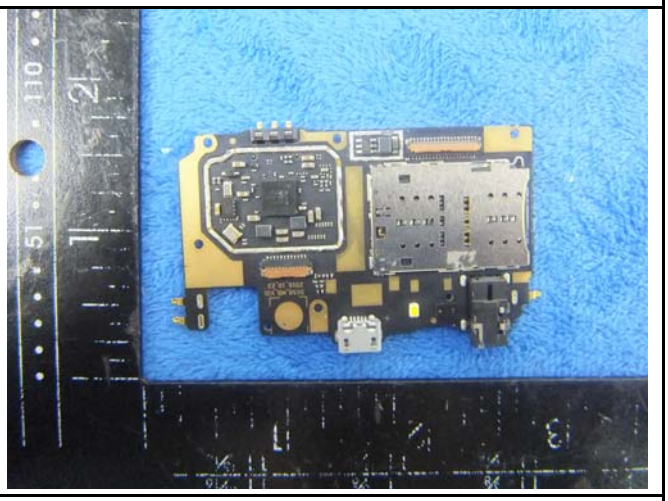


Battery - Front View

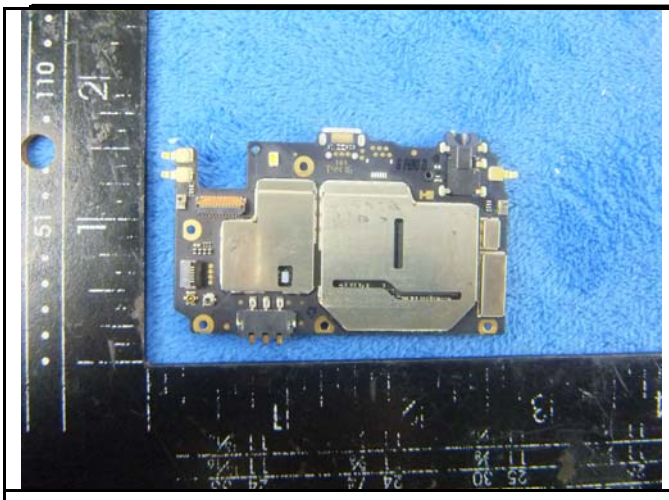
Battery - Rear View



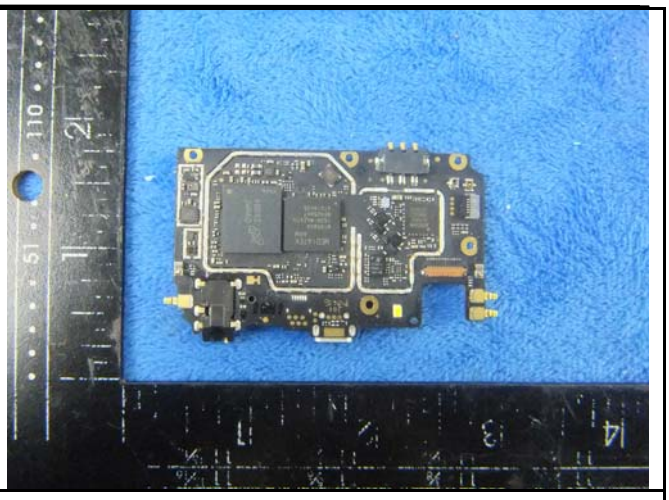
Mainboard with Shielding - Front View



Mainboard without Shielding - Front View



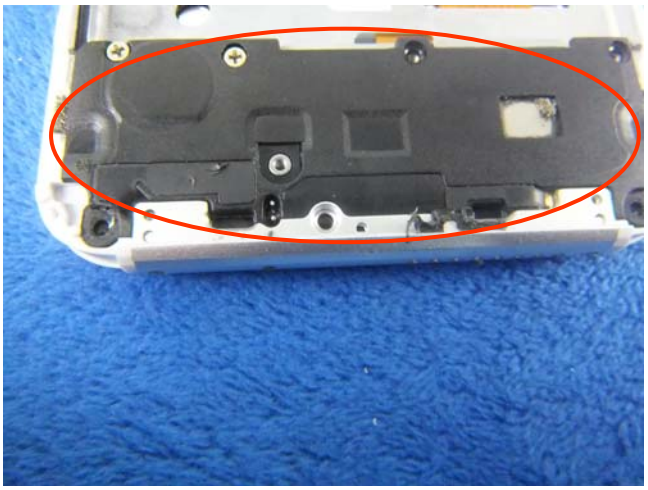
Mainboard with Shielding – Rear View



Mainboard without Shielding - Rear View

LCD – Front View

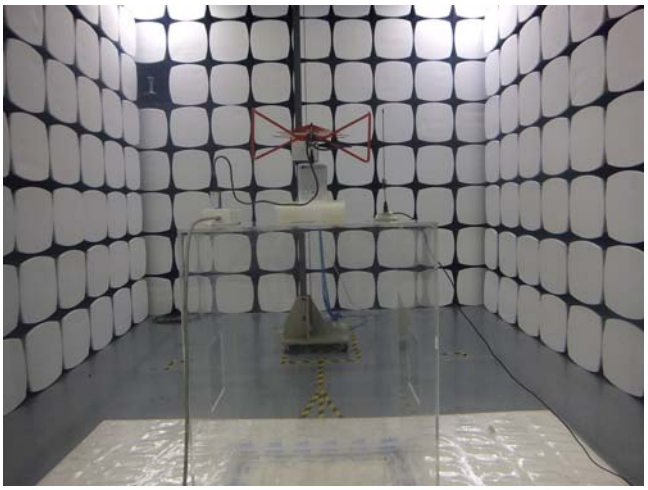
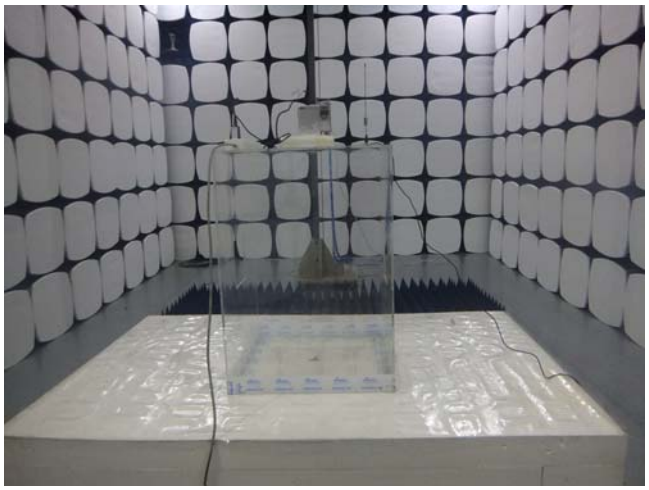
LCD – Rear View



GSM/PCS/UMTS-FDD Antenna View

WIFI/BT/BLE/GPS – Metallic Antenna View

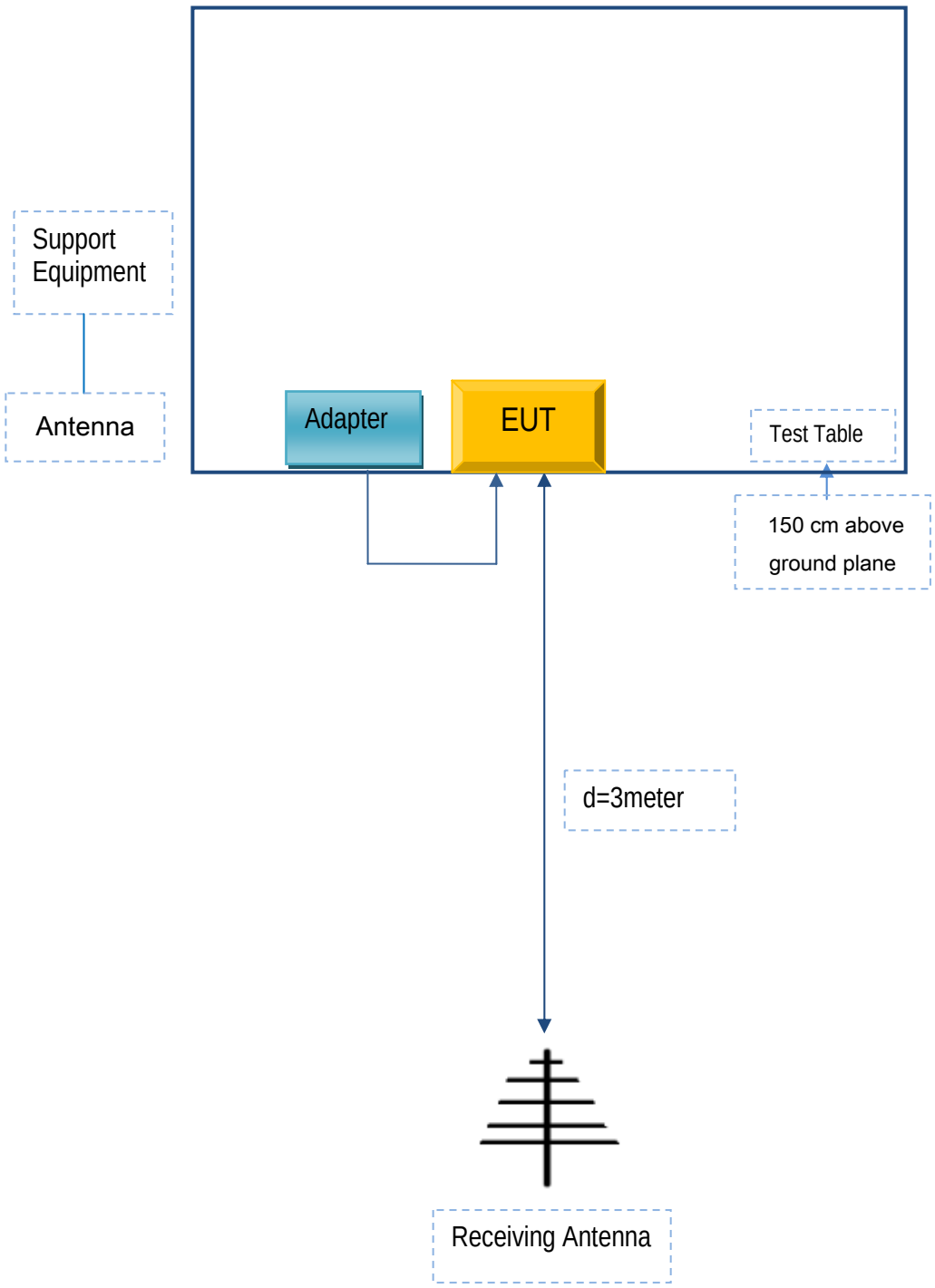
Annex B.iii. Photograph: Test Setup Photo

	
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. il. 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-1000	E157263

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	0.8m	E157263

Annex C.ii. EUT OPERATING CONKITIONS

N/A

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

Please see the attachment

Annex E. DECLARATION OF SIMILARITY

N/A