# RF TEST REPORT



Report No.: 15070892-FCC-R1
Supersede Report No.: N/A

Applicant	SENMAX INC.			
Product Name	LTE Phone			
Model No.	Carbon			
Serial No.	N/A			
Took Otom doud	FCC Part 2	FCC Part 22(H):2014 ;FCC Part 24(E):2014; FCC Part 27:2014;		
Test Standard	ANSI/TIAC603 D: 2010			
Test Date	October 10	October 10 to October 29, 2015		
Issue Date	October 29, 2015			
Test Result	Pass Fail			
Equipment complied with the specification				
Equipment did not comply with the specification				
Winnie Zheng David Huang				
Winnie Zhang Test Engineer		David Huang Checked By		

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

#### Issued by:

#### SIEMIC (SHENZHEN-CHINA) LABORATORIES

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## **Laboratories Introduction**

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



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#### **Accreditations for Conformity Assessment**

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



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## 1. Report Revision History

Report No.	Report Version	Description	Issue Date
15070892-FCC-R1	NONE	Original	October 29, 2015

## 2. Customer information

Applicant Name	SENMAX INC.
Applicant Add	2300 GRAYSON DR # 1611 GRAPEVINE, TX 76051
Manufacturer	SENMAX INC.
Manufacturer Add	2300 GRAYSON DR # 1611 GRAPEVINE, TX 76051

## 3. Test site information

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES	
	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park	
Lab Address	South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong	
	China 518108	
FCC Test Site No.	718246	
IC Test Site No.	4842E-1	
Test Software	Radiated Emission Program-To Shenzhen v2.0	



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## 4. Equipment under Test (EUT) Information

Description of EUT: LTE Phone

Main Model: Carbon

Serial Model: N/A

Date EUT received: October 09, 2015

Test Date(s): October 10 to October 29, 2015

Equipment Category: PCE

GSM850: -7.22 dBi PCS1900: -2.93 dBi

UMTS-FDD Band V: -7.22 dBi UMTS-FDD Band IV: -2.55 dBi UMTS-FDD Band II:-2.93 dBi

Bluetooth/BLE:-2.94 dBi

Antenna Gain: WIFI:-2.94 dBi

LTE Band 2: -3.96 dBi LTE Band 4: -2.33 dBi LTE Band 7: -2.54 dBi LTE Band 17: -8.25 dBi

GPS:-3.56 dBi

GSM / GPRS: GMSK EGPRS: GMSK, 8PSK

UMTS-FDD: QPSK, 16QAM 802.11b/g/n: DSSS, OFDM

Type of Modulation:

Bluetooth: GFSK, π /4DQPSK, 8DPSK

**BLE: GFSK** 

LTE Band: QPSK, 16QAM

**GPS:BPSK** 



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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 V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz

UMTS-FDD Band IV TX:1712.4 ~ 1752.6 MHz; UMTS-FDD Band II TX:1852.4 ~ 1907.6 MHz;

RX: 1932.4 ~ 1987.6 MHz

RF Operating Frequency (ies):

WIFI:802.11n(40M): 2422-2452 MHz

WIFI:802.11b/g/n(20M): 2412-2462 MHz

Bluetooth& BLE: 2402-2480 MHz

LTE Band 2 TX:  $1852.5 \sim 1907.5$  MHz; RX:  $1932.5 \sim 1987.5$  MHz LTE Band 4 TX:  $1712.5 \sim 1752.5$  MHz; RX:  $2112.5 \sim 2152.5$  MHz LTE Band 7 TX:  $2502.5 \sim 2567.5$  MHz; RX:  $2622.5 \sim 2687.5$  MHz LTE Band 17 TX:  $706.5 \sim 713.5$  MHz; RX:  $736.5 \sim 743.5$  MHz

GPS RX:1575.42 MHz

GSM850: 34.27 dBm

PCS1900: 30.63dBm

Maximum Conducted AV Power to Antenna:

UMTS-FDD Band V: 23.63 dBm

LIM

UMTS-FDD Band II: 24.17 dBm

UMTS-FDD Band IV: 24.13 dBm

GSM850: 25.48 dBm / ERP

PCS1900: 28.37 dBm / EIRP

ERP/EIRP: UMTS-FDD Band V: 22.79 dBm / ERP

UMTS-FDD Band II: 19.96 dBm / EIRP UMTS-FDD Band IV: 22.46 dBm/ EIRP

GSM 850: 124CH

PCS1900: 299CH

UMTS-FDD Band V: 102CH

UMTS-FDD Band IV: 202CH

UMTS-FDD Band II: 277CH Number of Channels:

WIFI:802.11b/g/n(20M): 11CH

WIFI:802.11n(40M):7CH

Bluetooth: 79CH

BLE: 40CH

GPS:1CH



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Port: Power Port, Earphone Port, USB Port

Battery:

Spec:3.8V,2850mAh

Adapter:

Input Power: Model:TPA-955100UU

Input: 100-240V; 50/60Hz; 150mA

Output: DC 5.0V,1000mA

Trade Name:

Ojji

GPRS/EGPRS Multi-slot class 8/10/12

FCC ID: 2AF99CARBON



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## 5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result	
§ 1.1307; § 2.1093	RF Exposure (SAR)	Compliance	
§2.1046; § 22.913(a); § 24.232(c);	DE Output Dower	Camplianas	
§ 27.50(c.10); § 27.50(d.4)	RF Output Power	Compliance	
§ 24.232 (d) ; § 27.50(d)	Peak-Average Ratio	Compliance	
§ 2.1047	Modulation Characteristics	N/A	
§ 2.1049; § 22.905; § 22.917;	000/ 9 26 dB Ossumind Bandwidth	Camplianas	
§ 24.238; § 27.53(a.5)	99% & -26 dB Occupied Bandwidth	Compliance	
§ 2.1051; § 22.917(a);	Courier Conincione of Antonina Torrigal	Camplianas	
§ 24.238(a); § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliance	
§ 2.1053; § 22.917(a);	Field Chromath of Countries Dedication	Camplianas	
§ 24.238(a); § 27.53(h)	Field Strength of Spurious Radiation	Compliance	
§ 22.917(a); § 24.238(a);	Out of hand aminaing Band Edge	Compliance	
§ 27.53(h)	Out of band emission, Band Edge	Compliance	
§ 2.1055; § 22.355; § 24.235;	Frequency stability vs. temperature	Compliance	
§ 27.5(h); § 27.54	Frequency stability vs. voltage	Compliance	

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

#### **Measurement Uncertainty**

Emissions				
Test Item	Uncertainty			
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB		
-	-	-		



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## 6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

### 6.1 RF Exposure (SAR)

Test Result: Pass

The EUT is a portable device, thus requires SAR evaluation;

Please refer to RF Exposure Evaluation Report: 15070892-FCC-H.



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## 6.2 RF Output Power

Temperature	23°C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	October 26, 2015
Tested By :	Winnie Zhang

#### Requirement(s):

Requirement(s):								
Spec	Item	Requirement Applicable						
§22.913 (a)	a)	RP:38.45dBm						
§24.232 (c)	b)	RP:33dBm						
§27.50 (c)	c)	EIRP: 30dBm	>					
Test Setup		EUT Base Station						
	Fo	r Conducted Power:						
	- The transmitter output port was connected to base station.							
	- Set EUT at maximum power through base station.							
	- Select lowest, middle, and highest channels for each band and							
	different test mode.							
	For ERP/EIRP:							
	- The transmitter was placed on a wooden turntable, and it was							
	transmitting into a non-radiating load which was also placed on the							
Test Procedure	turntable.							
	- The measurement antenna was placed at a distance of 3 meters							
	from the EUT. During the tests, the antenna height and							
	polarization as well as EUT azimuth were varied in order to identify							
	the maximum level of emissions from the EUT. The test was							
	performed by placing the EUT on 3-orthogonal axis.							
	- The frequency range up to tenth harmonic of the fundamental							
	frequency was investigated.							
	-	Remove the EUT and replace it with substitution anten	na. A signal					



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	generator was connected to the substitution antenna by a non-				
	radiating cable. The absolute levels of the spurious emissions				
	were measured by the substitution.				
	- Spurious emissions in dB = 10 log (TX power in Watts/0.001) –				
	the absolute level				
	- Spurious attenuation limit in dB = 43 + 10 Log10 (power out in				
	Watts.				
Remark					
Result	Pass				
Test Data Yes	□ <sub>N/A</sub>				
Test Plot Yes	(See below) N/A				



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#### **Conducted Power**

### **GSM Mode:**

Burst Average Power (dBm);								
Band	GSM850 PCS1900							
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	1	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	34.06	34.05	34.27	34±1	30.63	30.57	30.56	30±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	34.02	34.01	34.20	34±1	30.61	30.43	30.48	30±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	33.71	33.68	34.17	34±1	29.58	29.60	29.79	30±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK	33.60	33.57	34.14	34±1	26.61	26.66	26.87	26±1
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1	34.03	34.05	34.24	34±1	30.47	30.45	30.46	30±1
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1	33.54	33.60	33.98	34±1	29.57	29.58	29.78	30±1
EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1	33.58	33.54	34.11	34±1	26.39	26.62	26.83	26±1
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS5	27.86	27.82	27.84	27±1	26.68	26.67	26.71	26±1
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS5	26.87	26.86	26.88	27±1	25.82	25.81	25.84	26±1
EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS5	26.89	26.81	26.81	27±1	25.8	25.79	25.8	26±1



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#### Remark:

GPRS, CS1 coding scheme.

EGPRS, MCS1 coding scheme.

EGPRS, MCS5 coding scheme.

Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link

Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link

Multi-Slot Class 12, Support Max 4 downlink, 4 uplink, 5 working link

Note: Since GSM mode has higher power, so the test items below were not performed to GPRS and EGPRS mode.



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## **UMTS Mode:**

## UMTS-FDD Band V

Band/ Time Slot	Channel	Frequency	Average power	Tune up	
configuration	Chame	Frequency	(dBm)	Power tolerant	
DMC	4132	826.4	23.63	23±1	
RMC	4175	835	23.42	23±1	
12.2kbps	4233	846.6	23.35	23±1	
HCDDA	4132	826.4	22.36	22±1	
HSDPA Subtest1	4175	835	22.56	22±1	
Sublest i	4233	846.6	22.51	22±1	
LICDDA	4132	826.4	22.62	22±1	
HSDPA Subtest2	4175	835	22.53	22±1	
Sublesiz	4233	846.6	22.61	22±1	
HCDDA	4132	826.4	22.54	22±1	
HSDPA Subtest3	4175	835	22.62	22±1	
Sublesis	4233	846.6	22.52	22±1	
HCDDA	4132	826.4	22.48	22±1	
HSDPA Subtest4	4175	835	22.53	22±1	
Sublesia	4233	846.6	22.56	22±1	
LICLIDA	4132	826.4	22.46	22±1	
HSUPA Subtest1	4175	835	22.42	22±1	
Sublest i	4233	846.6	22.44	22±1	
LICLIDA	4132	826.4	22.58	22±1	
HSUPA Subtest2	4175	835	22.36	22±1	
Sublesiz	4233	846.6	22.46	22±1	
LICLIDA	4132	826.4	22.53	22±1	
HSUPA Subtest3	4175	835	22.53	22±1	
Sublesis	4233	846.6	22.58	22±1	
HOUDA	4132	826.4	22.55	22±1	
HSUPA	4175	835	22.49	22±1	
Subtest4	4233	846.6	22.47	22±1	
LICUIDA	4132	826.4	22.46	22±1	
HSUPA Subtoats	4175	835	22.52	22±1	
Subtest5	4233	846.6	22.48	22±1	



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## **UMTS-FDD Band II**

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant	
RMC	9262	1852.4	23.88	24±1	
	9400	1880	23.97	24±1	
12.2kbps	9538	1907.6	24.17	24±1	
LICDDA	9262	1852.4	22.35	22±1	
HSDPA Subtest1	9400	1880	22.56	22±1	
Sublest i	9538	1907.6	22.59	22±1	
HODDA	9262	1852.4	22.58	22±1	
HSDPA	9400	1880	22.56	22±1	
Subtest2	9538	1907.6	22.57	22±1	
LIODDA	9262	1852.4	22.55	22±1	
HSDPA	9400	1880	22.64	22±1	
Subtest3	9538	1907.6	22.53	22±1	
HODDA	9262	1852.4	22.58	22±1	
HSDPA	9400	1880	22.56	22±1	
Subtest4	9538	1907.6	22.55	22±1	
HOUDA	9262	1852.4	22.59	22±1	
HSUPA	9400	1880	22.54	22±1	
Subtest1	9538	1907.6	22.57	22±1	
HOURA	9262	1852.4	22.51	22±1	
HSUPA	9400	1880	22.55	22±1	
Subtest2	9538	1907.6	22.46	22±1	
HOUDA	9262	1852.4	22.58	22±1	
HSUPA	9400	1880	22.57	22±1	
Subtest3	9538	1907.6	22.53	22±1	
LICUIDA	9262	1852.4	22.51	22±1	
HSUPA Subtest4	9400	1880	22.63	22±1	
Sublesi4	9538	1907.6	22.42	22±1	
LICUDA	9262	1852.4	22.54	22±1	
HSUPA Subtest5	9400	1880	22.46	22±1	
Sublesto	9538	1907.6	22.49	22±1	



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## **UMTS-FDD Band IV**

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant	
DMC	1313	1712.6	24.13	24±1	
RMC	1413	1732.6	24.13	24±1	
12.2kbps	1512	1752.4	24.02	24±1	
LICDDA	1313	1712.6	22.89	22±1	
HSDPA Subtest1	1413	1732.6	22.87	22±1	
Sublest i	1512	1752.4	22.86	22±1	
LIODDA	1313	1712.6	22.83	22±1	
HSDPA	1413	1732.6	22.85	22±1	
Subtest2	1512	1752.4	22.86	22±1	
LIODDA	1313	1712.6	22.81	22±1	
HSDPA	1413	1732.6	22.84	22±1	
Subtest3	1512	1752.4	22.56	22±1	
LIODEA	1313	1712.6	22.78	22±1	
HSDPA	1413	1732.6	22.76	22±1	
Subtest4	1512	1752.4	22.73	22±1	
HOUDA	1313	1712.6	22.75	22±1	
HSUPA	1413	1732.6	22.69	22±1	
Subtest1	1512	1752.4	22.74	22±1	
HOURA	1313	1712.6	22.46	22±1	
HSUPA	1413	1732.6	22.53	22±1	
Subtest2	1512	1752.4	22.58	22±1	
HOUDA	1313	1712.6	22.68	22±1	
HSUPA	1413	1732.6	22.59	22±1	
Subtest3	1512	1752.4	22.73	22±1	
LICUIDA	1313	1712.6	22.69	22±1	
HSUPA Subtost4	1413	1732.6	22.59	22±1	
Subtest4	1512	1752.4	22.68	22±1	
LICUDA	1313	1712.6	22.76	22±1	
HSUPA Subtest5	1413	1732.6	22.69	22±1	
Sublesto	1512	1752.4	22.72	22±1	



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#### **ERP & EIRP**

### ERP for Cellular Band (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
824.2	19.15	V	6.8	0.53	25.42	38.45
824.2	17.92	Н	6.8	0.53	24.19	38.45
836.6	19.08	V	6.8	0.53	25.35	38.45
836.6	17.93	Н	6.8	0.53	24.20	38.45
848.8	19.11	V	6.9	0.53	25.48	38.45
848.8	17.89	Н	6.9	0.53	24.26	38.45

## EIRP for PCS Band (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1850.2	20.83	V	7.88	0.85	27.86	33
1850.2	21.29	Н	7.88	0.85	28.32	33
1880	20.91	V	7.88	0.85	27.94	33
1880	21.34	Н	7.88	0.85	28.37	33
1909.8	20.88	V	7.86	0.85	27.89	33
1909.8	21.27	Н	7.86	0.85	28.28	33



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### ERP for UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
826.4	16.48	V	6.8	0.53	22.75	38.45
826.4	15.73	Н	6.8	0.53	22.00	38.45
835	16.52	V	6.8	0.53	22.79	38.45
835	15.69	Н	6.8	0.53	21.96	38.45
846.6	16.44	V	6.9	0.53	22.81	38.45
846.6	15.62	Н	6.9	0.53	21.99	38.45

#### EIRP for UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1852.4	12.93	V	7.88	0.85	19.96	33
1852.4	11.67	Н	7.88	0.85	18.70	33
1880	12.81	V	7.88	0.85	19.84	33
1880	11.74	Н	7.88	0.85	18.77	33
1907.6	12.88	V	7.86	0.85	19.89	33
1907.6	11.69	Н	7.86	0.85	18.70	33

### EIRP for UMTS-FDD Band IV (Part 27H)

Frequency (MHz)	Substituted level (dBm)	Antenna Polarization	Antenna Gain correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)	Limit (dBm)
1712.4	15.49	V	7.76	0.82	22.43	30
1712.4	14.72	Н	7.76	0.82	21.66	30
1740	15.52	V	7.76	0.82	22.46	30
1740	14.69	Н	7.76	0.82	21.63	30
1752.6	15.47	V	7.74	0.82	22.39	30
1752.6	14.71	Н	7.74	0.82	21.63	30



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## 6.3 Peak-Average Ratio

Temperature	23°C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	October 26, 2015
Tested By:	Winnie Zhang

#### Requirement(s):

Requirement(s):			
Spec	Item	Requirement	Applicable
§24.232(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.	<u>~</u>
§ 27.50(d)		exceed 13 db.	
Test Setup	B	EUT Spectrum Analyzer	
Test Procedure	According with KDB 971168  1. The signal analyzer's CCDF measurement profile is enabled 2. Frequency = carrier center frequency 3. Measurement BW > Emission bandwidth of signal 4. The signal analyzer was set to collect one million samples to generate the CCDF curve 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power		
Remark			
Result	<b>▼</b> Pa	ss Fail	

Test Data	Yes	□ <sub>N/A</sub>
Test Plot	Yes (See below)	✓ <sub>N/A</sub>



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## GSM 1900 PK-AV POWER(PART 24E)

Frequency	Conducted power(dBm)		Peak-Average
(MHz)	Peak	Average	Ratio(PAR)
1850.2	31.56	30.63	0.93
1880	31.59	30.57	1.02
1909.8	31.62	30.56	1.06

#### UMTS-FDD BandII PK-AV POWER(PART 24E)

Frequency	Conducted power(dBm)		Peak-Average
(MHz)	Peak	Average	Ratio(PAR)
1852.4	27.27	23.88	3.39
1880	27.46	23.97	3.49
1907.6	27.12	24.17	2.95

#### UMTS-FDD BandIV PK-AV POWER (PART 27)

Frequency	Conducted power(dBm)		Peak-Average
(MHz)	Peak	Average	Ratio(PAR)
1712.6	26.34	24.13	2.21
1732.6	27.13	24.13	3.00
1752.4	26.36	24.02	2.34



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### 6.4 Modulation Characteristic

According to FCC § 2.1047(d), Part 22H, 24E& Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.



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## 6.5 Occupied Bandwidth

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	October 14, 2015
Tested By :	Winnie Zhang

#### Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049,	a)	99% Occupied Bandwidth(kHz)	
§22.917,			
§22.905	b)	26 dB Bandwidth(kHz)	
§24.238			<b>~</b>
§27.53(a)			
Test Setup	B	EUT Spectrum Analyzer	
	-	The EUT was connected to Spectrum Analyzer and Base	Station via
Test		power divider.	
Procedure	-	The 99% and 26 dB occupied bandwidth (BW) of the midd	dle channel
		for the highest RF powers.	
Remark			
Result	<b>☑</b> Pa	ss Fail	

Test Data	Yes	□ <sub>N/A</sub>
Test Plot	Yes (See below)	□ <sub>N/A</sub>



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## Cellular Band (Part 22H) result

Channel	Frequency	99% Occupied	26 dB Bandwidth
Chamilei	(MHz)	Bandwidth (kHz)	(kHz)
128	824.2	247.9858	319.849
190	836.6	249.3841	328.053
251	848.8	250.2818	324.002

### PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	246.2060	318.925
661	1880.0	244.5155	317.789
810	1909.8	247.0342	317.408

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

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.2001	4.830
4175	835.0	4.2128	4.858
4233	846.6	4.1852	4.817

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

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1506	4.719
9400	1880.0	4.2160	4.873
9538	1907.6	4.2519	4.961

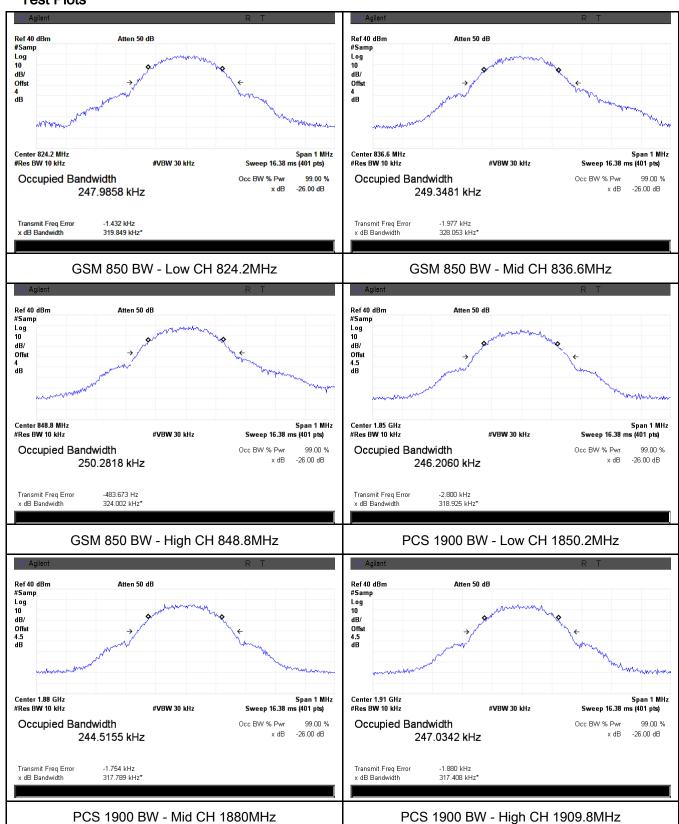
#### UMTS-FDD Band II (Part 24E)

Channel	Frequency	99% Occupied	26 dB Bandwidth
	(MHz)	Bandwidth (MHz)	(MHz)
9262	1852.4	4.2094	4.834
9400	1880.0	4.2278	4.864
9538	1907.6	4.2128	4.854



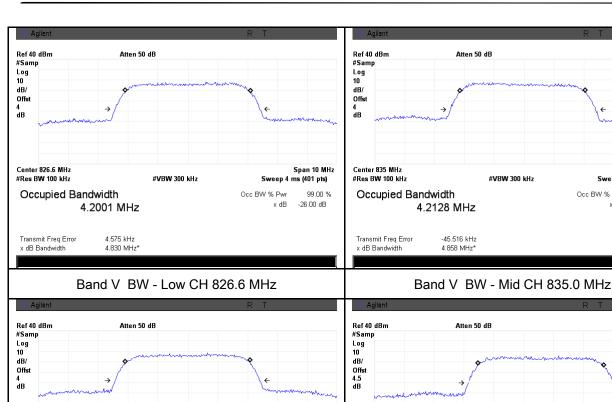
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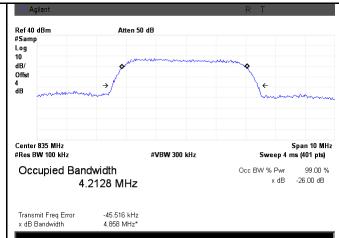
#### **Test Plots**

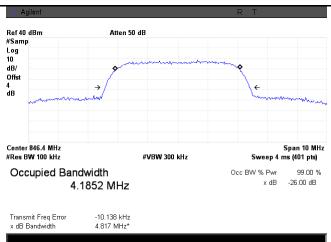


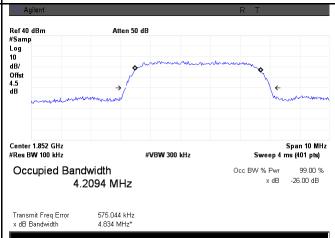


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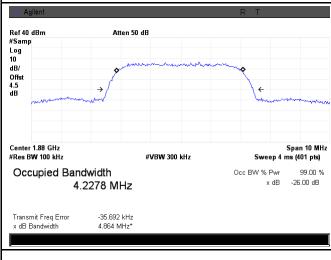


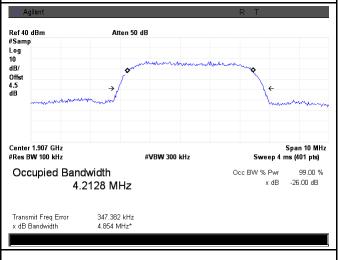




Band II BW - Low CH 1852.4MHz

Band V BW - High CH 846.4 MHz



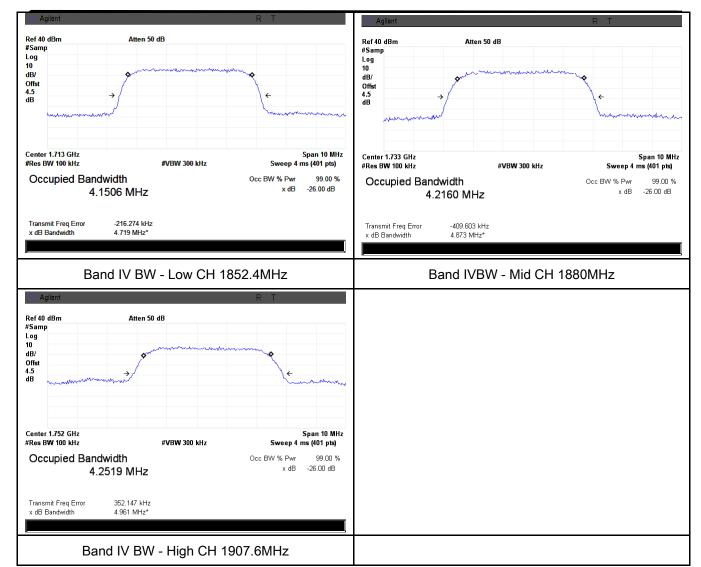


Band II BW - Mid CH 1880MHz

Band II BW - High CH 1907.6MHz



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## 6.6 Spurious Emissions at Antenna Terminals

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	October 14, 2015
Tested By :	Winnie Zhang

#### Requirement(s):

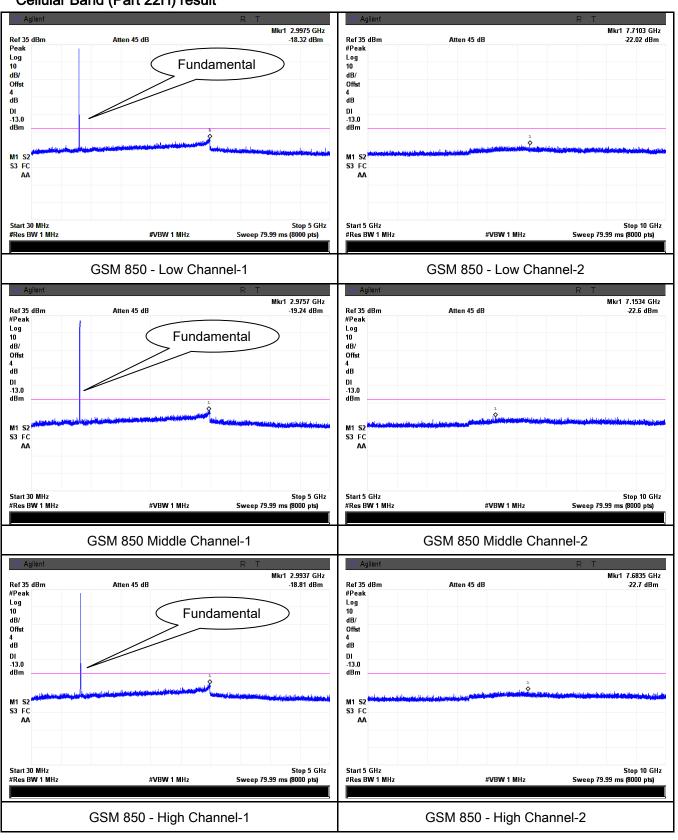
Spec	Item	Requirement	Applicable	
§2.1051,		The power of any emission outside of the authorized		
§22.917(a)&	2)	operating frequency ranges must be lower than the	<b>V</b>	
§24.238(a)	a)	transmitter power (P) by a factor of at least 43 + 10 log		
§ 27.53(h)		(P) dB		
Test Setup		Base Station Spectrum Analyzer		
Test Procedure	<ul> <li>The EUT was connected to Spectrum Analyzer and Base Station via power divider.</li> <li>The Band Edges of low and high channels for the highest RF powers were measured.</li> <li>Setting RBW as roughly BW/100.</li> </ul>			
Remark				
Result	<b>▼</b> Pa	ss Fail		

Test Data	Yes	$\square_{N/A}$
Test Plot	Yes (See below)	□ <sub>N/A</sub>



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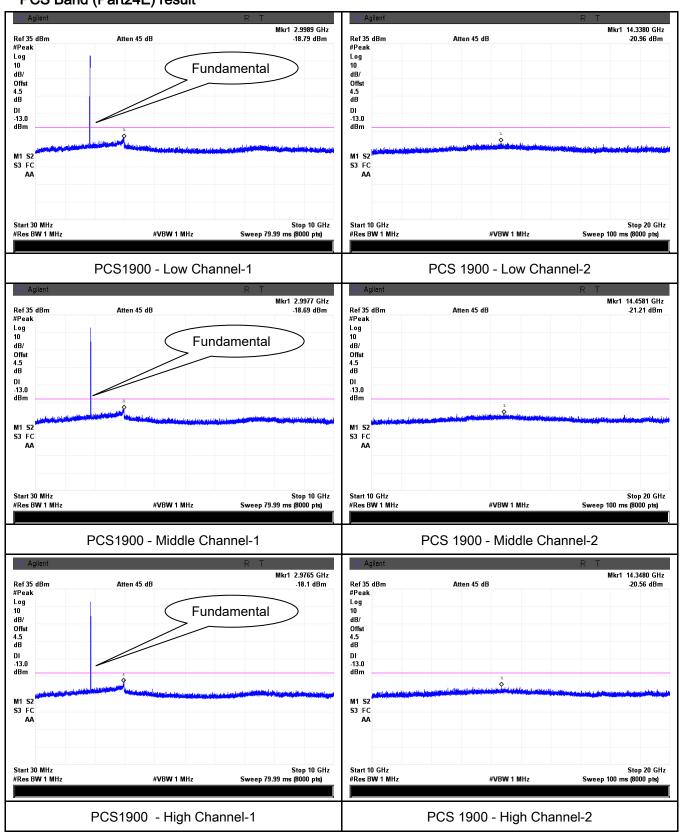
# Test Plots Cellular Band (Part 22H) result





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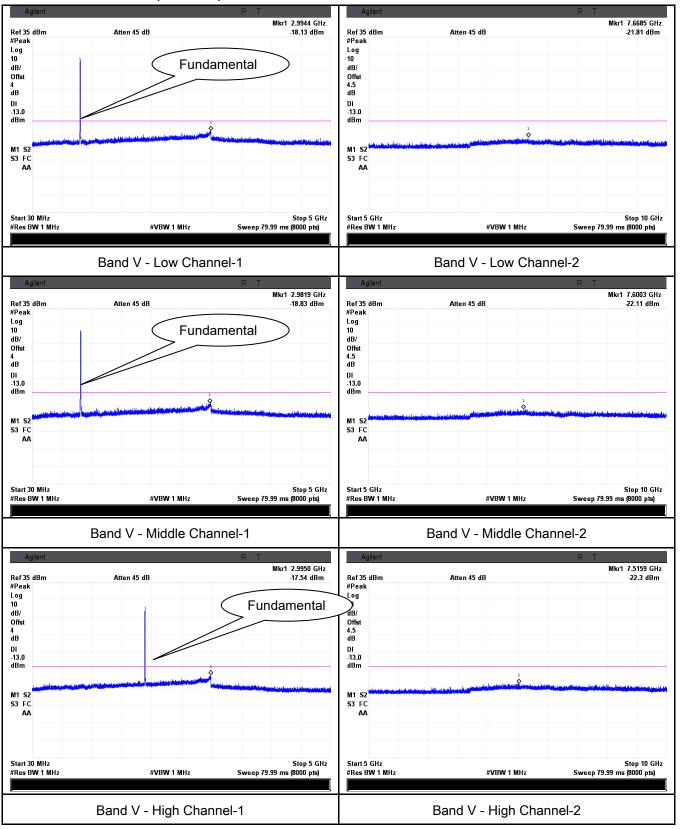
#### PCS Band (Part24E) result





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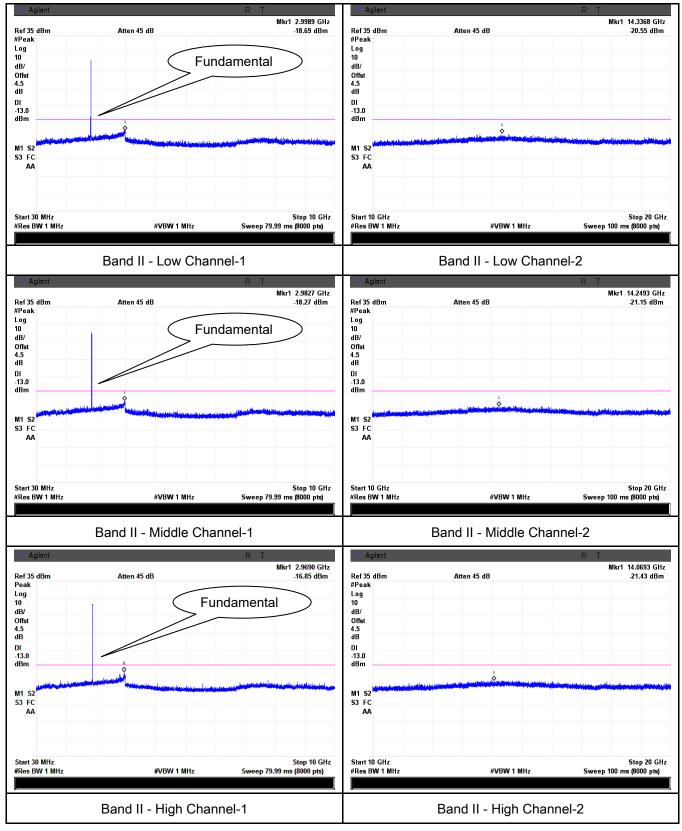
#### UMTS-FDD Band V (Part 22H)





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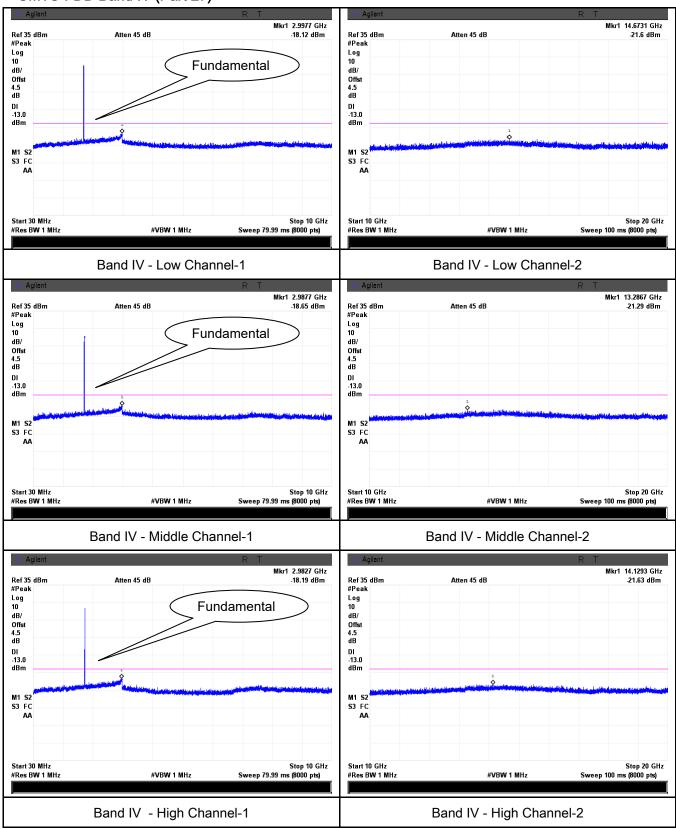
#### UMTS-FDD Band II (Part 24E)





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





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## 6.7 Spurious Radiated Emissions

Temperature	23°C
Relative Humidity	59%
Atmospheric Pressure	1026mbar
Test date :	October 26, 2015
Tested By :	Winnie Zhang

#### Requirement(s):

Requirement(s):			
Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238 § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	<b>&gt;</b>
Test setup	Ant. Tower  Support Units  Turn Table  Ground Plane  Test Receiver		
Test Procedure	<ol> <li>The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.</li> <li>The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.</li> <li>Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.         Sample Calculation:         EUT Field Strength = Raw Amplitude (dBµV/m) — Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)     </li> </ol>		
Remark			
Result	Pas	ss Fail	



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Test Data	
-----------	--

Yes

□<sub>N/A</sub>

Test Plot

Veς	(See	hel	OW)
1 62	(000	ne	OW)

✓<sub>N/A</sub>

### Cellular Band (Part 22H) result

#### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	-46.58	٧	7.95	0.78	-39.41	-13	-26.41
1648.4	-46.91	Н	7.95	0.78	-39.74	-13	-26.74
433.8	-52.33	V	6.3	0.29	-46.32	-13	-33.32
785.2	-53.07	Н	7	0.43	-46.5	-13	-33.5

#### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	-46.45	V	7.95	0.78	-39.28	-13	-26.28
1673.2	-46.82	Н	7.95	0.78	-39.65	-13	-26.65
433.2	-52.16	V	6.3	0.29	-46.15	-13	-33.15
785.6	-52.83	Н	7	0.43	-46.26	-13	-33.26

#### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	-46.52	V	7.95	0.78	-39.35	-13	-26.35
1697.6	-46.78	Н	7.95	0.78	-39.61	-13	-26.61
433.5	-52.21	V	6.3	0.29	-46.2	-13	-33.2
785.3	-52.77	Н	7	0.43	-46.2	-13	-33.2



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### PCS Band (Part24E) result

#### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3700.4	-47.38	V	10.25	2.73	-39.86	-13	-26.86
3700.4	-48.51	Н	10.25	2.73	-40.99	-13	-27.99
434.5	-52.16	V	6.3	0.29	-46.15	-13	-33.15
786.2	-52.83	Н	7	0.43	-46.26	-13	-33.26

#### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-51.28	٧	10.25	2.73	-43.76	-13	-30.76
3760	-51.91	Н	10.25	2.73	-44.39	-13	-31.39
434.1	-50.46	V	6.3	0.29	-44.45	-13	-31.45
786.9	-51.34	Н	7	0.43	-44.77	-13	-31.77

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3819.6	-51.11	V	10.36	2.73	-43.48	-13	-30.48
3819.6	-52.37	Н	10.36	2.73	-44.74	-13	-31.74
434.3	-50.52	V	6.3	0.29	-44.51	-13	-31.51
786.5	-51.36	Н	7	0.43	-44.79	-13	-31.79



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

### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1652.8	-47.38	٧	7.95	0.78	-40.21	-13	-27.21
1652.8	-48.12	Н	7.95	0.78	-40.95	-13	-27.95
433.8	-50.38	V	6.3	0.29	-44.37	-13	-31.37
785.2	-51.61	Н	7	0.43	-45.04	-13	-32.04

### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1670	-47.33	V	7.95	0.78	-40.16	-13	-27.16
1670	-48.27	Η	7.95	0.78	-41.1	-13	-28.1
433.9	-50.51	V	6.3	0.29	-44.5	-13	-31.5
785.1	-51.49	Н	7	0.43	-44.92	-13	-31.92

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1693.2	-48.16	V	7.95	0.78	-40.99	-13	-27.99
1693.2	-48.71	Н	7.95	0.78	-41.54	-13	-28.54
433.3	-52.37	٧	6.3	0.29	-46.36	-13	-33.36
785.7	-53.12	Н	7	0.43	-46.55	-13	-33.55



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

### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3704.8	-48.03	V	10.25	2.73	-40.51	-13	-27.51
3704.8	-48.67	Н	10.25	2.73	-41.15	-13	-28.15
434.8	-52.24	٧	6.3	0.29	-46.23	-13	-33.23
786.2	-53.18	Н	7	0.43	-46.61	-13	-33.61

### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	-48.13	V	10.25	2.73	-40.61	-13	-27.61
3760	-48.62	Η	10.25	2.73	-41.1	-13	-28.1
434.3	-52.37	V	6.3	0.29	-46.36	-13	-33.36
786.7	-53.22	Н	7	0.43	-46.65	-13	-33.65

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	-48.09	V	10.36	2.73	-40.46	-13	-27.46
3815.2	-48.56	Н	10.36	2.73	-40.93	-13	-27.93
434.2	-52.31	V	6.3	0.29	-46.3	-13	-33.3
786.5	-53.36	Н	7	0.43	-46.79	-13	-33.79



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

### Low channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3424.8	-46.81	V	10.07	2.52	-39.26	-13	-26.26
3424.8	-48.16	Н	10.07	2.52	-40.61	-13	-27.61
432.6	-52.82	٧	6.3	0.29	-46.81	-13	-33.81
785.1	-53.47	Н	7	0.43	-46.9	-13	-33.9

### Middle channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3480	-46.79	V	10.09	2.52	-39.22	-13	-26.22
3480	-48.05	Н	10.09	2.52	-40.48	-13	-27.48
432.5	-52.71	V	6.3	0.29	-46.7	-13	-33.7
785.9	-53.66	Н	7	0.43	-47.09	-13	-34.09

### High channel

Frequency (MHz)	Substituted level (dBm)	Polarity (H/V)	Antenna Gain Correction (dB)	Cable Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3505.2	-46.83	٧	10.09	2.52	-39.26	-13	-26.26
3505.2	-48.17	Н	10.09	2.52	-40.6	-13	-27.6
432.7	-52.62	٧	6.3	0.29	-46.61	-13	-33.61
785.4	-53.59	Н	7	0.43	-47.02	-13	-34.02



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# 6.8 Band Edge

Temperature	23°C
Relative Humidity	56%
Atmospheric Pressure	1014mbar
Test date :	October 14, 2015
Tested By:	Winnie Zhang

### Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a) § 27.53(h)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.	<b>&gt;</b>
Test setup		Base Station Spectrum Analyzer EUT	
Procedure	-	The EUT was connected to Spectrum Analyzer and Base Spower divider.  The Band Edges of low and high channels for the highest Rowere measured. Setting RBW as roughly BW/100.	
Remark			
Result	<b>☑</b> Pa	ss Fail	

Test Data	Yes	□ <sub>N/A</sub>
Test Plot	Yes (See below)	□ <sub>N/A</sub>



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## Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9950	-13.95	-13
849.0175	-15.33	-13

### PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9950	-16.46	-13
1910.0175	-15.43	-13

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9000	-20.91	-13
849.2000	-19.38	-13

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

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.8500	-17.91	-13
1910.0500	-17.97	-13

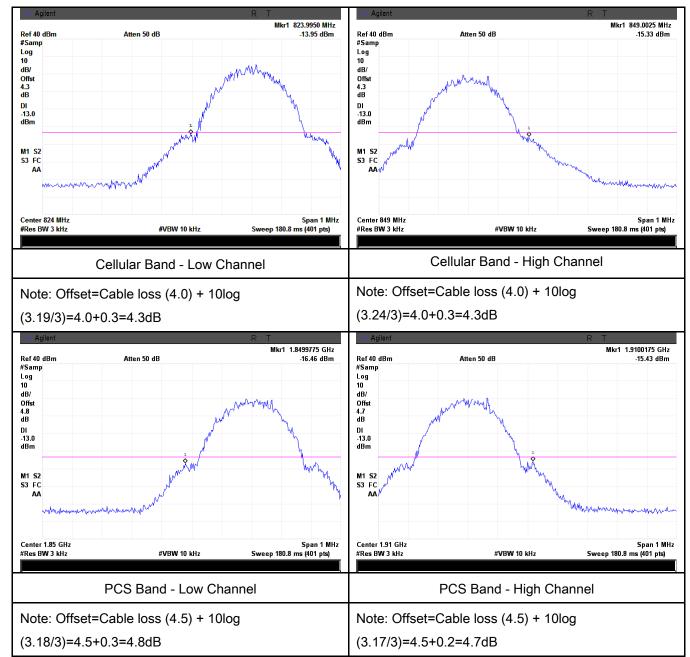
### UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.8500	-22.39	-13
1910.0500	-27.71	-13



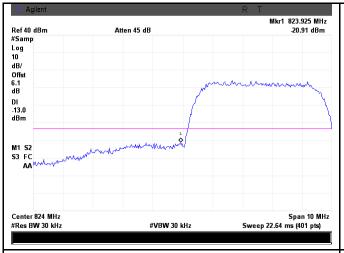
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#### **Test Plots**





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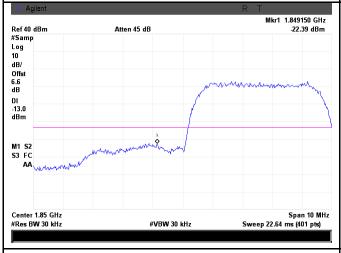
UMTS-FDD Band V - Low Channel

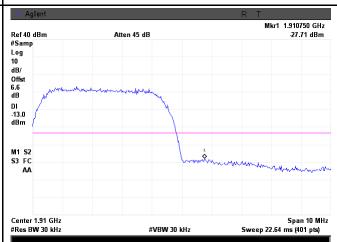
UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (4.0) + 10log (48.30/30)=4.0+2.1=6.1 dB

Note: Offset=Cable loss (4.0) + 10log

(48.17/30)=4.0+2.1=6.1 dB





UMTS-FDD Band II - Low Channel

UMTS-FDD Band II - High Channel

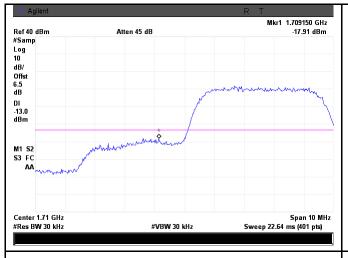
Note: Offset=Cable loss (4.5) + 10log (48.34/30)=4.5+2.1=6.6 dB

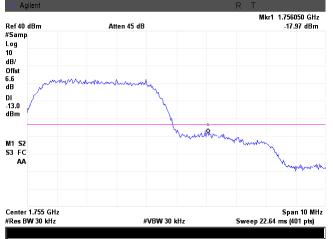
Note: Offset=Cable loss (4.5) + 10log

(48.54/30)=4.5+2.1=6.6 dB



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UMTS-FDD Band IV - Low Channel

Note: Offset=Cable loss (4.5) + 10log

(47.19/30)=4.5+2.0=6.5 dB

UMTS-FDD Band IV - High Channel

Note: Offset=Cable loss (4.5) + 10log

(49.61/30)=4.5+2.1=6.6 dB



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# 6.9 Frequency Stability

Temperature	23°C	
Relative Humidity	59%	
Atmospheric Pressure	1026mbar	
Test date :	October 26, 2015	
Tested By :	Winnie Zhang	

#### Requirement(s):

Spec	Item	Requirement				Applicable
		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				
§2.1055,		Frequency Range	Base, fixed	Mobile ≤ 3 watts	Mobile ≤ 3  watts	
§22.355 &		(MHz) 25 to 50	(ppm) 20.0	(ppm) 20.0	(ppm) 50.0	_
§24.235	a)	50 to 450	5.0	5.0	50.0	<b>V</b>
§ 27.5(h);		45 to 512	2.5	5.0	.0	
§ 27.54		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 §24.2				
		ensure that the fun frequency block.	damental en	nissions stay withi	n the authorized	
Test setup	Base Station  Thermal Chamber					



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	A communication link was established between EUT and base station. The		
	frequency error was monitored and measured by base station under variation		
Procedure	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	□ <sub>N/A</sub>
Test Plot	Yes (See below)	✓ <sub>N/A</sub>



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## Cellular Band (Part 22H) result

Middle Channel, f₀ = 836.6 MHz					
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	
-10		21	0.0251	2.5	
0		20	0.0239	2.5	
10	3.7	23	0.0275	2.5	
20		16	0.0191	2.5	
30		17	0.0203	2.5	
40		21	0.0251	2.5	
50		19	0.0227	2.5	
55		15	0.0179	2.5	
25	4.2	24	0.0287	2.5	
	3.5	20	0.0239	2.5	

### PCS Band (Part 24E) result

. CC Danie	1 00 Dand (1 art 24L) 169dit					
Middle Channel, f <sub>o</sub> = 1880 MHz						
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)		
-10		21	0.0112	2.5		
0		20	0.0106	2.5		
10	3.7	21	0.0112	2.5		
20		17	0.0090	2.5		
30		19	0.0101	2.5		
40		20	0.0106	2.5		
50		20	0.0106	2.5		
55		22	0.0117	2.5		
25	4.2	24	0.0128	2.5		
	3.5	22	0.0117	2.5		



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

Middle Channel, f₀ = 835 MHz					
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)	
-10		23	0.0275	2.5	
0	3.7	19	0.0228	2.5	
10		18	0.0216	2.5	
20		16	0.0192	2.5	
30		14	0.0168	2.5	
40		15	0.0180	2.5	
50		20	0.0240	2.5	
55		21	0.0251	2.5	
25	4.2	20	0.0240	2.5	
	3.5	21	0.0251	2.5	

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

Middle Channel, f₀ = 1880 MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10		18	0.0096	2.5
0		17	0.0090	2.5
10	3.7	14	0.0074	2.5
20		13	0.0069	2.5
30		12	0.0064	2.5
40		15	0.0080	2.5
50		16	0.0085	2.5
55		21	0.0112	2.5
25	4.2	14	0.0074	2.5
25	3.5	15	0.0080	2.5



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

Middle Channel, f₀ = 1880 MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10		14	0.0074	2.5
0		15	0.0080	2.5
10	3.7	12	0.0064	2.5
20		11	0.0059	2.5
30		10	0.0053	2.5
40		13	0.0069	2.5
50		12	0.0064	2.5
55		11	0.0059	2.5
25	4.2	13	0.0069	2.5
20	3.5	15	0.0080	2.5



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# Annex A. TEST INSTRUMENT

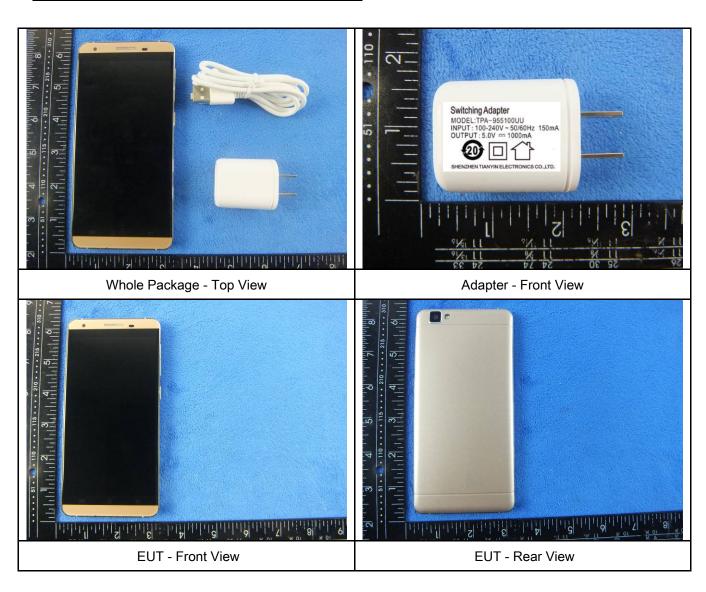
Instrument	Model	Serial #	Cal Date	Cal Due	In use
RF Conducted Test					
Agilent ESA-E SERIES SPECTRUM ANALYZER	E4407B	MY45108319	09/17/2015	09/16/2016	<b>\</b>
Power Splitter	1#	1#	09/01/2015	08/31/2016	>
Universal Radio Communication Tester	CMU200	121393	09/25/2015	09/24/2016	<b>T</b>
Temperature/Humidity Chamber	UHL-270	001	10/09/2015	10/08/2016	<u>\</u>
DC Power Supply	E3640A	MY40004013	09/17/2015	09/16/2016	~
Radiated Emissions					
EMI test receiver	ESL6	100262	09/17/2015	09/16/2016	>
OPT 010 AMPLIFIER (0.1-1300MHz)	8447E	2727A02430	09/01/2015	08/31/2016	<u>&lt;</u>
Microwave Preamplifier (1 ~ 26.5GHz)	8449B	3008A02402	03/25/2015	03/24/2016	<b>&gt;</b>
Bilog Antenna (30MHz~6GHz)	JB6	A110712	09/21/2015	09/20/2016	<u>&lt;</u>
Bilog Antenna (30MHz~2GHz)	JB1	A112017	09/21/2015	09/20/2016	<b>\</b>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71259	09/24/2015	09/23/2016	<b>(</b>
Double Ridge Horn Antenna (1 ~18GHz)	AH-118	71283	09/24/2015	09/23/2016	<b>T</b>
SYNTHESIZED SIGNAL GENERATOR	8665B	3744A01293	09/17/2015	09/16/2016	>
Tunable Notch Filter	3NF- 800/1000-S	AA4	09/01/2015	08/31/2016	<b>\</b>
Tunable Notch Filter	3NF- 1000/2000-S	AM 4	09/01/2015	08/31/2016	V



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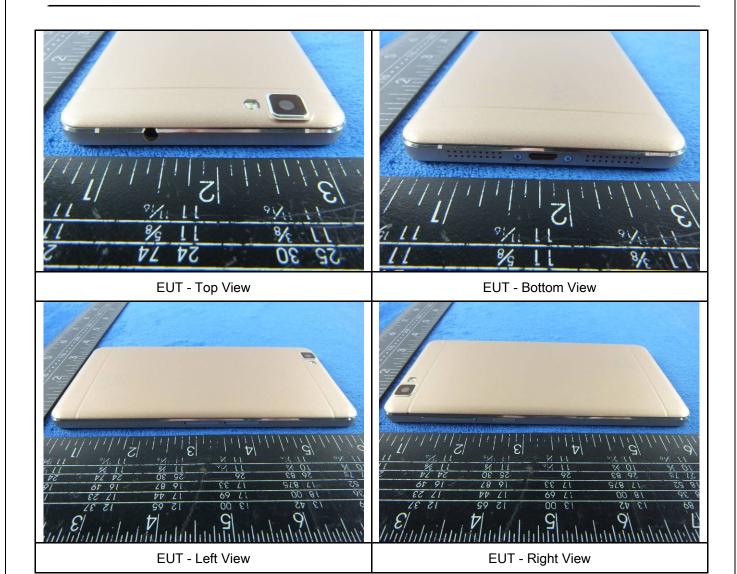
## Annex B. EUT And Test Setup Photographs

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





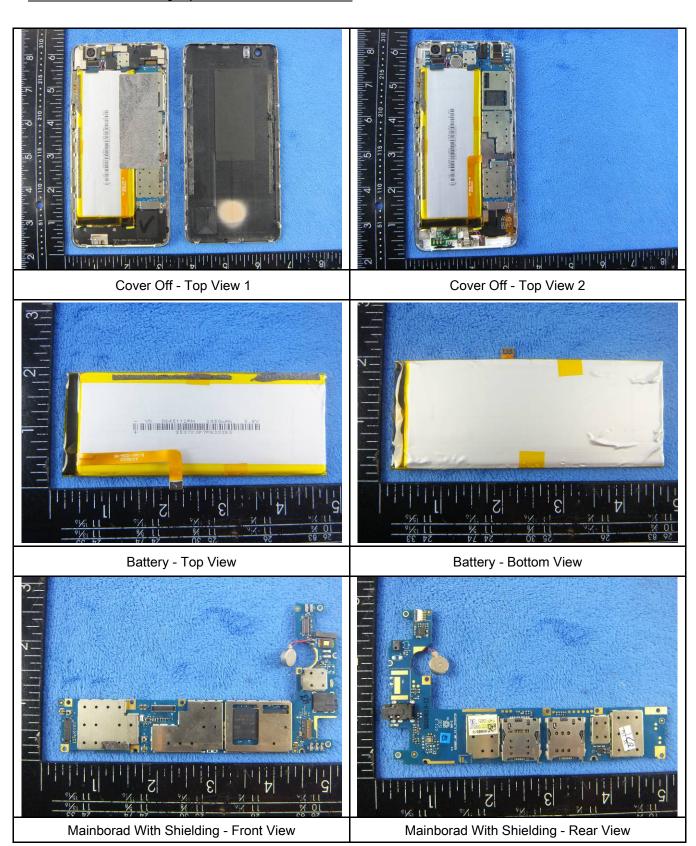
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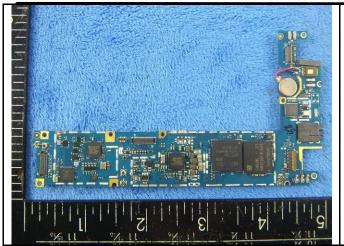
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### Annex B.ii. Photograph: EUT Internal Photo

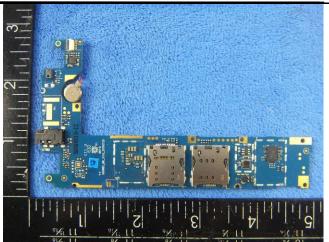




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Mainborad Without Shielding - Front View



Mainborad Without Shielding - Rear View



LCD - Front View



LCD - Rear View



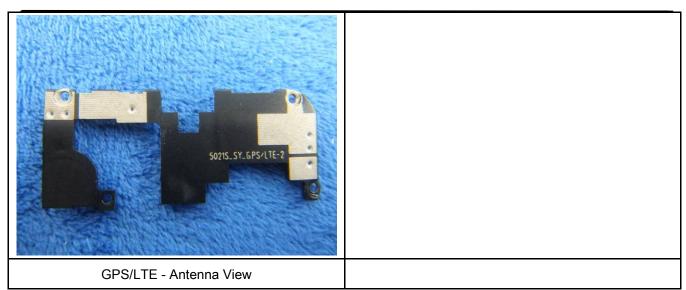
GSM/PCS/UMTS-FDD Antenna View



WIFI/BT/BLE - Antenna View



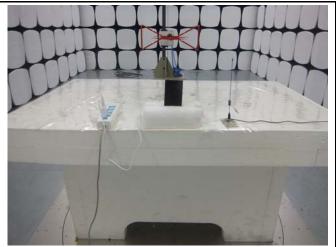
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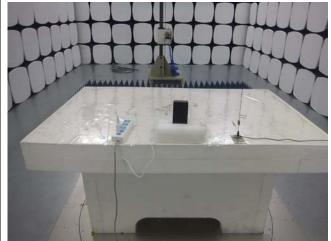


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## Annex B.iii. Photograph: Test Setup Photo



Radiated Spurious Emissions Test Setup Below 1GHz



Radiated Spurious Emissions Test Setup Above 1GHz

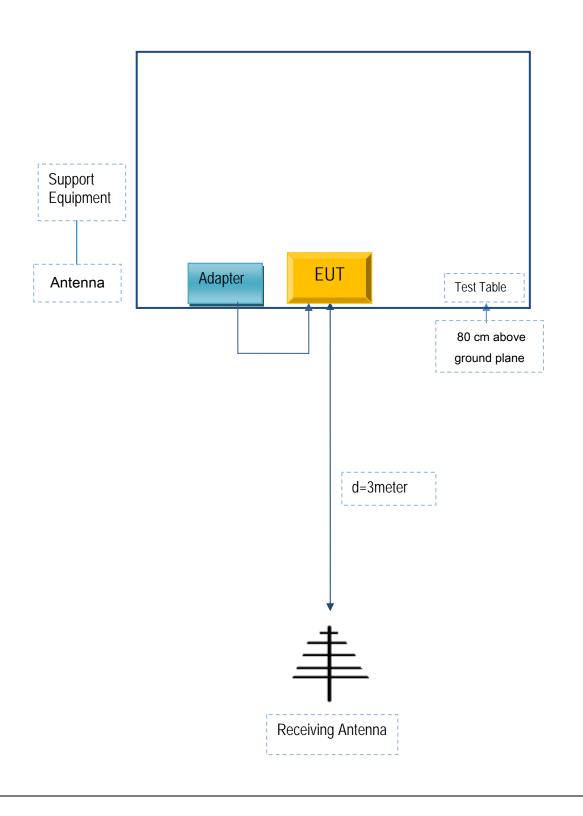


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## Annex C. TEST SETUP AND SUPPORTING EQUIPMENT

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

**Block Configuration Diagram for Radiated Emissions** 





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### Annex C. il. SUPPORTING EQUIPMENT DESCRIPTION

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

Manufacturer	Equipment Description	Model	Calibration Date	Calibration Due Date
N/A	N/A	N/A	N/A	N/A



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## Annex C.ii. EUT OPERATING CONKITIONS

N/A



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

Please see attachment



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## Annex E. DECLARATION OF SIMILARITY

N/A