



Report No.SH16060006W01

FCC RF TEST REPORT

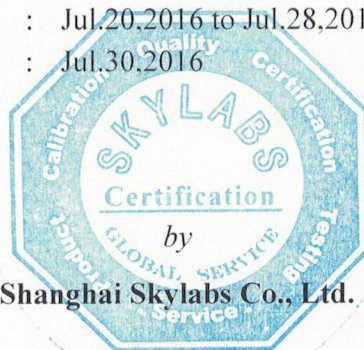
Issued to

Shanghai Rising Digital Co.,Ltd.

For

SECD-3I5A-02 display screen

Model Name : SECD-3I5A-02
Trade Name : RISING
Brand Name : RISING
Standard : 47 CFR Part 2,
47 CFR Part 22 Subpart H
47 CFR Part 24 Subpart E
47 CFR Part 27
FCC ID : 2AJONSECD-3I5A-02
Test date : Jul.20,2016 to Jul.28,2016
Issue date : Jul.30,2016



Tested by Wu Hongfei

Approved by Gao Yeqiang

Review by Xiao dong Wei

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**Change History**

Issue	Date	Reason for change
1.0	Jul.30,2016	First edition



1. General Information

1.1 Applicant

Shanghai Rising Digital Co.,Ltd.

No 318 ,Chuanda Road , Pudong New District, Shanghai,China

1.2 Manufacturer

Shanghai Rising Digital Co.,Ltd.

No 318 ,Chuanda Road , Pudong New District, Shanghai,China

1.3 Description of EUT

EUT Type: SECD-3I5A-02 display screen
Brand Name.....: RISING
Trade Name: RISING
Model Name: SECD-3I5A-02
Hardware Version.....: V109
Software Version: V1318
Antenna type.....: PCB and GPS antenna
Antenna gain.....: PCB 1.5 dBi
Frequency Range..... GSM 850MHz:
Tx: 824.20-848.80 MHz (at intervals of 200kHz);
Rx: 869.20-893.80 MHz (at intervals of 200kHz)
GSM 1900MHz
Tx: 1850.20-1909.80 MHz (at intervals of 200kHz);
Rx: 1930.20-1989.80 MHz (at intervals of 200kHz)
WCDMA Band II
Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);
Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
WCDMA Band IV
Tx: 1712.4 - 1752.6 MHz (at intervals of 200kHz);
Rx: 2112.4 - 2152.6 MHz (at intervals of 200kHz)
WCDMA Band V
Tx: 826.4 - 846.6MHz (at intervals of 200kHz);
Rx: 871.4 - 891.6MHz (at intervals of 200kHz)
Modulation Type.....: GPRS/GSM mode with GMSK modulation
EGPRS mode with 8PSK modulation
WCDMA mode with QPSK
Power: DC 24V

**NOTE:**

- (1) The transmitter (Tx) frequency arrangement of the cellular 850MHz used by the EUT can be represented with the formula $F(n)=824.2+0.2*(n-128)$, $128 \leq n \leq 251$; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 128 (824.2MHz), 190(836.6MHz) and 251 (848.8MHz); the PCS 1900MHz used by the EUT can be represented with the formula $F(n)=1850.2+0.2*(n-512)$, $512 \leq n \leq 810$; the lowest, middle, highest channel numbers (ARFCHs) used and tested in this report are separately 512 (1850.2MHz), 661(1880.0MHz) and 810 (1909.8MHz).
- (2) The transmitter (Tx) frequency arrangement of the WCDMA 850MHz band used by the EUT can be represented with the formula $F(n)=826.4+0.2*(n-4132)$, $4132 \leq n \leq 4233$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4175(835MHz) and 4233 (846.6MHz).
- (3) The transmitter (Tx) frequency arrangement of the WCDMA 1900MHz band used by the EUT can be represented with the formula $F(n)=1852.4+0.2*(n-9262)$, $9262 \leq n \leq 9538$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).
- (4) The transmitter (Tx) frequency arrangement of the WCDMA 1700MHz band used by the EUT can be represented with the formula $F(n)=1712.4+0.2*(n-1312)$, $1312 \leq n \leq 1513$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 1312 (1712.4MHz), 1450 (1742MHz) and 1513 (1752.6MHz).
- (5) For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



2. Facilities and Accreditations

2.1 Test Facility

Shanghai Skylabs Co., Ltd. is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. FCC listed: 196218, IC listed: 21609.

The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 20~25°C

Relative humidity: 40~60%

Atmosphere pressure: 86-102kPa

2.3 Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Uncertainty of Conducted Emission: $\pm 1.76\text{dB}$

Uncertainty of Radiated Emission: $\pm 3.16\text{dB}$



2.4 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB46040102	2015.9.22	1year
Spectrum Analyzer	Rohde&Schwarz	FSU26	200880	2016.6.17	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Power Splitter	Mini-Circuits	ZFRSC-183-S+	765001016	(n.a.)	(n.a.)
Attenuator 1	Mini-Circuits	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 3	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
DC/AC Power supplier	NF	ES2000S	9087735	2015.10.17	1year
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2015.9.20	1year
Full/Half-Anechoic Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2016.04.11	3year
Singal Generator	Rohde&Schwarz	SMF100A	101935	2015.9.22	1year
Broadband Trilog Antenna	Schwarzbeck	VULB 9163	9163-561	2016.07.25	2year
Substitution Broadband Trilog Antenna	Schwarzbeck	VULB 9163	9163-572	2016.07.25	2year
Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1033	2016.07.25	2year
Substitution Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1034	2016.07.25	2year
Broadband Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91970171	2015.9.22	2year
Substitution Broadband Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91970208	2015.9.22	2year
Test Antenna-Loop	Schwarzbeck	FMZB 1519	1519-025	2015.9.22	2year
Temporary Antenna Connector	Farpu	SMA-K	(n.a.)	(n.a.)	(n.a.)
RF Cable	(n.a.)	(n.a.)	(n.a.)	(n.a.)	(n.a.)

NOTE:

Equipments listed above have been calibrated and are in the period of validation.



3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and part 24 for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22	Public Mobile Services
3	47 CFR Part 24	Personal Communications Services
4	47 CFR Part 27	Miscellaneous Wireless Communications Services

Test detailed items/section required by FCC rules and results are as below:

No.	FCC Rules	Description	Result
1	2.1046	Conducted Output Power	PASS
2	2.1049	99%/-26dB Occupied Bandwidth	PASS
3	2.1055 22.355 24.235	Frequency Stability	PASS
4	24.232	Peak-to-Average Ratio	PASS
5	2.1051 2.1057 22.917 24.238	Conducted Out of Band Emissions	PASS
6	2.1051 2.1057 22.917 24.238	Band Edge	PASS
7	22.913 24.232	Transmitter Radiated Power (EIPR/ERP)	PASS
8	2.1053 2.1057 22.917 24.238	Radiated Out of Band Emissions	PASS

NOTE: Measurement method according to TIA/EIA 603.D-2010



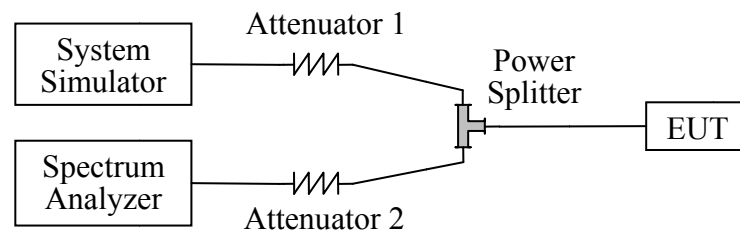
4. Test Result

4.1 Conducted Output Power

4.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

4.1.2 Test Description



The EUT, which is powered by the DC Power Supply, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50 Ohm; the path loss as the factors calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



4.1.3 Test Result

Here the lowest, middle and highest channels are selected to perform testing to verify the conducted RF output power of the EUT.

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	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	32.34	32.01	32.2	31.75 ± 0.75	28.68	28.40	28.42	28.75 ± 0.75
GPRS Multi-Slot Class 8 (1 uplink),GMSK	31.99	32.33	32.15	31.75 ± 0.75	28.41	28.38	28.67	28.75 ± 0.75
GPRS Multi-Slot Class 10 (2 uplink) GMSK	31.98	32.05	32.02	31.75 ± 0.75	28.21	28.20	28.45	28.75 ± 0.75
GPRS Multi-Slot Class 12 (4 uplink) GMSK	29.85	29.78	29.85	29.75 ± 0.75	27.84	27.96	27.89	27.75 ± 0.75
EGPRS Multi-Slot Class 8 (1 uplink) GMSK MCS1	31.87	32.29	32.20	31.75 ± 0.75	28.36	28.38	28.65	28.75 ± 0.75
EGPRS Multi-Slot Class 10 (2 uplink) GMSK MCS1	31.84	32.11	32.06	31.75 ± 0.75	28.24	28.15	28.45	28.75 ± 0.75
EGPRS Multi-Slot Class 12 (4 uplink) GMSK MCS1	29.90	29.84	29.77	29.75 ± 0.75	27.86	27.93	27.85	27.75 ± 0.75
EGPRS Multi-Slot Class 8 (1 uplink) 8PSK MCS5	26.36	26.35	26.42	26.75 ± 0.75	25.02	24.97	24.90	24.75 ± 0.75
EGPRS Multi-Slot Class 10 (2 uplink) 8PSK MCS5	26.13	26.15	26.25	26.75 ± 0.75	24.72	24.67	24.51	24.75 ± 0.75
EGPRS Multi-Slot Class 12 (4 uplink) 8PSK MCS5	26.00	26.06	25.99	25.75 ± 0.75	24.01	23.88	23.74	23.75 ± 0.75

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



Band	UMTS-FDD Band 5			
Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	4132	826.4	23.21	22.5±1
	4175	835	23.00	22.5±1
	4233	846.6	22.95	22.5±1
HSDPA Subtest1	4132	826.4	22.36	22.5±1
	4175	835	22.58	22.5±1
	4233	846.6	22.45	22.5±1
HSDPA Subtest2	4132	826.4	22.15	22.5±1
	4175	835	22.16	22.5±1
	4233	846.6	22.37	22.5±1
HSDPA Subtest3	4132	826.4	22.15	22.5±1
	4175	835	22.14	22.5±1
	4233	846.6	22.25	22.5±1
HSDPA Subtest4	4132	826.4	22.35	22.5±1
	4175	835	22.31	22.5±1
	4233	846.6	22.26	22.5±1
HSUPA Subtest1	4132	826.4	21.86	22±1
	4175	835	22.53	22±1
	4233	846.6	21.42	22±1
HSUPA Subtest2	4132	826.4	22.27	22±1
	4175	835	21.55	22±1
	4233	846.6	21.43	22±1
HSUPA Subtest3	4132	826.4	22.44	22.5±1
	4175	835	21.88	22.5±1
	4233	846.6	21.56	22.5±1
HSUPA Subtest4	4132	826.4	21.54	22.5±1
	4175	835	21.88	22.5±1
	4233	846.6	22.34	22.5±1
HSUPA Subtest5	4132	826.4	22.36	22±1
	4175	835	21.45	22±1
	4233	846.6	22.44	22±1



Band	UMTS-FDD Band 2			
Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	9262	1852.4	22.26	22.5±1
	9400	1880	22.07	22.5±1
	9538	1907.6	21.93	22.5±1
HSDPA Subtest1	9262	1852.4	22.36	22±1
	9400	1880	21.53	22±1
	9538	1907.6	21.46	22±1
HSDPA Subtest2	9262	1852.4	21.55	22±1
	9400	1880	21.59	22±1
	9538	1907.6	21.58	22±1
HSDPA Subtest3	9262	1852.4	21.56	22±1
	9400	1880	21.46	22±1
	9538	1907.6	21.43	22±1
HSDPA Subtest4	9262	1852.4	21.38	22±1
	9400	1880	21.57	22±1
	9538	1907.6	21.24	22±1
HSUPA Subtest1	9262	1852.4	21.28	22±1
	9400	1880	21.80	22±1
	9538	1907.6	21.23	22±1
HSUPA Subtest2	9262	1852.4	21.34	22±1
	9400	1880	21.55	22±1
	9538	1907.6	21.64	22±1
HSUPA Subtest3	9262	1852.4	21.46	22±1
	9400	1880	21.47	22±1
	9538	1907.6	21.41	22±1
HSUPA Subtest4	9262	1852.4	21.24	22±1
	9400	1880	21.33	22±1
	9538	1907.6	21.53	22±1
HSUPA Subtest5	9262	1852.4	21.26	22±1
	9400	1880	21.29	22±1
	9538	1907.6	21.58	22±1



Band	UMTS-FDD Band 4			
Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	1313	1712.6	21.86	22.5±1
	1413	1732.6	22.30	22.5±1
	1512	1752.4	21.77	22.5±1
HSDPA Subtest1	1313	1712.6	21.65	22.5±1
	1413	1732.6	21.53	22.5±1
	1512	1752.4	21.54	22.5±1
HSDPA Subtest2	1313	1712.6	21.59	22.5±1
	1413	1732.6	21.56	22.5±1
	1512	1752.4	21.57	22.5±1
HSDPA Subtest3	1313	1712.6	21.55	22±1
	1413	1732.6	21.36	22±1
	1512	1752.4	21.39	22±1
HSDPA Subtest4	1313	1712.6	21.48	22±1
	1413	1732.6	21.57	22±1
	1512	1752.4	21.53	22±1
HSUPA Subtest1	1313	1712.6	21.43	22±1
	1413	1732.6	21.65	22±1
	1512	1752.4	21.43	22±1
HSUPA Subtest2	1313	1712.6	21.23	22±1
	1413	1732.6	21.48	22±1
	1512	1752.4	21.66	22±1
HSUPA Subtest3	1313	1712.6	21.45	22±1
	1413	1732.6	21.61	22±1
	1512	1752.4	21.47	22±1
HSUPA Subtest4	1313	1712.6	21.35	22±1
	1413	1732.6	21.52	22±1
	1512	1752.4	21.44	22±1
HSUPA Subtest5	1313	1712.6	21.56	22±1
	1413	1732.6	21.58	22±1
	1512	1752.4	21.43	22±1



4.2 99%/-26dB Occupied Bandwidth

4.2.1 Definition

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth.

4.2.2 Test Description

See section 4.1.1 of this report.

4.2.3 Test Results

GSM 850

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	244.0649	318.105
190	836.6	243.7665	318.459
251	848.8	251.1488	322.426

PCS 1900

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850.2	246.4523	322.958
661	1880.0	241.8352	314.149
810	1909.8	243.7575	317.534

UMTS-FDD Band 5

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.4	4.1708	4.687
4175	835.0	4.1796	4.731
4233	846.6	4.1627	4.712



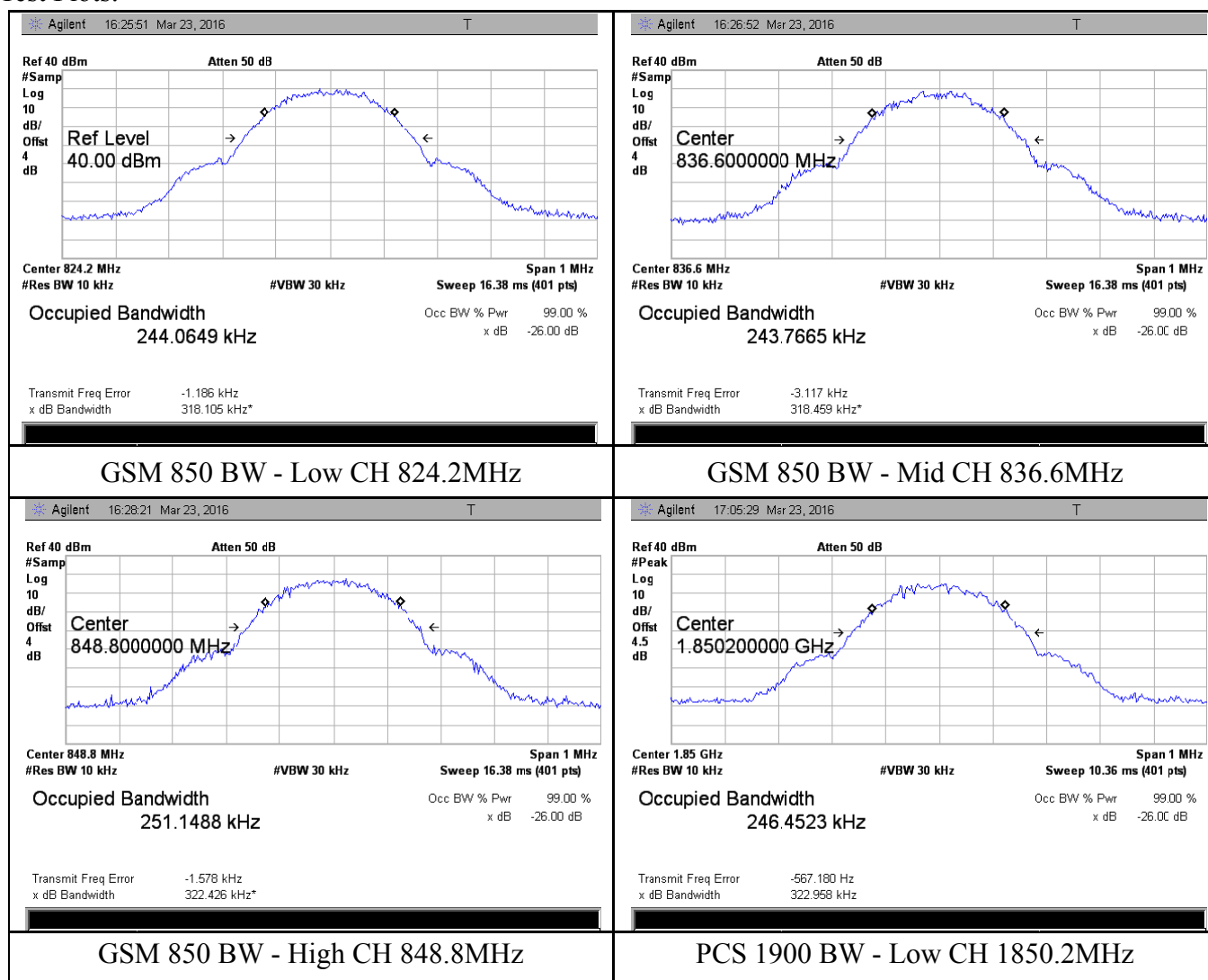
UMTS-FDD Band 2

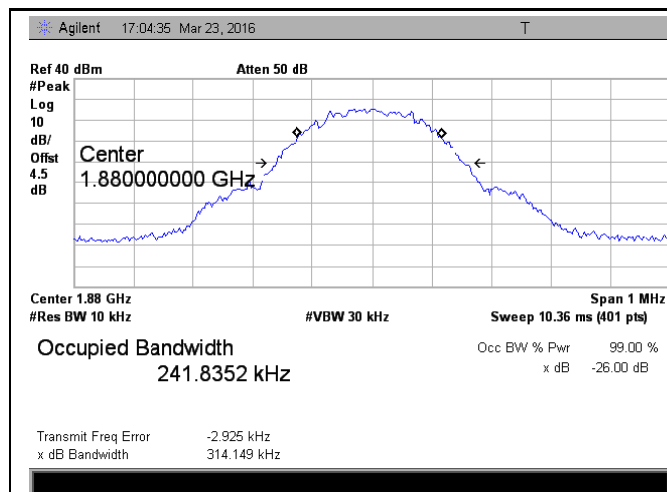
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1852.4	4.1540	4.671
9400	1880.0	4.1573	4.695
9538	1907.6	4.1634	4.703

UMTS-FDD Band 4 (Part 27)

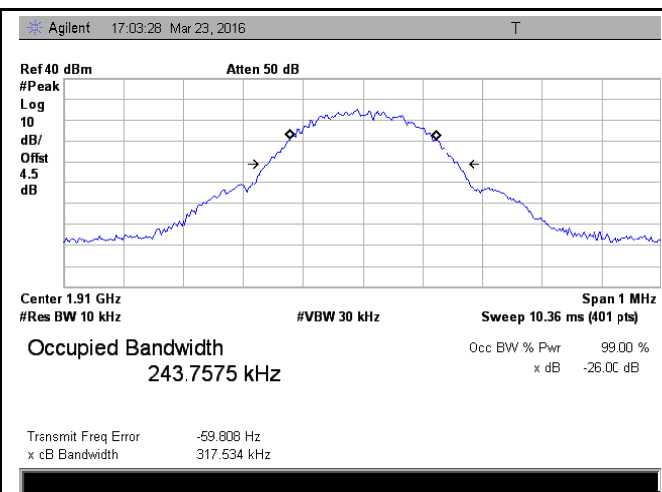
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
1313	1712.6	4.1524	4.691
1413	1732.6	4.1654	4.713
1512	1752.4	4.1609	4.696

Test Plots:

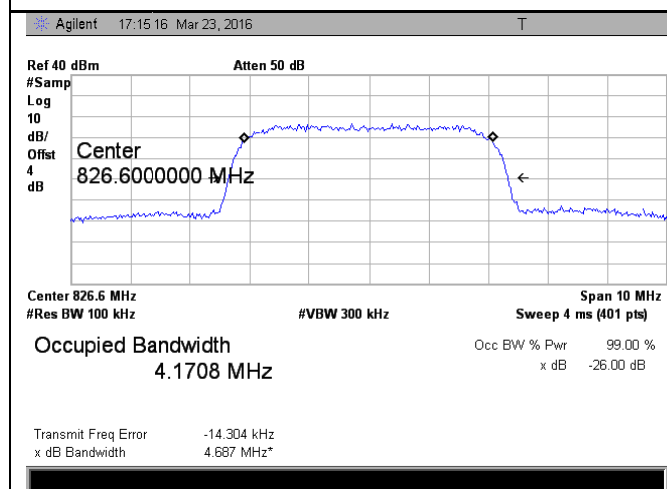




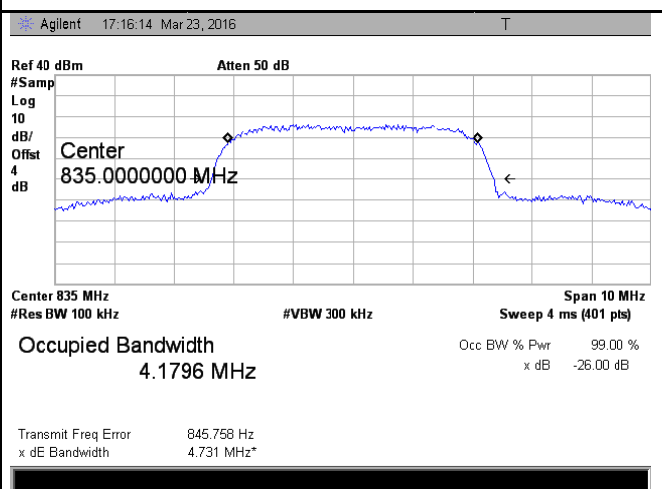
PCS 1900 BW - Mid CH 1880MHz



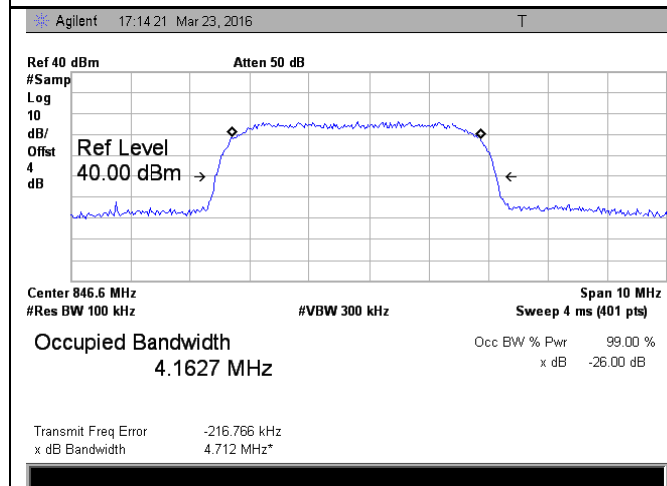
PCS 1900 BW - High CH 1909.8MHz



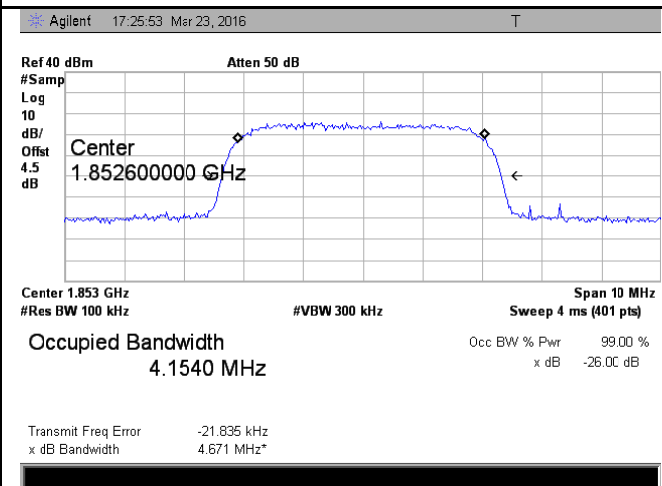
Band 5 BW - Low CH 826.6 MHz



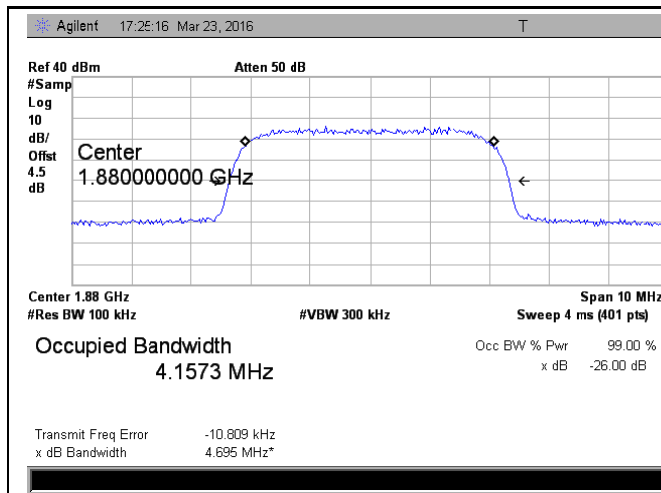
Band 5 BW - Mid CH 835.0 MHz



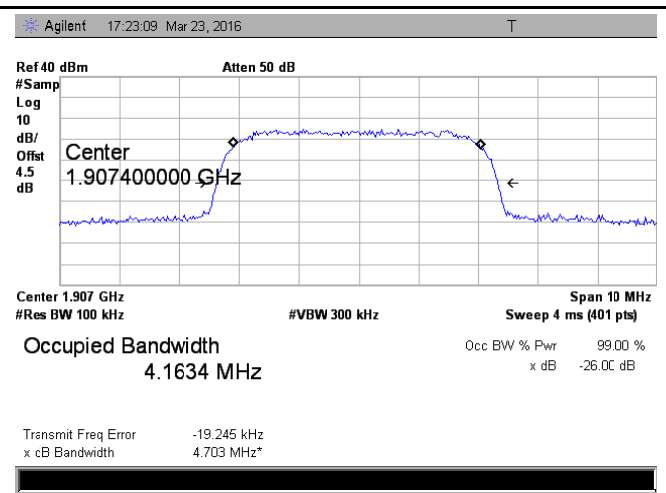
Band 5 BW - High CH 846.4 MHz



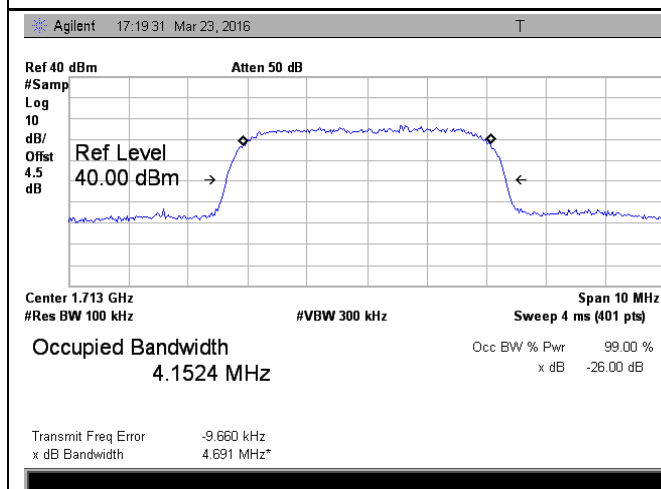
Band 2 BW - Low CH 1852.4MHz



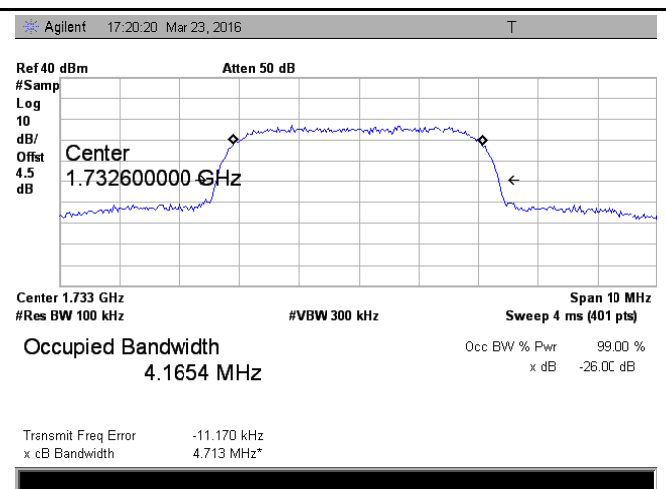
Band 2 BW - Mid CH 1880MHz



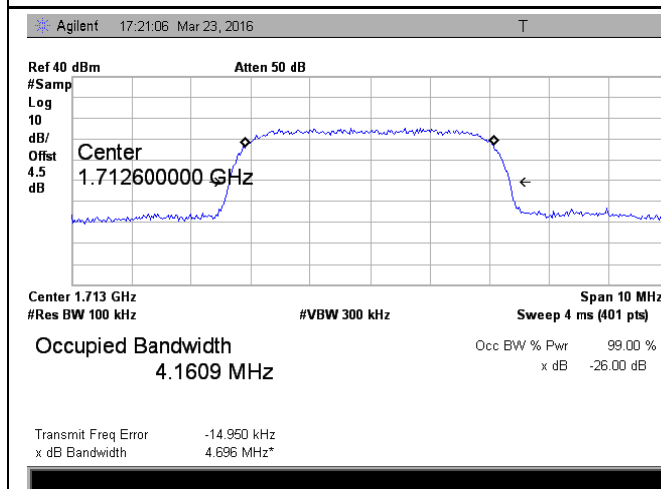
Band 2 BW - High CH 1907.6MHz



Band 4 BW - Low CH 1852.4MHz



Band 4 BW - Mid CH 1880MHz



Band 4 BW - High CH 1907.6MHz



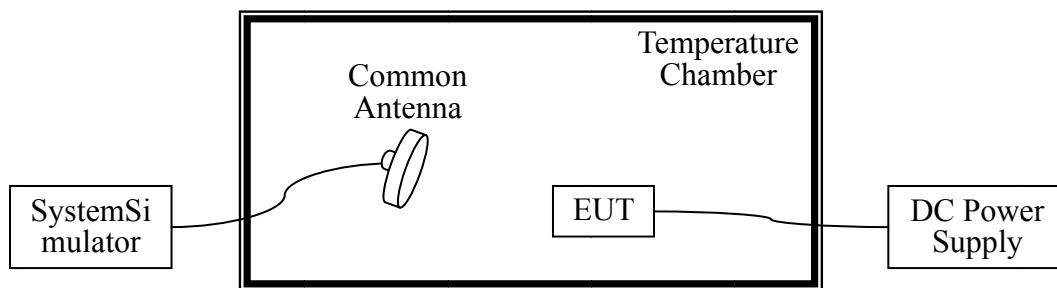
4.3 Frequency Stability

4.3.1 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

4.3.2 Test Description



4.3.3 Test Setup

The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.



4.3.4 Test Results

For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer; the normal temperature here used is 25°C. The frequency deviation limit is ± 2.5 ppm.

GSM 850

Middle Channel, fo = 836.6 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	-16	0.0191	2.5
0		-14	0.0167	2.5
10		-15	0.0179	2.5
20		-11	0.0131	2.5
30		-14	0.0167	2.5
40		-17	0.0203	2.5
50		-20	0.0239	2.5
55		-21	0.0251	2.5
25	4.2	-20	0.0239	2.5
	3.5	-18	0.0215	2.5

PCS1900

Middle Channel, fo = 1880 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	-23	0.0122	2.5
0		-20	0.0106	2.5
10		-14	0.0074	2.5
20		-10	0.0053	2.5
30		-14	0.0074	2.5
40		-20	0.0106	2.5
50		-16	0.0085	2.5
55		-21	0.0112	2.5
25	4.2	-21	0.0112	2.5
	3.5	-22	0.0117	2.5



UMTS-FDD Band 5

Middle Channel, fo = 835 MHz				
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	14	0.0120	2.5
0		12	0.0072	2.5
10		6	0.0060	2.5
20		6	0.0036	2.5
30		6	0.0108	2.5
40		12	0.0096	2.5
50		11	0.0084	2.5
55		14	0.0072	2.5
25	4.2	12	0.0132	2.5
	3.5	14	0.0120	2.5

UMTS-FDD Band 2

Middle Channel, fo = 1880 MHz				
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	11	0.0016	2.5
0		9	0.0021	2.5
10		7	0.0011	2.5
20		5	0.0016	2.5
30		6	0.0027	2.5
40		8	0.0021	2.5
50		10	0.0032	2.5
55		10	0.0032	2.5
25	4.2	8	0.0037	2.5
	3.5	9	0.0043	2.5



UMTS-FDD Band 4

Middle Channel, fo = 1732.6 MHz				
Temperature (°C)	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.7	6	0.0035	2.5
0		7	0.0040	2.5
10		6	0.0035	2.5
20		10	0.0058	2.5
30		7	0.0040	2.5
40		4	0.0023	2.5
50		10	0.0058	2.5
55		9	0.0052	2.5
25	4.2	8	0.0046	2.5
	3.5	10	0.0058	2.5

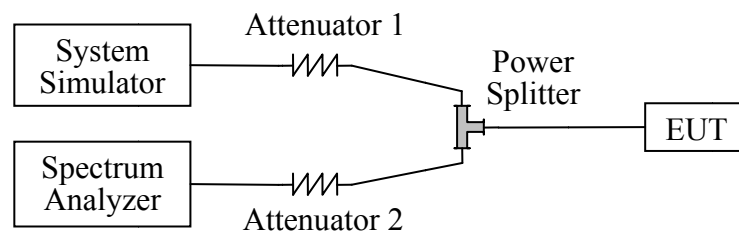


4.4 Peak-to-Average Ratio

4.4.1 Requirement

According to FCC section 24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.4.2 Test Description



4.4.3 Test Result

GSM 1900 PK-AV POWER

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	31.56	28.42	3.14
1880	31.26	28.4	2.86
1909.8	31.56	28.68	2.88

UMTS-FDD Band 2 PK-AV POWER

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	25.35	22.26	3.09
1880	25.96	22.07	3.89
1907.6	25.48	21.93	3.55

UMTS-FDD Band 4 PK-AV POWER

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1712.6	26.35	21.86	4.49
1732.6	25.68	22.30	3.38
1752.4	25.66	21.77	3.89



4.5 Conducted Out of Band Emissions

4.5.1 Requirement

According to FCC section 22.917(a) and FCC section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \cdot \log(P)$ dB. This calculated to be -13 dBm.

4.5.2 Test Description

See section 4.2.1 of this report.

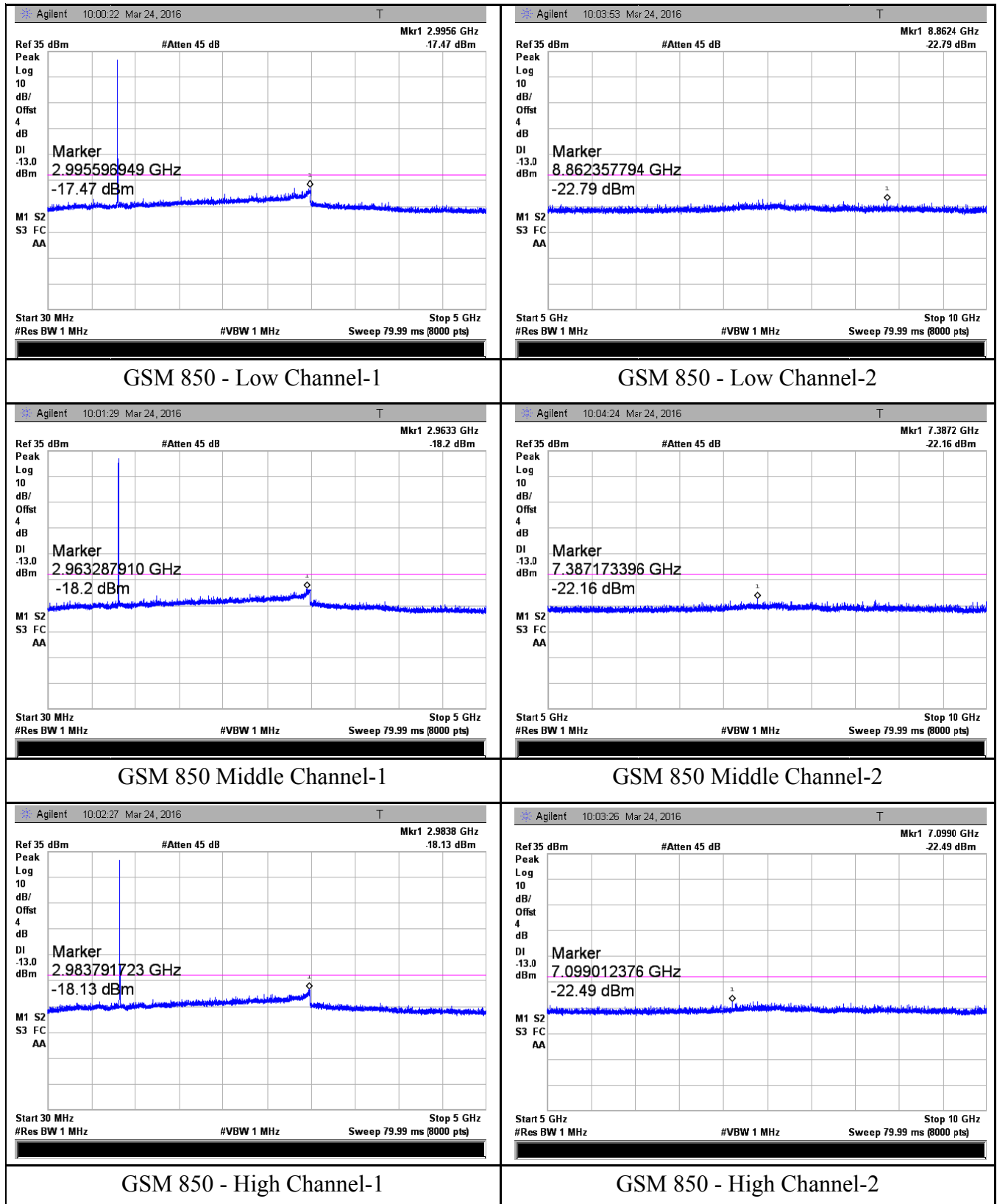
4.5.3 Test Results

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.



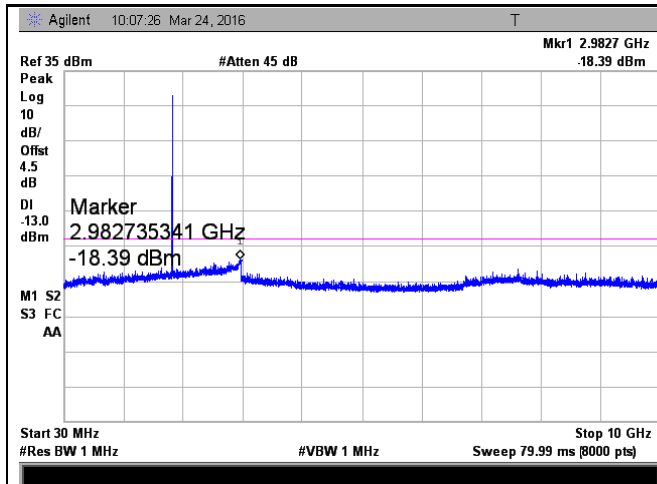
Test Plots:

GSM 850

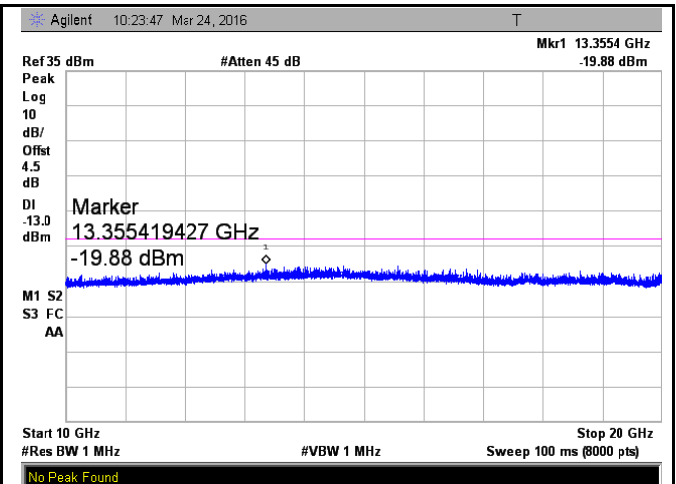




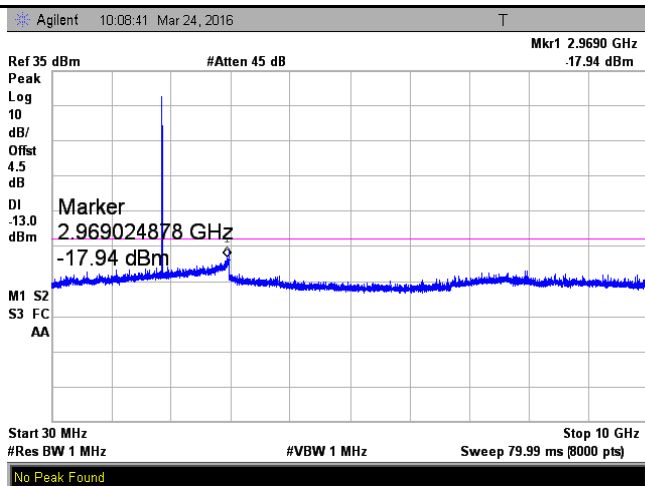
PCS1900



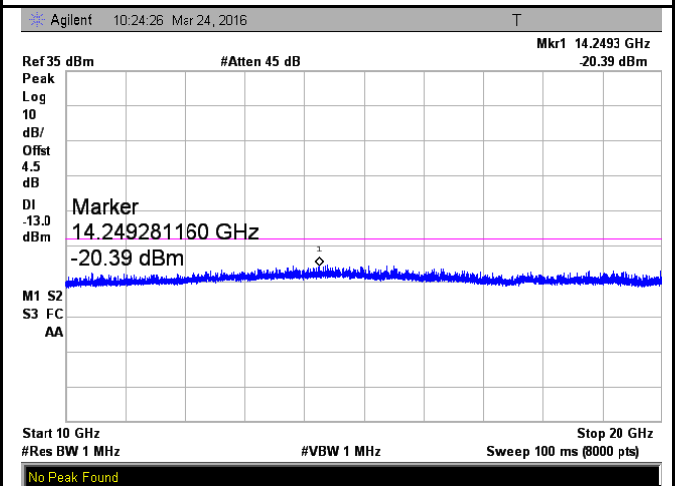
PCS1900 - Low Channel-1



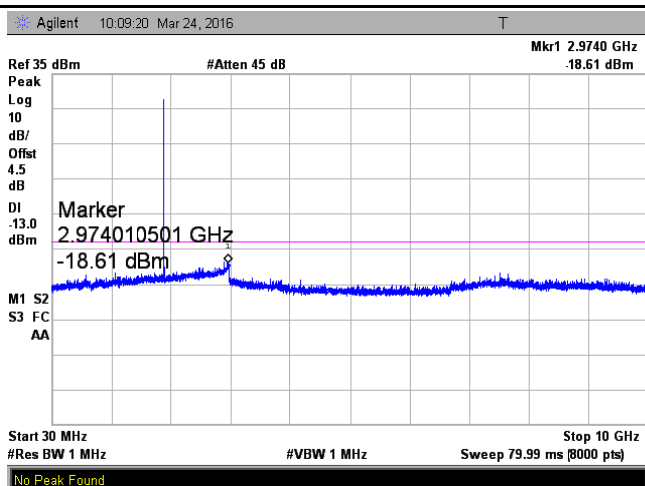
PCS1900 - Low Channel-2



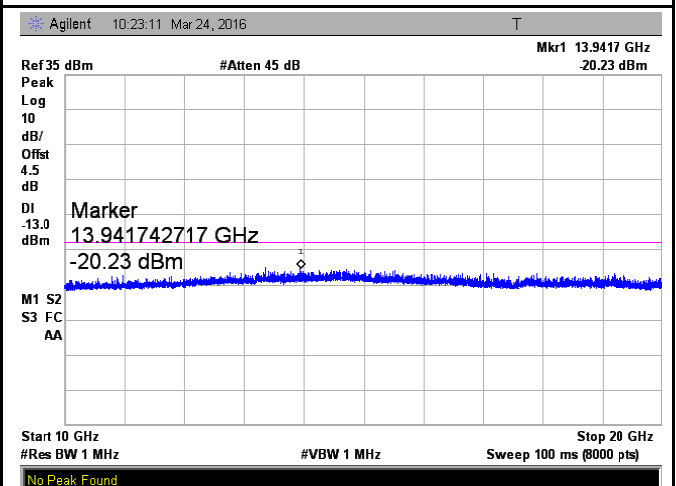
PCS1900 - Middle Channel-1



PCS1900 - Middle Channel-2



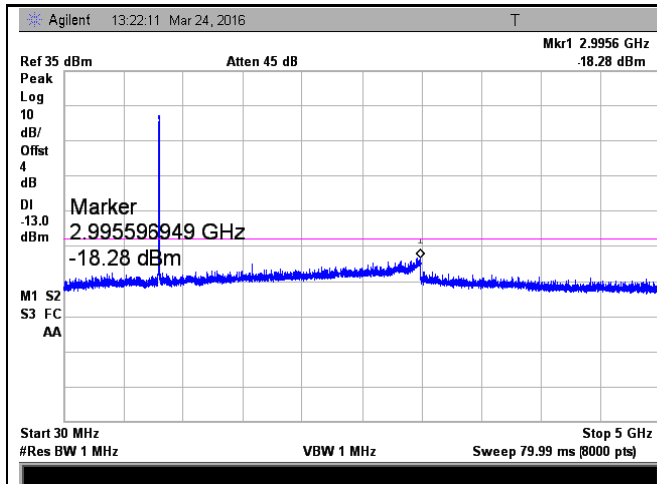
PCS1900 - High Channel-1



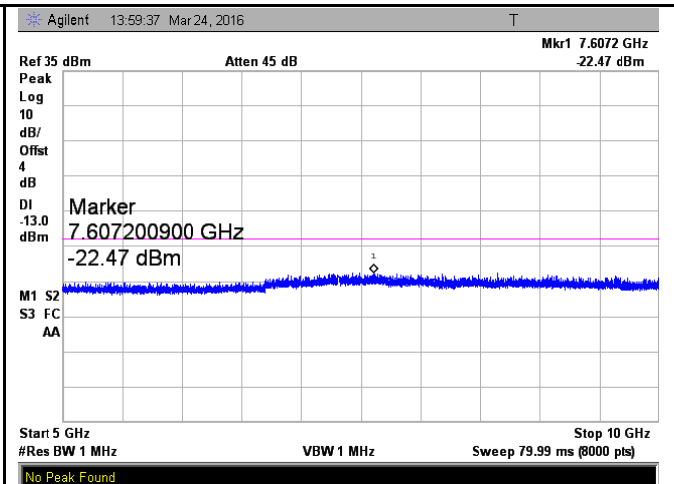
PCS1900 - High Channel-2



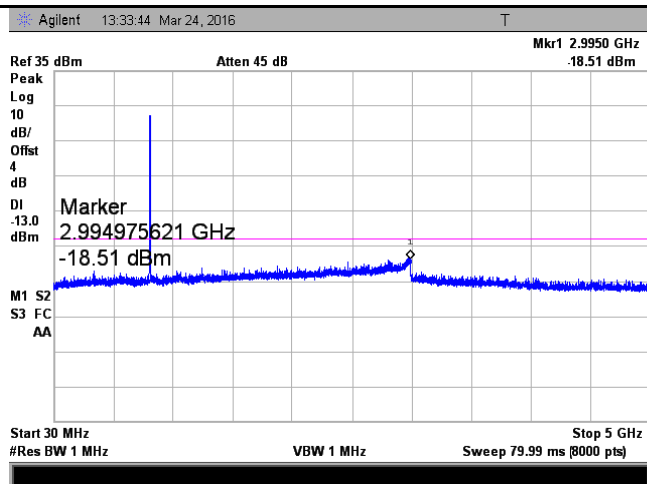
UMTS-FDD Band 5



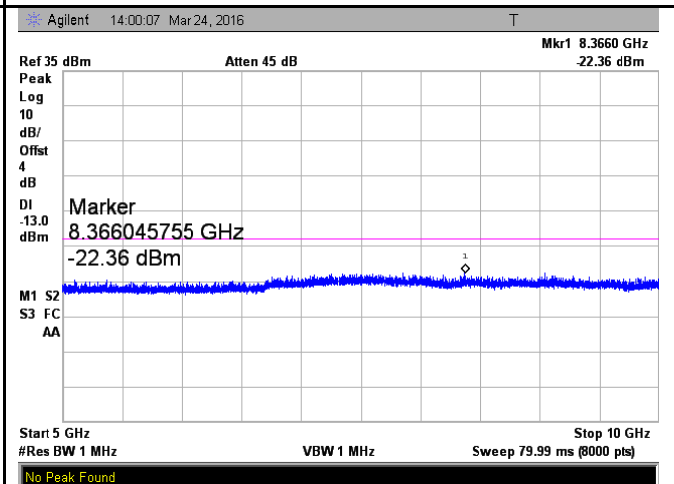
Band 5 - Low Channel-1



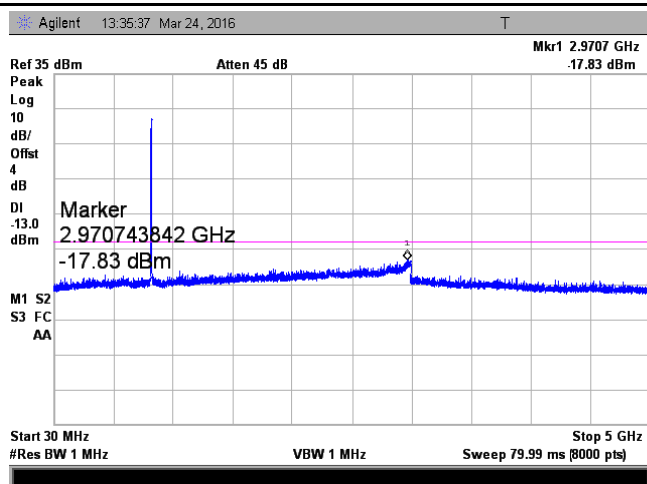
Band 5 - Low Channel-2



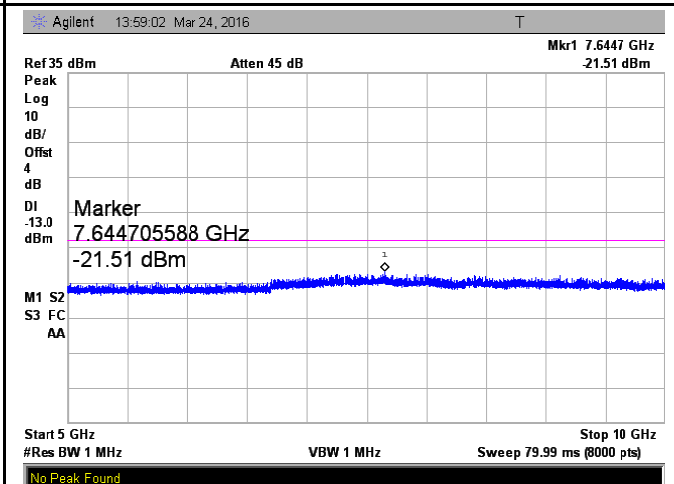
Band 5 - Middle Channel-1



Band 5 - Middle Channel-2



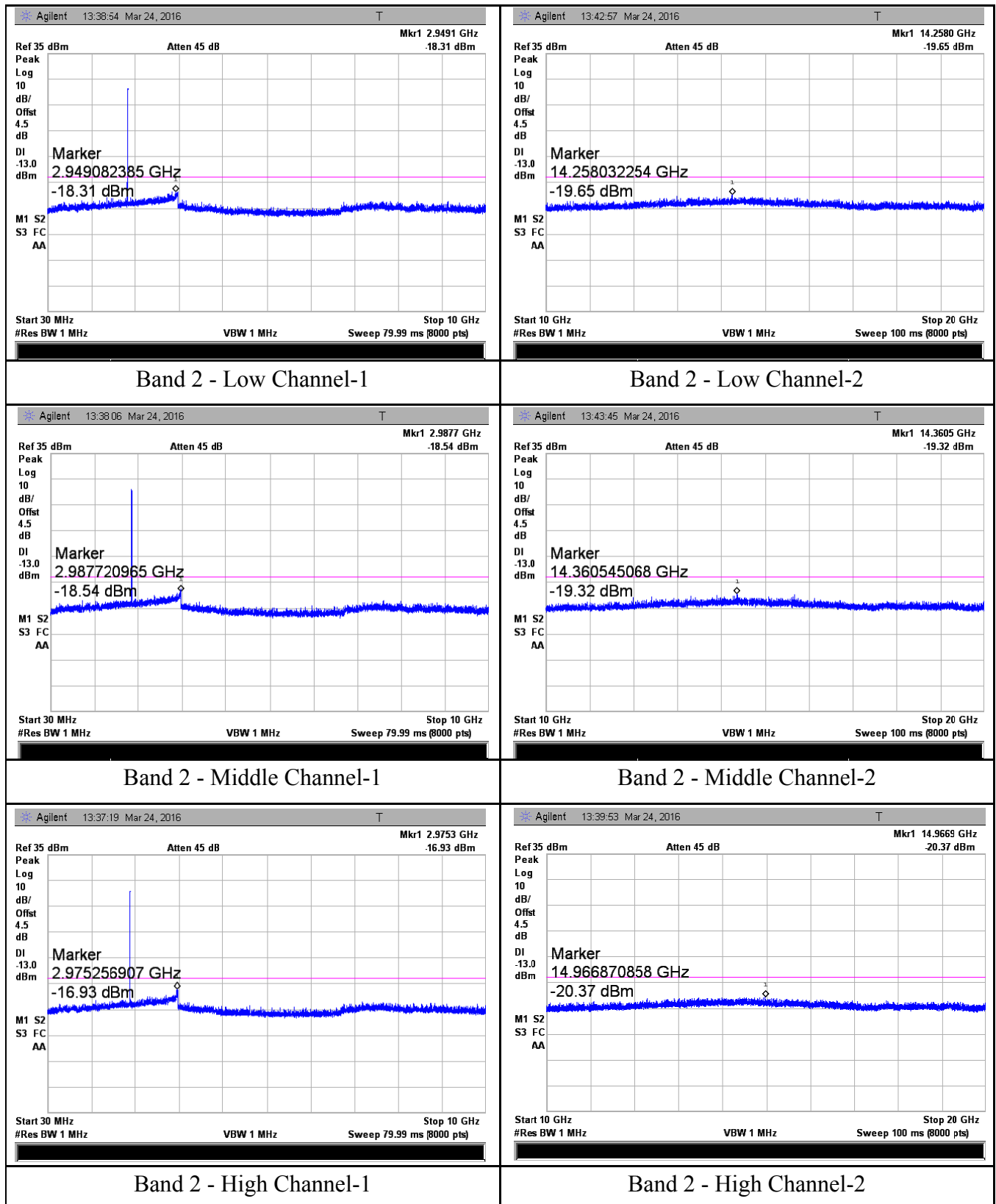
Band 5 - High Channel-1



Band 5 - High Channel-2

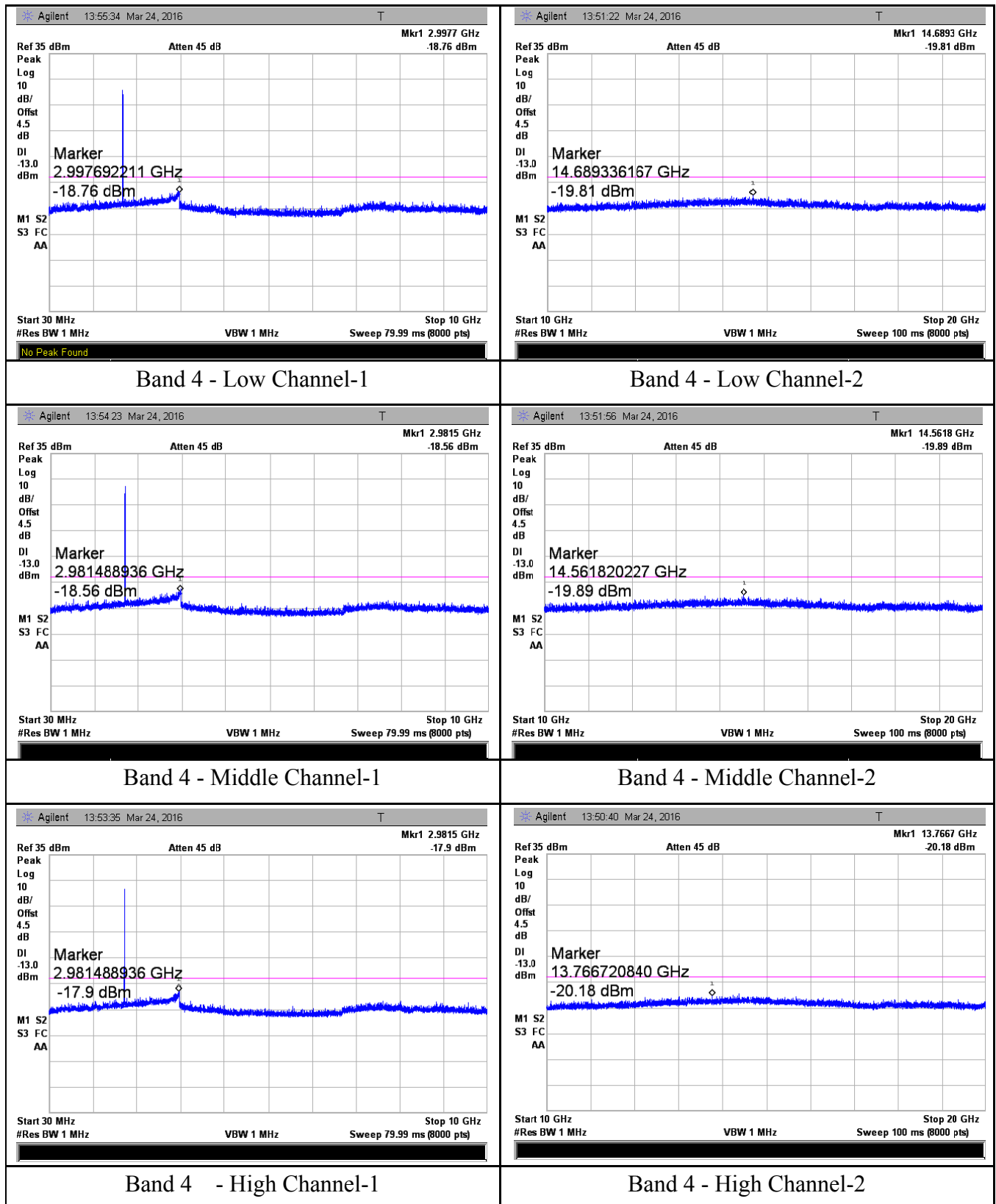


UMTS-FDD Band 2





UMTS-FDD Band 4

**NOTE:**

The power of the EUT transmitting frequency should be ignored.



4.6 Band Edge

4.6.1 Requirement

According to FCC section 22.917(b) and FCC section 24.238(b), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

4.6.2 Test Description

See section 4.2.1 of this report.

4.6.3 Test Results

The lowest and highest channels are tested to verify the band edge emissions.

GSM 850

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9925	-19.78	-13
849.0225	-18.81	-13

PCS 1900

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9800	-16.22	-13
1910.0150	-17.94	-13

UMTS-FDD Band 5

Frequency (MHz)	Emission (dBm)	Limit (dBm)
822.900	-29.45	-13
849.100	-27.67	-13

UMTS-FDD Band 2

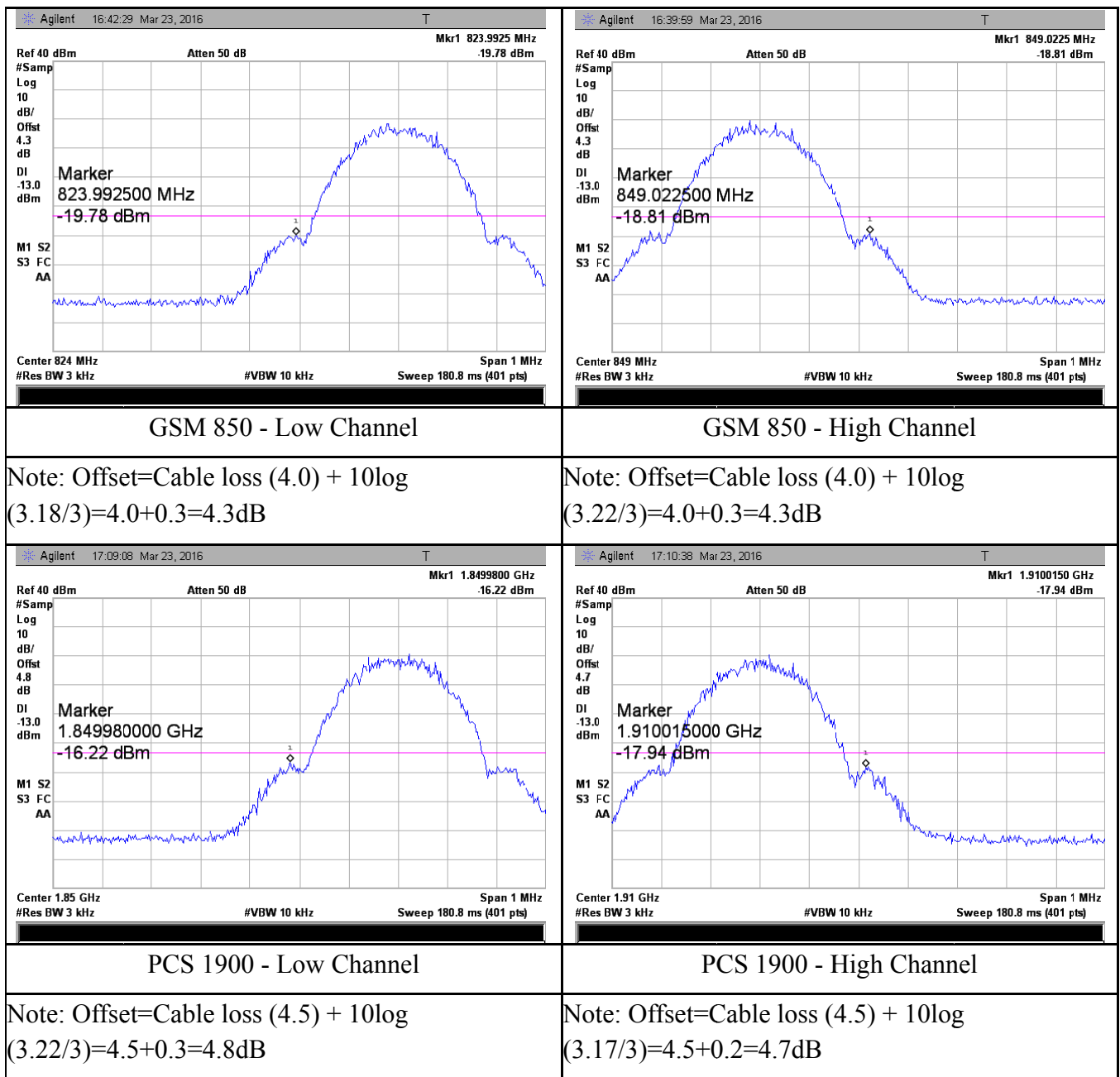
Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.875	-32.46	-13
1910.000	-30.15	-13

UMTS-FDD Band 4

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1709.125	-30.00	-13
1755.025	-25.46	-13

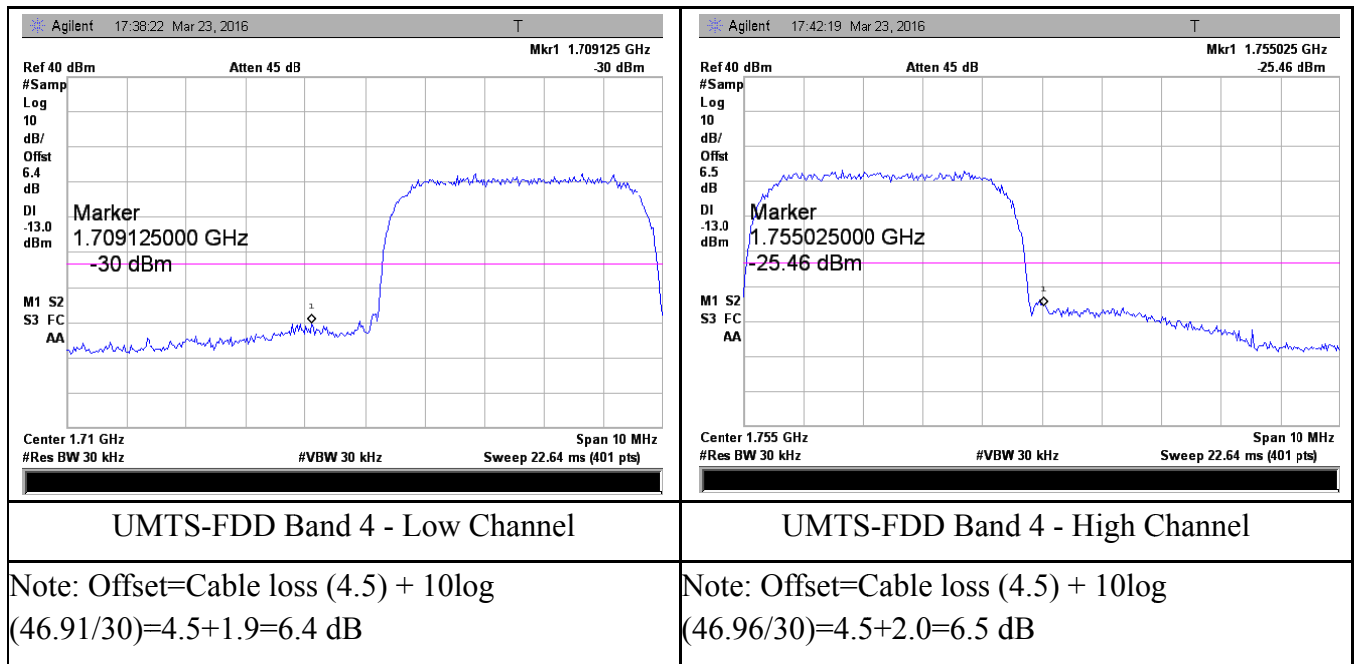


Test Plots:





<p>Agilent 17:49:15 Mar 23, 2016 T</p> <p>Ref 40 dBm Atten 45 dB Mkr1 822.900 MHz 29.45 dBm</p> <p>#Samp Log 10 dB/ Offset 5.9 dB DI -13.0 dBm</p> <p>Marker 822.900000 MHz -29.45 dBm</p> <p>M1 S2 S3 FC AA</p> <p>Center 824 MHz #Res BW 30 kHz #VBW 30 kHz Span 10 MHz Sweep 22.64 ms (401 pts)</p>	<p>Agilent 17:47:38 Mar 23, 2016 T</p> <p>Ref 40 dBm Atten 45 dB Mkr1 849.100 MHz -27.67 dBm</p> <p>#Samp Log 10 dB/ Offset 6 dB DI -13.0 dBm</p> <p>Marker 849.100000 MHz -27.67 dBm</p> <p>M1 S2 S3 FC AA</p> <p>Center 849 MHz #Res BW 30 kHz #VBW 30 kHz Span 10 MHz Sweep 22.64 ms (401 pts)</p>
UMTS-FDD Band 5- Low Channel	UMTS-FDD Band 5- High Channel
<p>Note: Offset=Cable loss (4.0) + 10log (46.87/30)=4.0+1.9=5.9dB</p>	<p>Note: Offset=Cable loss (4.0) + 10log (47.12/30)=4.0+2.0=6.0 dB</p>
<p>Agilent 17:32:05 Mar 23, 2016 T</p> <p>Ref 40 dBm Atten 45 dB Mkr1 1.849875 GHz 32.46 dBm</p> <p>#Samp Log 10 dB/ Offset 6.4 dB DI -13.0 dBm</p> <p>Marker 1.849875000 GHz -32.46 dBm</p> <p>M1 S2 S3 FC AA</p> <p>Center 1.85 GHz #Res BW 30 kHz #VBW 30 kHz Span 10 MHz Sweep 22.64 ms (401 pts)</p>	<p>Agilent 17:35:32 Mar 23, 2016 T</p> <p>Ref 40 dBm Atten 45 dB Mkr1 1.910000 GHz -30.15 dBm</p> <p>#Samp Log 10 dB/ Offset 6.5 dB DI -13.0 dBm</p> <p>Marker 1.910000000 GHz -30.15 dBm</p> <p>M1 S2 S3 FC AA</p> <p>Center 1.91 GHz #Res BW 30 kHz #VBW 30 kHz Span 10 MHz Sweep 22.64 ms (401 pts)</p>
UMTS-FDD Band 2- Low Channel	UMTS-FDD Band 2- High Channel
<p>Note: Offset=Cable loss (4.5) + 10log (46.71/30)=4.5+1.9=6.4 dB</p>	<p>Note: Offset=Cable loss (4.5) + 10log (47.03/30)=4.5+2.0=6.5 dB</p>



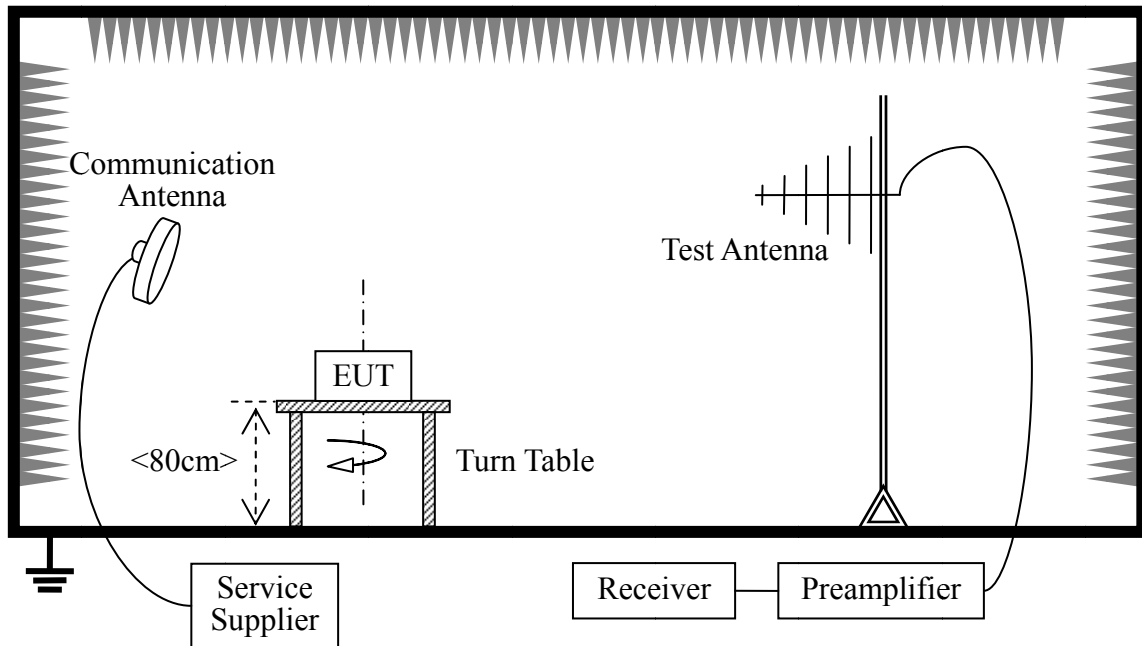


4.7 Transmitter Radiated Power (EIRP/ERP)

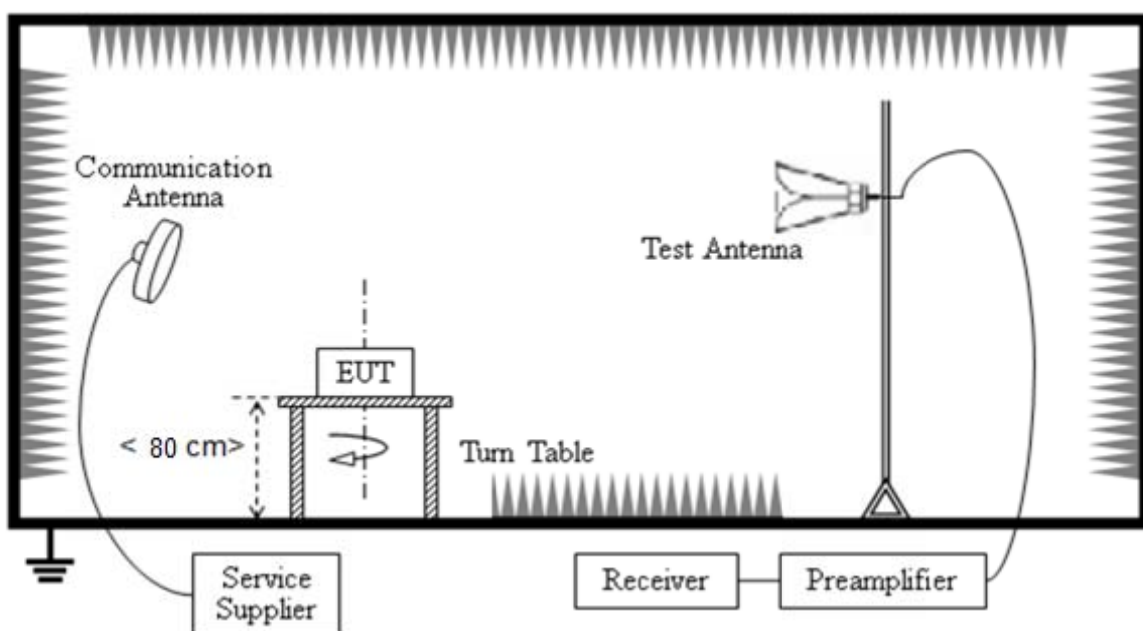
4.7.1 Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCCsection24.232, the broadband PCS mobile station is limited to 2Watts e.i.r.p. peak power.

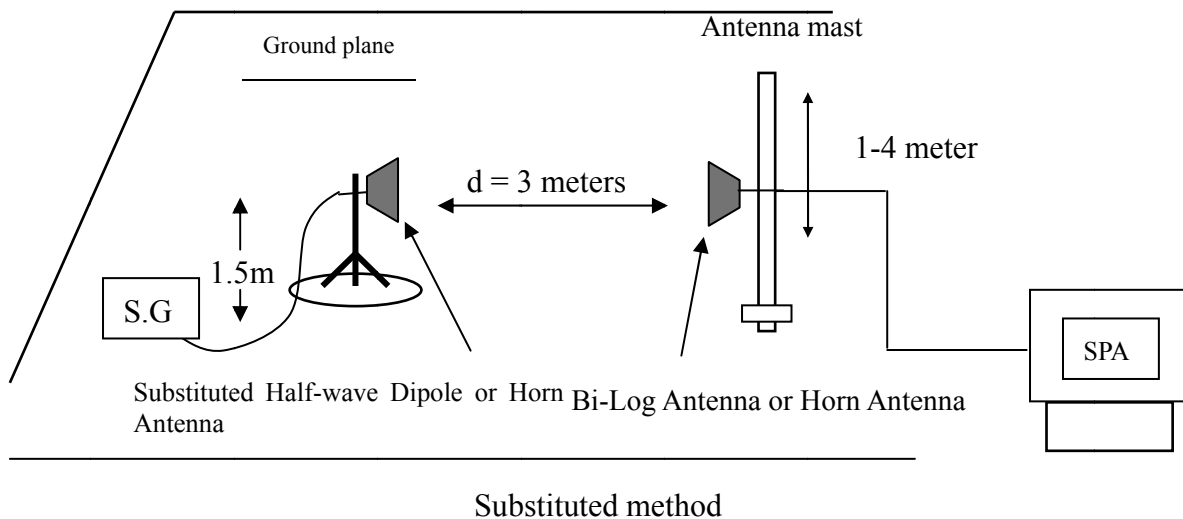
4.7.2 Test Description



Radiated Emissions 30-1000MHz



Radiated Emissions above 1000MHz



4.7.3 Test Procedure

The measurements procedures in TIA 603.D-2010 are used.

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1-4m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (P_r).
3. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
4. The cable loss (P_{cl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test. The measurement results are obtained as described below:
$$\text{Power(EIRP)} = P_{Mea} + P_{cl} + G_a$$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.



4.7.4 Test Results

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested. All modes are tested.

Limits

Band	Burst Peak ERP (dBm)
GSM 850MHz	$\leq 38.45\text{dBm}$ (7W)
WCDMA Band 5	$\leq 38.45\text{dBm}$ (7W)

Band	Burst Peak ERIP (dBm)
GSM 1900MHz	$\leq 33.0\text{dBm}$ (2W)
WCDMA Band 2	$\leq 33.0\text{dBm}$ (2W)

Band	Burst Peak ERP (dBm)
WCDMA Band 4	$\leq 30\text{dBm}$ (1W)

Measurement Result

Band	Channel	Peak ERP (dBm)	Limit (dBm)	Polarization
GSM 850	128	28.62	38.45	Horizontal
	190	27.43	38.45	Horizontal
	251	27.70	38.45	Horizontal
	128	26.37	38.45	Vertical
	190	27.03	38.45	Vertical
	251	26.50	38.45	Vertical

Band	Channel	Peak EIRP (dBm)	Limit (dBm)	Polarization
GSM 1900	512	29.67	33	Horizontal
	661	29.43	33	Horizontal
	810	29.74	33	Horizontal
	512	28.52	33	Vertical
	661	28.43	33	Vertical
	810	28.35	33	Vertical
	810	26.27	33	Vertical



Band	Channel	Peak ERP (dBm)	Limit (dBm)	Polarization
UMTS-FDD Band 5	4132	18.30	38.5	Horizontal
	4175	18.15	38.5	Horizontal
	4233	18.95	38.5	Horizontal
	4132	15.79	38.5	Vertical
	4175	14.62	38.5	Vertical
	4233	15.11	38.5	Vertical

Band	Channel	Peak EIRP (dBm)	Limit (dBm)	Polarization
UMTS-FDD Band 2	9262	23.54	33	Horizontal
	9400	23.14	33	Horizontal
	9538	22.03	33	Horizontal
	9262	20.74	33	Vertical
	9400	20.98	33	Vertical
	9538	20.36	33	Vertical

Band	Channel	Peak EIRP (dBm)	Limit (dBm)	Polarization
UMTS-FDD Band 4	1312	23.54	30	Horizontal
	1450	23.14	30	Horizontal
	1513	22.03	30	Horizontal
	1312	20.74	30	Vertical
	1450	20.98	30	Vertical
	1513	20.36	30	Vertical

Remark: $ERP(dBm) = P_{Mea} + P_{cl} + G_a - 2.15$



4.8 Radiated Out of Band Emissions

4.8.1 Requirement

According to FCC section 22.917(a) and section 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. This calculated to be -13dBm.

4.8.2 Test Description

See section 4.7.2 of this report.

4.8.3 Test Procedure

1. The lowest, middle and the highest channel were selected to perform tests respectively.
2. The EUT was placed on a rotatable non-conductive table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A substituted antenna was in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10 \log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10 \log(P)] \text{ (dB)}$
 $= [30 + 10 \log(P)] \text{ (dBm)} - [43 + 10 \log(P)] \text{ (dB)}$
 $= -13 \text{ dBm}.$



4.8.4 Test Results

Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
GSM 850MHz	128	V	1648.4	-29.2	-13	Pass
		V	2472.6	-39.3	-13	Pass
		V	3296.8	-46.1	-13	Pass
		V	4121.0	-45.0	-13	Pass
		V	4945.2	nf	-13	Pass
		H	1648.4	-48.2	-13	Pass
		H	2472.6	-38.3	-13	Pass
		H	3296.8	-48.4	-13	Pass
		H	4121.0	-49.6	-13	Pass
		H	4945.2	nf	-13	Pass
	190	V	1673.2	-29.0	-13	Pass
		V	2509.8	-43.1	-13	Pass
		V	3346.4	-46.4	-13	Pass
		V	4183.0	-45.3	-13	Pass
		V	5019.6	nf	-13	Pass
		H	1673.2	-50.2	-13	Pass
		H	2509.8	-43.1	-13	Pass
		H	3346.4	-47.9	-13	Pass
		H	4183.0	-45.3	-13	Pass
		H	5019.6	nf	-13	Pass
	251	V	1697.6	-43.7	-13	Pass
		V	2546.4	-46.9	-13	Pass
		V	3395.2	-48.5	-13	Pass
		V	4244.0	-49.7	-13	Pass
		V	5092.8	nf	-13	Pass
		H	1697.6	-52.0	-13	Pass
		H	2546.4	-42.3	-13	Pass
		H	3395.2	-47.3	-13	Pass
		H	4244.0	-45.1	-13	Pass
		H	5092.8	nf	-13	Pass



Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
GSM 1900MHz	512	V	3700.4	-52.8	-13	Pass
		V	5550.6	-46.3	-13	Pass
		V	7400.8	-44.7	-13	Pass
		V	9251.0	-39.0	-13	Pass
		V	11101.2	nf	-13	Pass
		H	3700.4	-49.0	-13	Pass
		H	5550.6	-46.5	-13	Pass
		H	7400.8	-44.7	-13	Pass
		H	9251.0	-40.3	-13	Pass
		H	11101.2	nf	-13	Pass
	661	V	3760.0	-48.6	-13	Pass
		V	5640.0	-47.3	-13	Pass
		V	7520.0	-43.4	-13	Pass
		V	9400.0	-40.7	-13	Pass
		V	11280.0	nf	-13	Pass
		H	3760.0	-48.3	-13	Pass
		H	5640.0	-46.1	-13	Pass
		H	7520.0	-44.6	-13	Pass
		H	9400.0	-40.7	-13	Pass
		H	11280.0	nf	-13	Pass
	810	V	3819.6	-49.8	-13	Pass
		V	5729.4	-47.2	-13	Pass
		V	7639.2	-43.1	-13	Pass
		V	9549.0	-42.6	-13	Pass
		V	11458.8	nf	-13	Pass
		H	3819.6	-48.0	-13	Pass
		H	5729.4	-47.4	-13	Pass
		H	7639.2	-43.8	-13	Pass
		H	9549.0	-40.6	-13	Pass
		H	11458.8	nf	-13	Pass



Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
UMTS-FDD Band 5	4132	V	1652.8	-51.4	-13	Pass
		V	2479.2	-50.7	-13	Pass
		V	3305.6	nf	-13	Pass
		V	4132.0	nf	-13	Pass
		V	4958.4	nf	-13	Pass
		H	1652.8	-52.5	-13	Pass
		H	2479.2	-47.3	-13	Pass
		H	3305.6	nf	-13	Pass
		H	4132.0	nf	-13	Pass
		H	4958.4	nf	-13	Pass
	4175	V	1670.0	-52.6	-13	Pass
		V	2505.0	-51.9	-13	Pass
		V	3340.0	nf	-13	Pass
		V	4175.0	nf	-13	Pass
		V	5010.0	nf	-13	Pass
		H	1670.0	-49.7	-13	Pass
		H	2505.0	-51.0	-13	Pass
		H	3340.0	nf	-13	Pass
		H	4175.0	nf	-13	Pass
		H	5010.0	nf	-13	Pass
	4233	V	1693.2	-50.4	-13	Pass
		V	2539.8	-52.7	-13	Pass
		V	3386.4	nf	-13	Pass
		V	4233.0	nf	-13	Pass
		V	5079.6	nf	-13	Pass
		H	1693.2	-51.2	-13	Pass
		H	2539.8	-49.1	-13	Pass
		H	3386.4	nf	-13	Pass
		H	4233.0	nf	-13	Pass
		H	5079.6	nf	-13	Pass



Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
UMTS-FDD Band 2	9262	V	3704.8	-53.1	-13	Pass
		V	5557.2	-52.7	-13	Pass
		V	7409.6	-50.4	-13	Pass
		V	9262.0	nf	-13	Pass
		V	11114.4	nf	-13	Pass
		H	3704.8	-47.6	-13	Pass
		H	5557.2	-52.3	-13	Pass
		H	7409.6	-51.7	-13	Pass
		H	9262.0	nf	-13	Pass
		H	11114.4	nf	-13	Pass
	9400	V	3760.0	-55.9	-13	Pass
		V	5640.0	-52.6	-13	Pass
		V	7520.0	-52.0	-13	Pass
		V	9400.0	nf	-13	Pass
		V	11280.0	nf	-13	Pass
		H	3760.0	-44.3	-13	Pass
		H	5640.0	-55.8	-13	Pass
		H	7520.0	-52.3	-13	Pass
		H	9400.0	nf	-13	Pass
		H	11280.0	nf	-13	Pass
	9538	V	3815.2	-50.9	-13	Pass
		V	5722.8	-53.7	-13	Pass
		V	7630.4	-51.6	-13	Pass
		V	9538.0	nf	-13	Pass
		V	11445.6	nf	-13	Pass
		H	3815.2	-49.4	-13	Pass
		H	5722.8	-50.0	-13	Pass
		H	7630.4	-53.7	-13	Pass
		H	9538.0	nf	-13	Pass
		H	11445.6	nf	-13	Pass



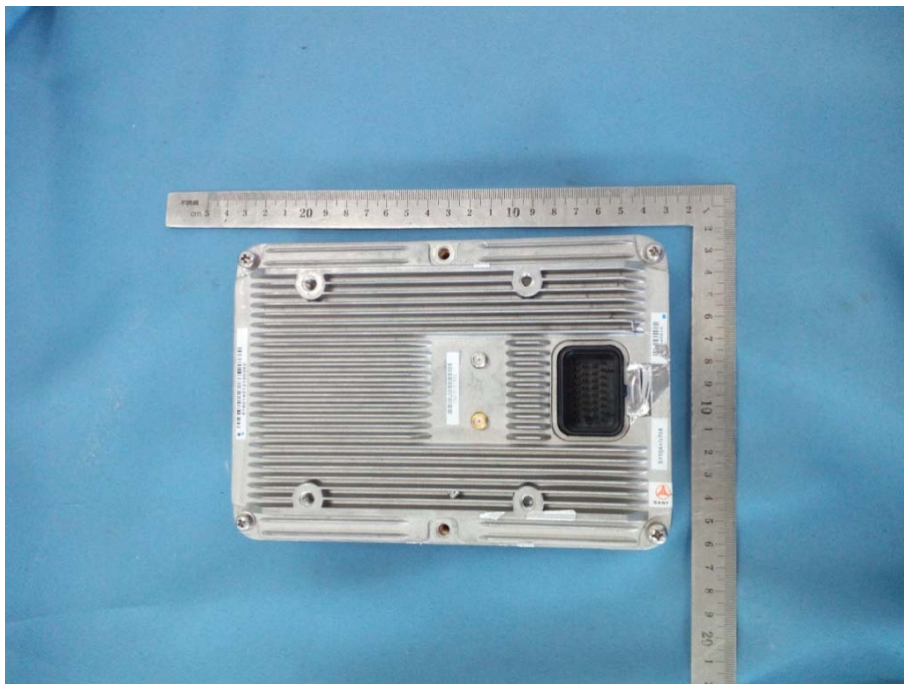
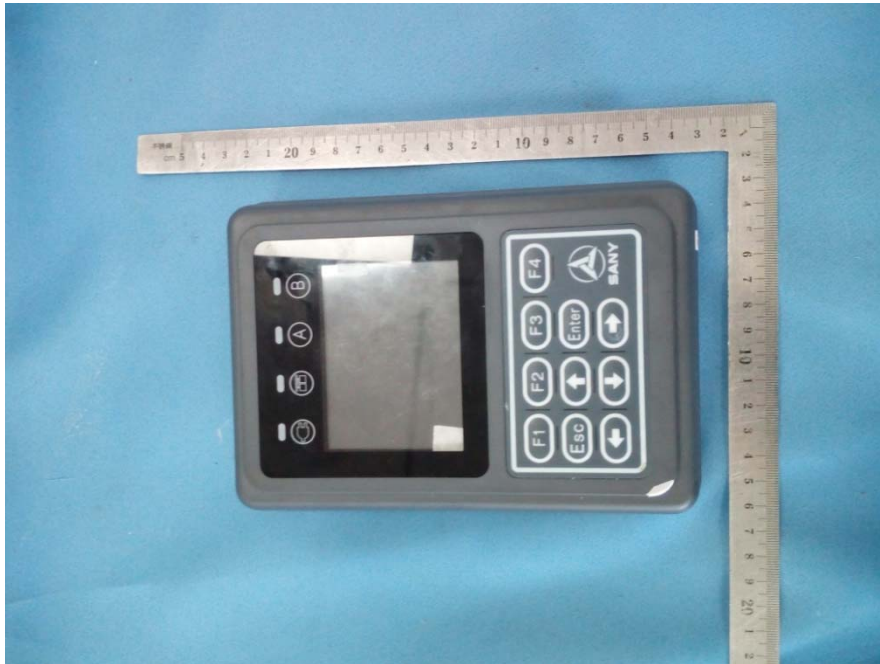
Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
UMTS-FDD Band 4	1312	V	3424.8	-53.4	-13	Pass
		V	5137.2	-52.0	-13	Pass
		V	6849.6	-50.4	-13	Pass
		V	8562	nf	-13	Pass
		V	10274.4	nf	-13	Pass
		H	3424.8	-47.1	-13	Pass
		H	5137.2	-52.0	-13	Pass
		H	6849.6	-51.7	-13	Pass
		H	8562	nf	-13	Pass
		H	10274.4	nf	-13	Pass
	1450	V	3484	-55.3	-13	Pass
		V	5226	-52.8	-13	Pass
		V	6968	-52.9	-13	Pass
		V	8710	nf	-13	Pass
		V	10452	nf	-13	Pass
		H	3484	-44.8	-13	Pass
		H	5226	-55.7	-13	Pass
		H	6968	-52.7	-13	Pass
		H	8710	nf	-13	Pass
		H	10452	nf	-13	Pass
	1513	V	3505.2	-50.3	-13	Pass
		V	5257.8	-53.6	-13	Pass
		V	7010.4	-51.0	-13	Pass
		V	8763	nf	-13	Pass
		V	10515.6	nf	-13	Pass
		H	3505.2	-49.3	-13	Pass
		H	5257.8	-50.3	-13	Pass
		H	7010.4	-53.2	-13	Pass
		H	8763	nf	-13	Pass
		H	10515.6	nf	-13	Pass

NOTE:

- 1) The power of the EUT transmitting frequency should be ignored.
- 2) All spurious emission tests were performed in X,Y,Z axis direction. Only the worst axis test condition was recorded in this test report.
- 3) 'nf' means that the emission level is too low to read out from the noise floor.
- 4) The emission levels of below 1 GHz are very lower than the limit(<-40dBm) and not show in this report.



Annex Photos of the EUT







**** END OF REPORT ****