FCC Radio Test Report

FCC ID: 2AICM-RT9X0

Original Grant

Report No.	:	TB-FCC148446
Applicant	:	RTscan Technology Limited
Equipment Under Test (EUT)		
EUT Name	:	Portable data terminals
Model No.	:	RT920
Series No.	:	RT9X0 (X=A-Z or X=0-9 or Null which denotes different market)
Brand Name	:	RTscan
Receipt Date	:	2016-06-06
Test Date	:	2016-06-07 to 2016-06-26
Issue Date	:	2016-06-27
Standards	:	FCC Part 2 FCC Part 22 Subpart H, FCC Part 24 Subpart E, 2015 ANSI C63.26: 2015
Conclusions	:	**PASS** In the configuration tested, the EUT complied with the standards specified above, The EUT technically complies with the FCC requirements

Test/Witness Engineer : IVAN SU

Approved& Authorized :

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.

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1. General Information about EUT

1.1 Client Information

Applicant	:	RTscan Technology Limited
Address	:	702C, Block C, Ying Da Li Park, Futian Free Trade Zone, Futian District, Shenzhen, China
Manufacturer	:	RTscan Technology Limited
Address	:	702C, Block C, Ying Da Li Park, Futian Free Trade Zone, Futian District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Portable data terminals	
Models No.	:	RT920, RT9X0 (X=A-Z or X=0-9 or Null which denotes different market)	
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is model name for commercial.	
Product Description	:	Frequency Bands: UMTS FDD Band II; UMTS FDD Band V	
		UMTS Band V Power:	Cond:22.18 dBm ERP:20.46 dBm
		UMTS Band II Power:	Cond:22.88 dBm EIRP:19.68 dBm
		Antenna Gain:	2.4 dBi PIFA Antenna
		Modulation Type:	UMTS:QPSK
FCC Operating Frequency	:	UMTS Band II: 1852.40MHz-1907.60MHz UMTS Band V:826.40MHz-846.60MHz	
Emission Designator	:	UMTS Band II: 4M21F9W UMTS Band V: 4M18F9W	
Power Supply	:	DC power supplied by AC/DC Adapter DC power by Li-ion battery.	
Power Rating	:	AC/DC Adapter: Input: 100-240V, 50/60Hz, 0.4A Output: 5.5V, 2.6A DC 3.8V by 3800mAh Li-ion Battery.	
Connecting I/O Port(S)	:	Please refer to the User's Manual	
Remark	:	This EUT owns two SIM cards, after we perform the pretest for these two SIM card, we found the SIM 1 is the worst case, so only recorded the test result of SIM 1 in the report.	

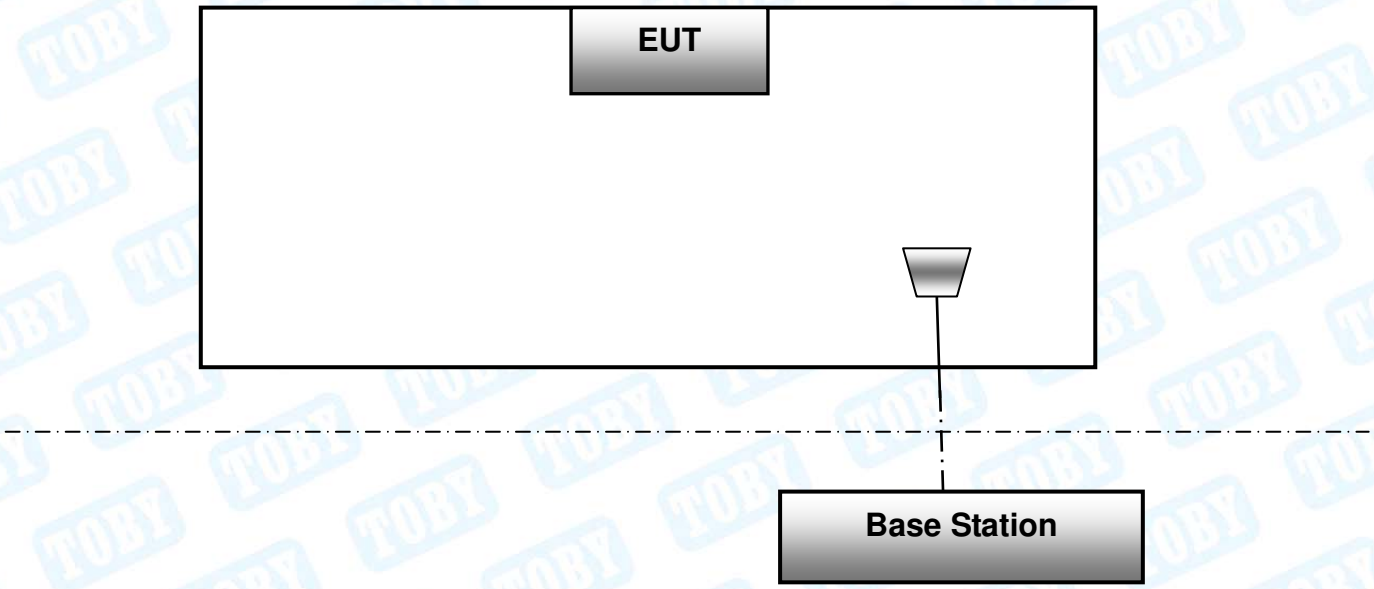
Note:

(1) For a more detailed features description, please refer to the manufacturer's specifications or

the User's Manual.

(2) This test report only product for PCS Licensed Transmitter (PCB).

1.3 Block Diagram Showing the Configuration of System Tested



The above block diagram of setup is the normal mode. And more detail please refer to the test setup of each test item of bellow.

1.4 Description of Support Units

The EUT has been tested as an independent unit.

1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

During all testing, EUT is link mode with base station at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range. Frequency range investigated for radiated emission as below:

1. 9kHz~10GHz for UMTS Band V.
2. 9kHz~20GHz for UMTS Band II.

Test Channel		
Mode	**Channel**	**Frequency(MHz)**
UMTS Band V	4132	826.40
	4183	836.60

	4233	846.60
UMTS Band II	9262	1852.40
	9400	1880.00
	9538	1907.60

Pre-scanning test Mode	**Description**
RMC UMTS Band V	highest , middle, lowest channels
HSDPA UMTS Band V	highest , middle, lowest channels
HSUPA UMTS Band V	highest , middle, lowest channels
RMC UMTS Band II	highest , middle, lowest channels
HSDPA UMTS Band II	highest , middle, lowest channels
HSUPA UMTS Band II	highest , middle, lowest channels
Final test Mode	**Description**
RMC UMTS Band V	highest , middle, lowest channels
RMC UMTS Band II	highest , middle, lowest channels

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) During the testing procedure, the EUT is in link mode with base station emulator at maximum power level in each test mode.

(3) The EUT has RMC, HSDP, HSUP functions in UMTS band II and UMTS band V, and after pre-testing, RMC mode is the worst case for all the emission tests.

(4) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on Z-plane as the normal use. Therefore only the test data of this Z-plane was used for radiated emission measurement test.

1.6 Measurement Uncertainty

Test Item	**Parameters**	**Expanded Uncertainty (U_{Lab})**
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	 ±3.42 dB ±3.42 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	±4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	±4.40 dB
Radiated Emission	Level Accuracy: Above 1000MHz	±4.20 dB

1.7 Test Facility

The testing was performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at: 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China.
At the time of testing, the following bodies accredited the Laboratory:

CNAS (L5813)
The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

FCC List No.: (811562)
The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

IC Registration No.: (11950A-1)
The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

2. Test Summary

Test Standards and Test Results			
Standard	**Document Title**		
FCC Part 2 (10-1-05 Edition)	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations		
FCC Part 22 (10-1-05 Edition)	Public Mobile Services		
FCC Part 24 (10-1-05 Edition)	Personal Communications Services		
Standard Section	**Test Item**	**Judgment**	**Remark**
2.1046	Conducted RF Output Power	PASS	N/A
24.232(d)	Peak-Average Ratio	PASS	N/A
2.1049; 22.917; 24.238	99% & -26 dB Occupied Bandwidth	PASS	N/A
2.1055; 22.355; 24.235	Frequency Stability	PASS	N/A
2.1051; 2.1057; 22.917; 24.238	Conducted Out of Band Emissions	PASS	N/A
2.1051; 2.1057; 22.917; 24.238	Band Edge	PASS	N/A
22.913; 24.238	Transmitter Radiated Power (EIRP/ERP)	PASS	N/A
2.1053; 2.1057; 22.917; 24.238	Radiated Out of Band Emissions	PASS	N/A
Note: N/A is an abbreviation for Not Applicable.			

3. Test Equipment

AC Main Conducted Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
50ΩCoaxial Switch	Anritsu	MP59B	X10321	Aug. 07, 2015	Aug. 06, 2016
L.I.S.N	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 08, 2015	Aug. 07, 2016
Radiation Spurious Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 26, 2016	Mar. 25, 2017
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 26, 2016	Mar. 25, 2017
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 26, 2016	Mar. 25, 2017
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 26, 2016	Mar. 25, 2017
Pre-amplifier	Sonoma	310N	185903	Mar. 26, 2016	Mar. 25, 2017
Pre-amplifier	HP	8447B	3008A00849	Mar. 26, 2016	Mar. 25, 2017
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 26, 2016	Mar. 25, 2017
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Mar. 26, 2016	Mar. 25, 2017
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jun.23, 2016	Jun.22, 2017
Antenna Conducted Emission					
Description	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Due Date**
Spectrum Analyzer	Agilent	E4407B	MY45106456	Aug. 29, 2015	Aug. 28, 2016
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jun.23, 2016	Jun.22, 2017

4. Frequency Stability

4.1 Test Standard and Requirement

4.1.1 Test Standard

FCC Part 2.1055
FCC Part 22.355
FCC Part 24.235

4.1.2 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:

(1) Temperature:

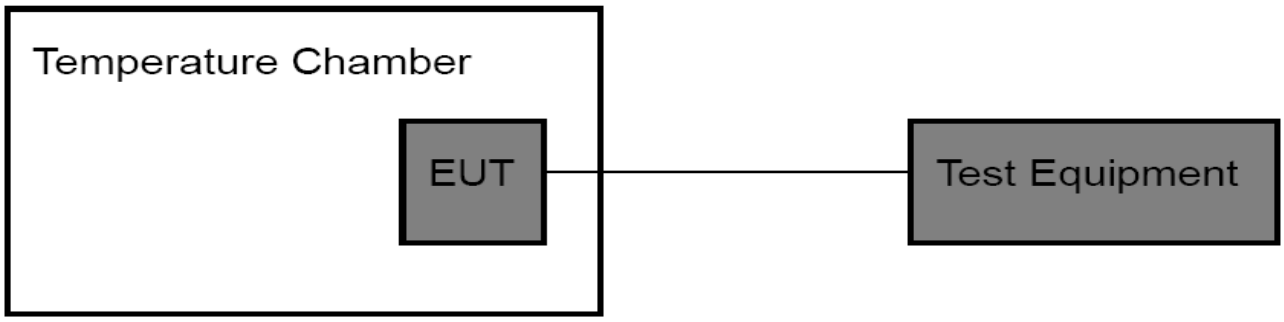
The temperature is varied from -30℃ to +50℃ at intervals of not more than 10℃.

(2) Primary Supply Voltage:

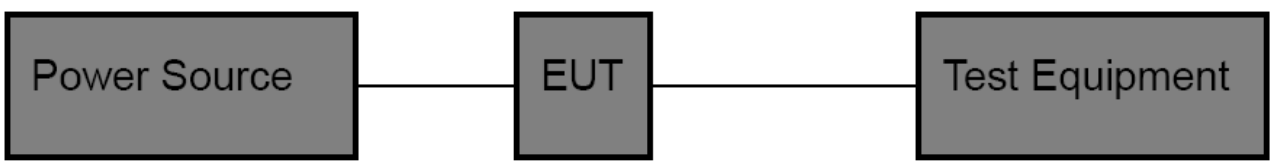
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at input to the cable normally provide with the equipment, or at the power supply terminals if cables are not normally provided.

4.2 Test Setup

For Temperature Test:



For Voltage Test:



4.3 Test Procedure

Test Procedures for Temperature Variation:

(1) The EUT was set up in the thermal chamber and connected with the base station.

(2) With power off, the temperature was decreased to -30℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(3) With power off, the temperature was raised in 10℃ set up to 50℃ and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.

(4) If the EUT cannot be turned on at -30℃, the testing lowest temperature will be raised in 10℃ step until the EUT can be turned on.

Test Procedures for Voltage Variation:

(1) The EUT was placed in a temperature chamber at 25±5℃ and connected with the base station.

(2) Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

(3) The variation in frequency was measured for the worst case.

4.4 EUT Operating Condition

The Equipment Under Test was set to Communication with the Base Station.

3.5 Test Data

Please refer the following pages.

Temperature Variation

Temperature Variation UMTS Band V (CH 4183)		
Temperature (℃)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	10	0.012
-20	11	0.013
-10	13	0.016
0	12	0.014
10	10	0.012
20	15	0.018
30	9	0.011
40	11	0.013
50	13	0.016
60	14	0.017
Limit	2.5 (ppm)	
Result	PASS	

Temperature Variation UMTS Band II (CH 9400)		
Temperature (℃)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	7	0.004
-20	9	0.005
-10	8	0.004
0	10	0.005
10	6	0.003
20	7	0.004
30	11	0.006
40	12	0.006
50	13	0.007
60	12	0.006
Limit	2.5 (ppm)	
Result	PASS	

Voltage Variation

Voltage Variation UMTS Band V (CH 4183)		
Voltage (V)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
3.23	13	0.016
3.80	15	0.018
4.37	12	0.014
Limit	2.5 (ppm)	
Result	PASS	

Voltage Variation UMTS Band II (CH 9400)		
Voltage (V)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
3.23	9	0.005
3.80	8	0.004
4.37	10	0.005
Limit	2.5 (ppm)	
Result	PASS	

5. Conducted RF Output Power

5.1 Test Standard and Limit

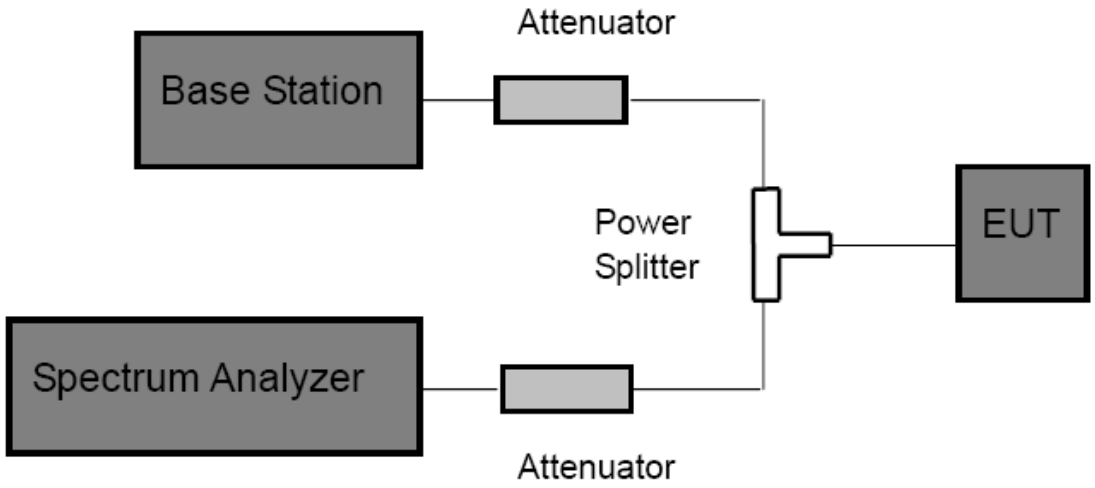
5.1.1 Test Standard

FCC Part 2: 2.1046
FCC Part 22H : 22.913 (a)
FCC Part 24E: 24.232 (c)

5.1.2 Test Limit

UMTS Band V	UMTS Band II
38.5 dBm (ERP)	33 dBm (EIRP)

5.2 Test Setup



5.3 Test Procedure

(1) The EUT is coupled to the Spectrum Analyzer and the Base Station with the suitable Attenuators through the Power Splitter, the path loss is calibrated to correct the reading.
(2) A call is set up by the Base Station to the generic call set up procedure.
(3) Set EUT at maximum power level through base station by power level command.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak and mark it; finally record the peak and the plot.

5.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

5.5 EUT Operating Condition

UMTS Band V				
Mode	**Channel**	**Frequency (MHz)**	**Conducted Power (dBm)**	**Conducted Power (W)**
Band V RMC	4132	826.4	22.18	0.165
	4183	835.0	21.18	0.131
	4233	846.6	22.02	0.159
HSDPA Subtest 1	4132	826.4	22.06	0.161
	4183	835.0	21.96	0.157
	4233	846.6	22.12	0.163
HSDPA Subtest 2	4132	826.4	21.69	0.148
	4183	835.0	21.95	0.157
	4233	846.6	21.86	0.153
HSDPA Subtest 3	4132	826.4	22.01	0.159
	4183	835.0	21.79	0.151
	4233	846.6	21.86	0.153
HSDPA Subtest 4	4132	826.4	22.03	0.160
	4183	835.0	21.58	0.144
	4233	846.6	21.69	0.148
HSUPA Subtest 1	4132	826.4	21.76	0.150
	4183	835.0	21.84	0.153
	4233	846.6	21.64	0.146
HSUPA Subtest 2	4132	826.4	21.87	0.154
	4183	835.0	21.65	0.146
	4233	846.6	21.38	0.137
HSUPA Subtest 3	4132	826.4	21.54	0.143
	4183	835.0	21.75	0.150
	4233	846.6	21.67	0.147
HSUPA Subtest 4	4132	826.4	21.52	0.142
	4183	835.0	21.61	0.145
	4233	846.6	21.74	0.149
HSUPA Subtest 5	4132	826.4	21.55	0.143
	4183	835.0	21.68	0.147
	4233	846.6	21.53	0.142
Limit			**38.5**	**7**

UMTS Band II				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
Band II RMC	9262	1852.4	22.88	0.194
	9400	1880.0	22.42	0.175
	9538	1907.6	22.00	0.158
HSDPA Subtest 1	9262	1852.4	22.12	0.163
	9400	1880.0	22.35	0.172
	9538	1907.6	22.34	0.171
HSDPA Subtest 2	9262	1852.4	22.08	0.161
	9400	1880.0	22.12	0.163
	9538	1907.6	22.20	0.166
HSDPA Subtest 3	9262	1852.4	21.85	0.153
	9400	1880.0	21.98	0.158
	9538	1907.6	21.87	0.154
HSDPA Subtest 4	9262	1852.4	21.69	0.148
	9400	1880.0	21.68	0.147
	9538	1907.6	21.73	0.149
HSUPA Subtest 1	9262	1852.4	21.65	0.146
	9400	1880.0	21.69	0.148
	9538	1907.6	21.76	0.150
HSUPA Subtest 2	9262	1852.4	21.84	0.153
	9400	1880.0	21.66	0.147
	9538	1907.6	21.59	0.144
HSUPA Subtest 3	9262	1852.4	21.48	0.141
	9400	1880.0	21.54	0.143
	9538	1907.6	21.38	0.137
HSUPA Subtest 4	9262	1852.4	21.68	0.147
	9400	1880.0	21.74	0.149
	9538	1907.6	21.63	0.146
HSUPA Subtest 5	9262	1852.4	21.75	0.150
	9400	1880.0	21.55	0.143
	9538	1907.6	21.67	0.147
Limit			33	2

6. Peak-Average Ratio

6.1 Test Standard and Limit

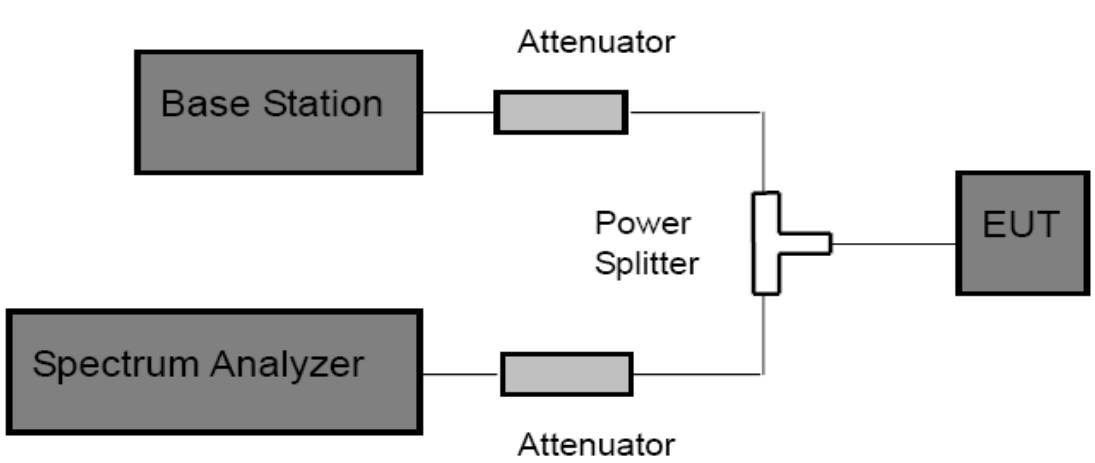
6.1.1 Test Standard

FCC Part 24E: 24.232 (d)

6.1.2 Test Limit

UMTS Band II
The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

6.2 Test Setup



6.3 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 of the transmitter is operating at maximum power.

6.4 EUT Operating Condition

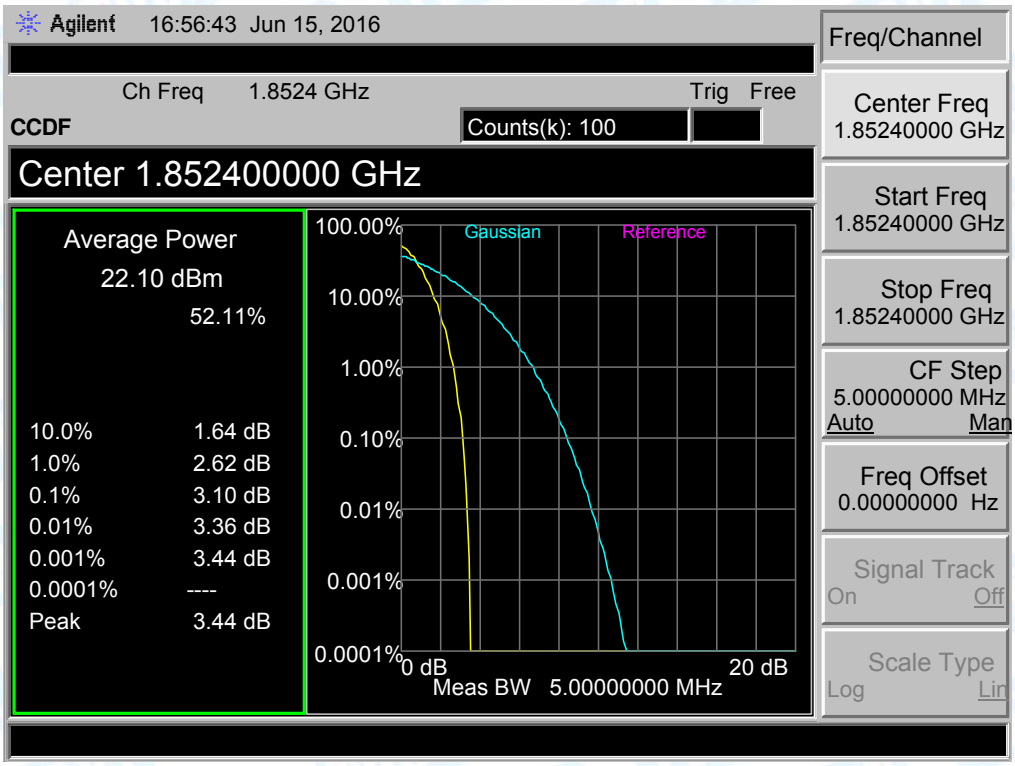
The EUT was continuously connected with the Base station and transmitting in the max power during the test.

6.5 Test Data

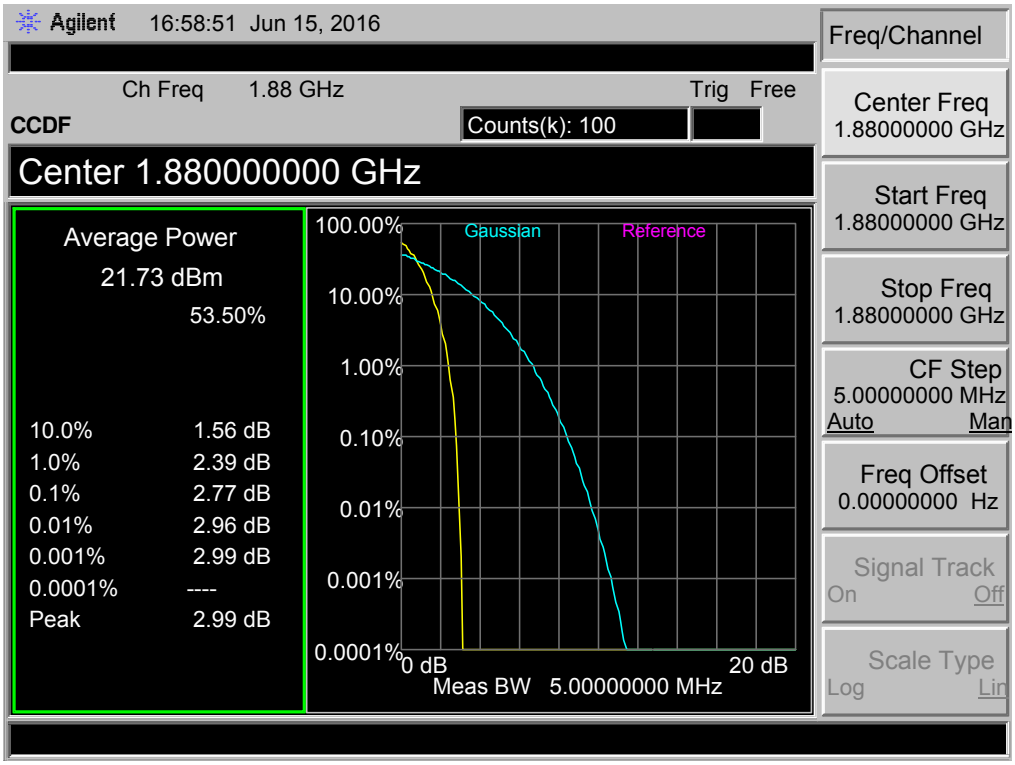
UMTS Band II					
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)		Peak-Average Ratio (PAR)
			Peak	Average	
UMTS Band II RMC	9262	1852.4	25.54	22.10	3.10
	9400	1880.0	24.72	21.73	2.77
	9538	1907.6	23.87	21.22	2.36
UMTS Band II HSDPA	9262	1852.4	25.37	20.53	4.16
	9400	1880.0	24.34	20.36	3.56
	9538	1907.6	23.59	19.99	3.24
UMTS Band II HSUPA	9262	1852.4	24.85	20.03	4.13
	9400	1880.0	24.10	19.77	3.69
	9538	1907.6	23.39	19.22	3.71

UMTS Band II RMC

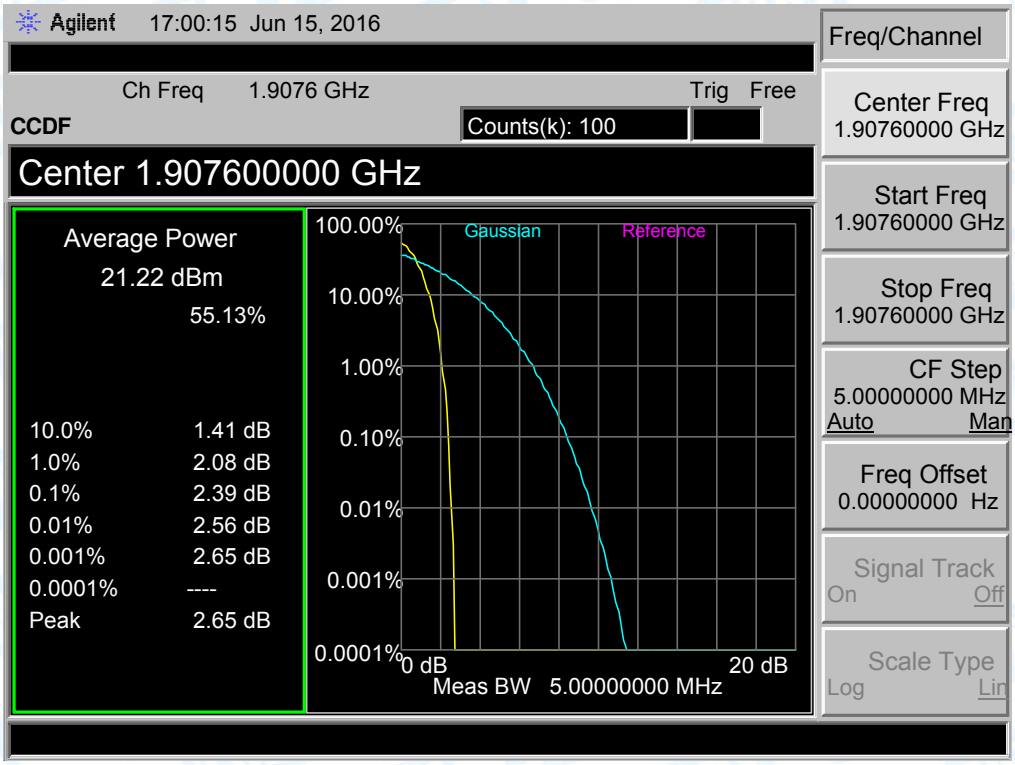
CH 9262



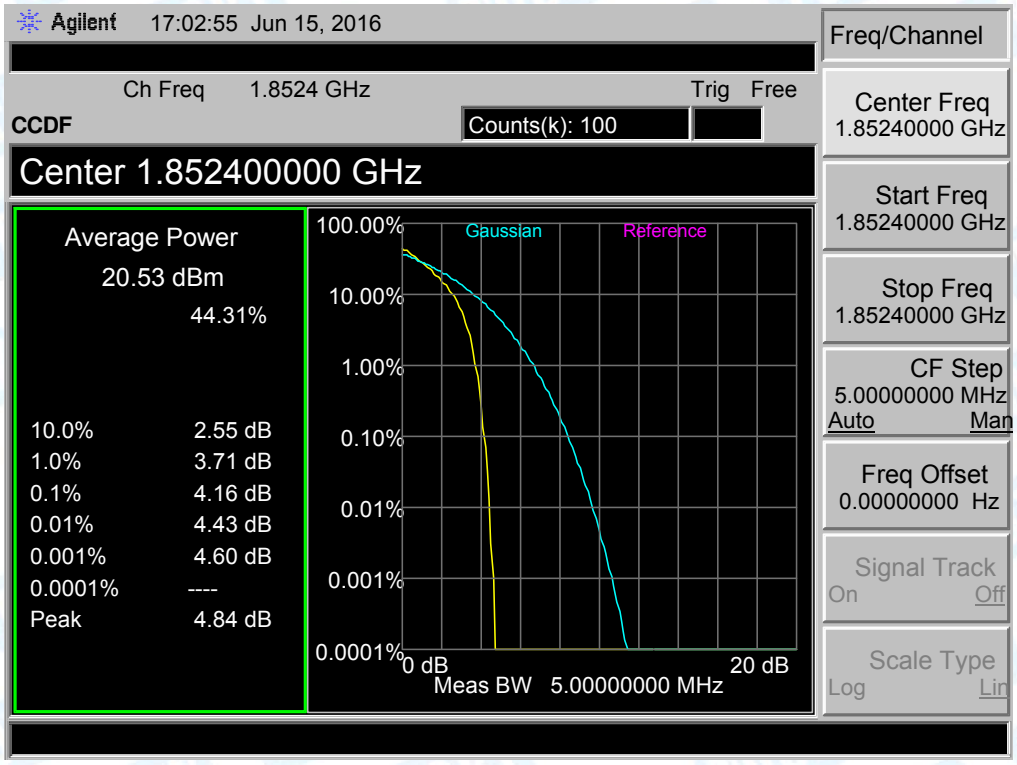
CH 9400



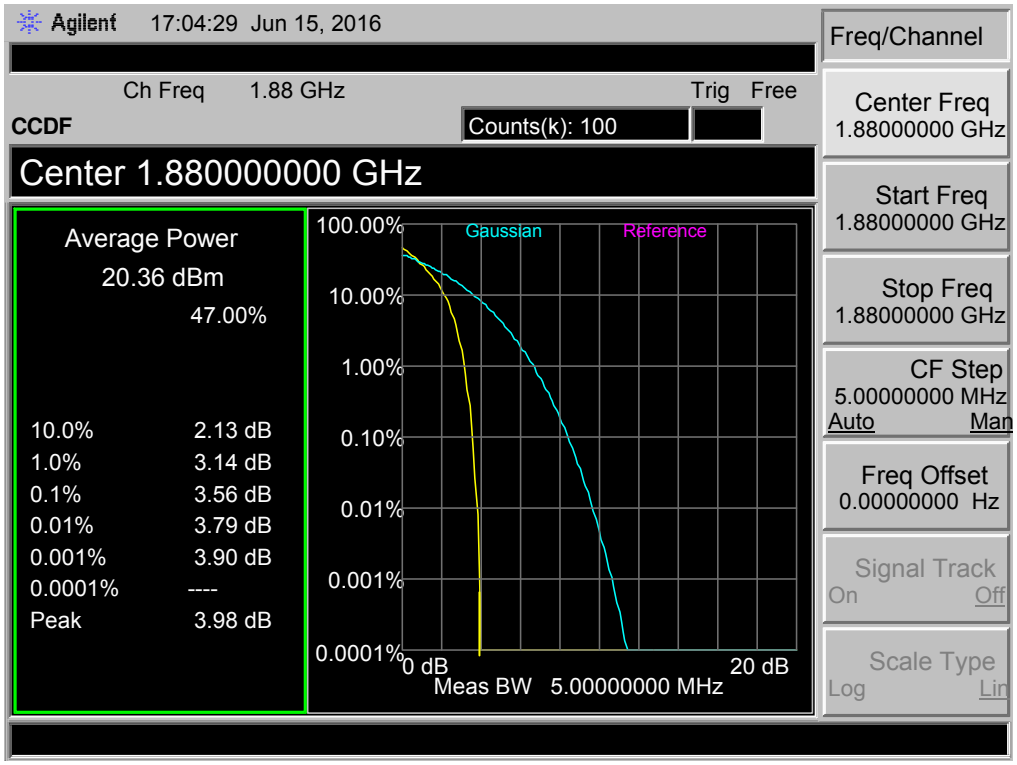
CH 9538



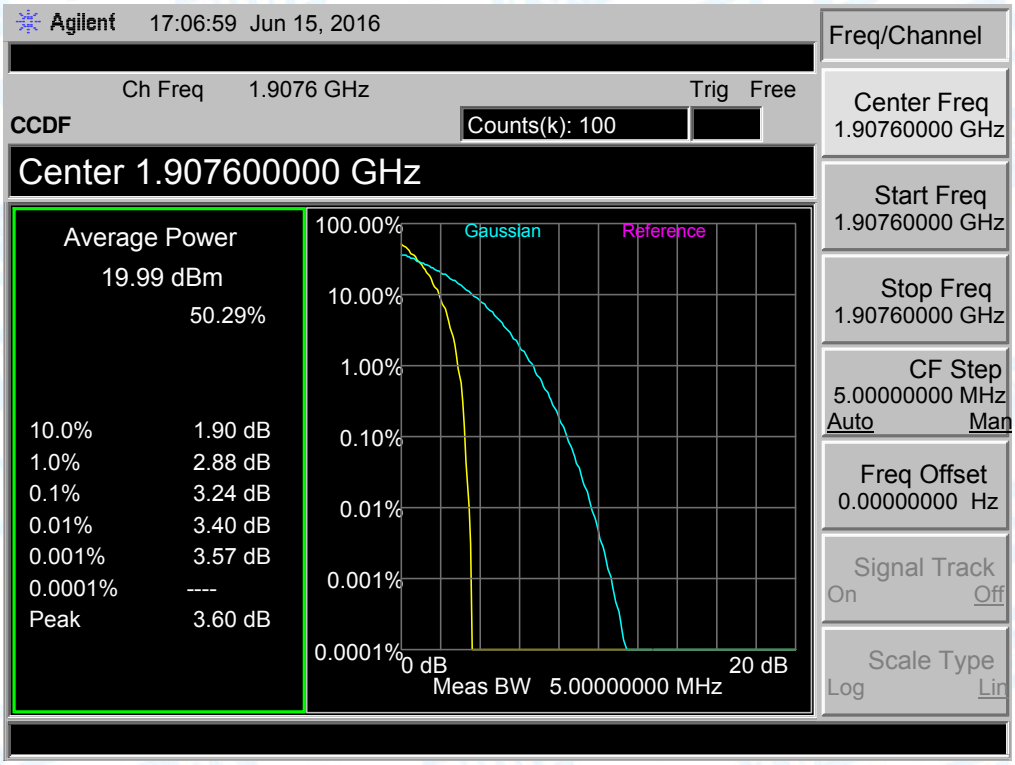
UMTS Band II HSDPA
CH 9262



CH 9400

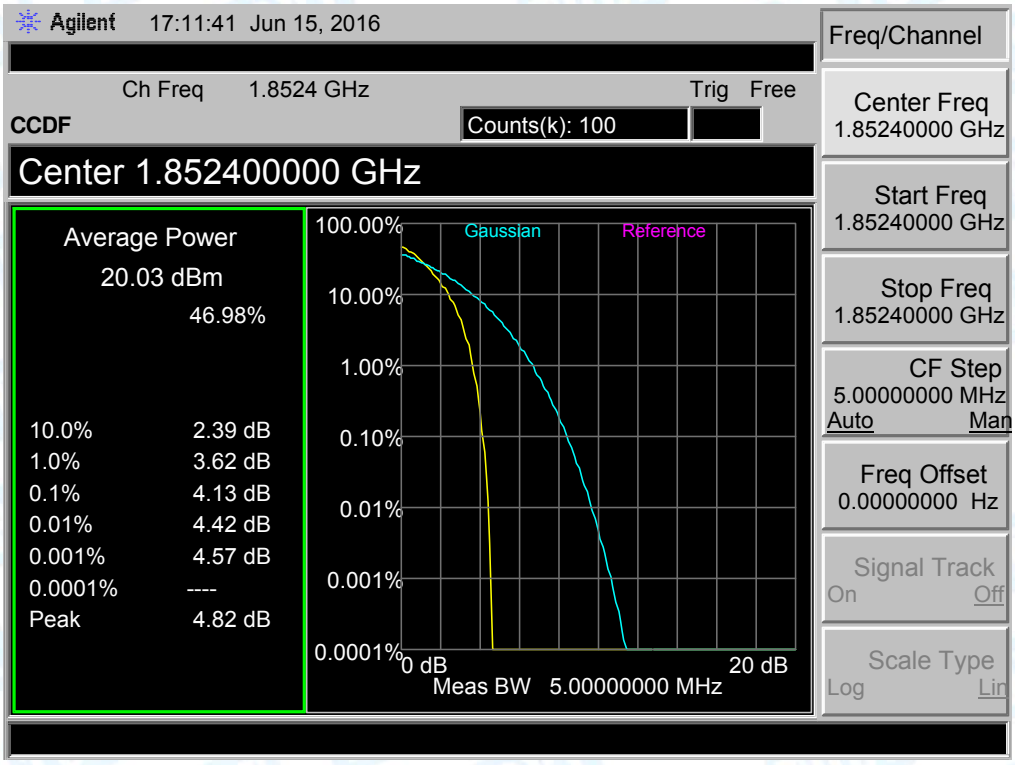


CH 9538

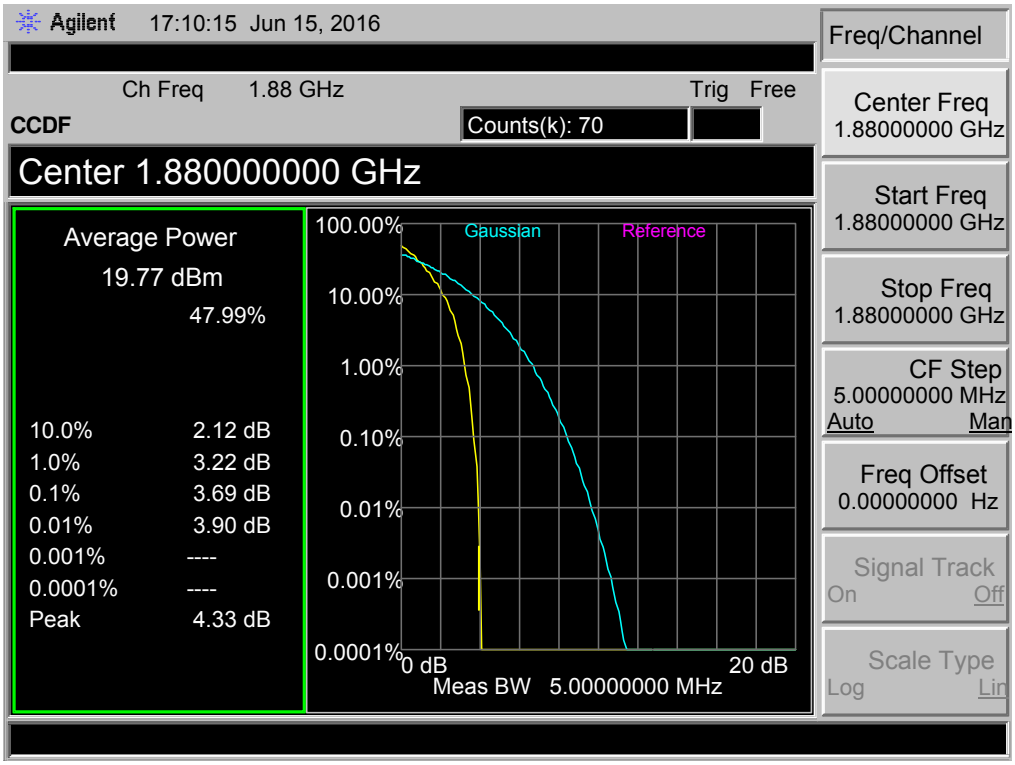


UMTS Band II HSUPA

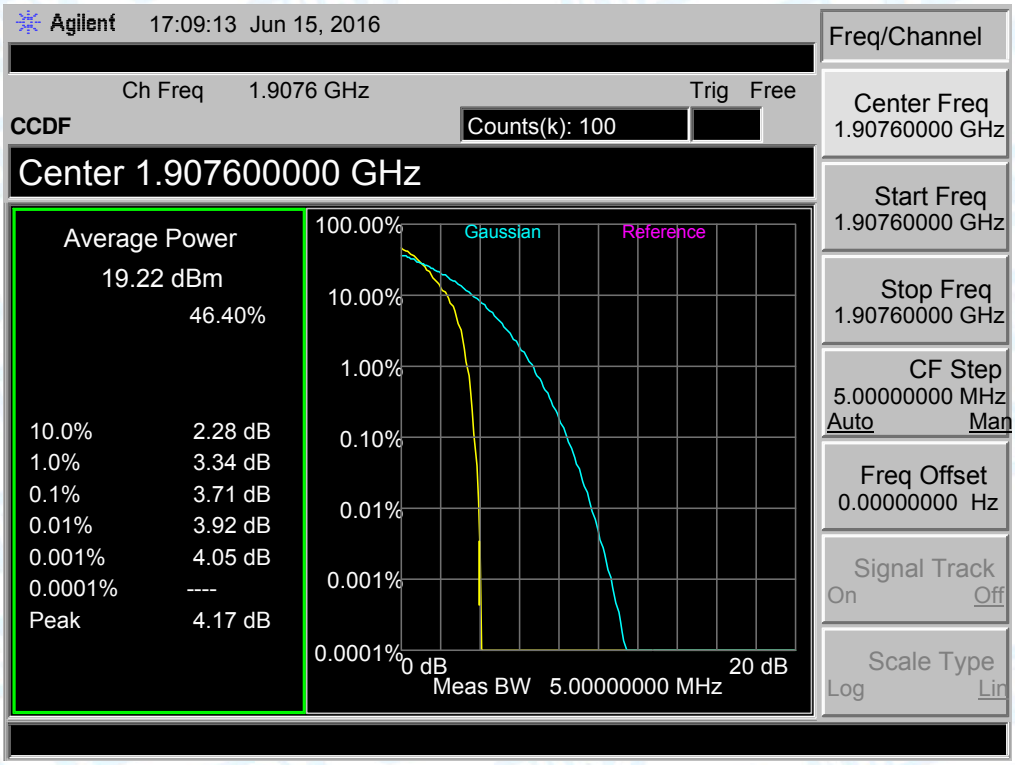
CH 9262



CH 9400



CH 9538



7. Radiated Output Power

7.1 Test Standard and Limit

7.1.1 Test Standard

FCC Part 22H : 22.913 (a)

FCC Part 24E: 24.232 (c)

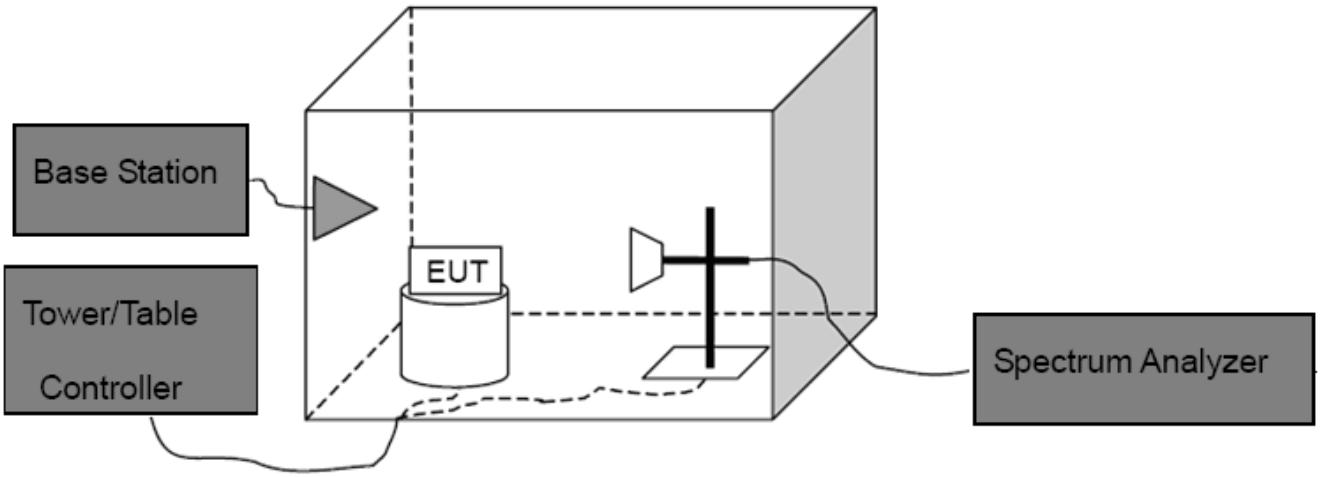
7.1.2 Test Limit

According to FCC Part 22.913 (a), the ERP of Cellular mobile transmitters must not exceed 7 Watts(38.5 dBm).

According to FCC Part 24.232 (c), the Mobile/portable stations are limited to 2 Watts(33 dBm) EIRP peak power.

Cellular Band	PCS Band
UMTS Band V	**UMTS Band II**
38.5 dBm (ERP)	33 dBm (EIRP)

7.2 Test Setup



7.3 Test Procedure

(1) The EUT was placed on an non-conductive rotating platform with 0.8 meter height in an anechoic chamber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer with RBW=3 MHz, VBW=3 MHz and peak detector settings.

(2) During the measurement, the EUT was enforced in maximum power and linked with the Base

Station. The highest was recorded from analyzer power level (LVT) from the 360 degrees rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.

(3) Effective Isotropic Radiated Power (EIRP) was measured by substitution method according to TIA/EIA-603-D. The EUT was replaced by dipole antenna (for frequency below 1 GHz) or Horn antenna (for frequency above 1 GHz) at same location with same polarize of receiver antenna and then a known power of each measure frequency from S.G. was applied into the dipole antenna or Horn antenna through a TX cable, and then recorded the maximum Analyzer reading through raised and lowered the test antenna.
Then the EUT's EIRP and ERP was calculated with the correction factor:
ERP=S.G.Level +Antenna Gain Cord.(dBd)-Cable Loss(dB)
EIRP=S.G.Level+Antenna Gain Cord.(dBi)-Cable Loss(dB)

7.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

7.5 Test Data

Measurement Data (worst case)

UMTS Band V								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP Power (dBm)	ERP Power (W)
Band V RMC	4132	826.4	H	18.26	3.46	1.26	20.46	0.111
			V	17.78	3.46	1.26	19.98	0.100
	4183	836.6	H	17.55	3.82	1.26	20.11	0.103
			V	16.79	3.82	1.26	19.35	0.086
	4233	846.6	H	17.13	4.16	1.26	20.03	0.101
			V	16.84	4.16	1.26	19.74	0.094
Limit							38.5	7

UMTS Band II								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP Power (dBm)	ERP Power (W)
Band II RMC	9262	1852.4	H	17.26	5.01	2.59	19.68	0.093
			V	15.47	5.01	2.59	17.89	0.062
	9400	1880.0	H	17.13	4.82	2.59	19.36	0.086
			V	15.65	4.82	2.59	17.88	0.061
	9538	1907.6	H	17.10	4.45	2.59	18.96	0.079
			V	15.17	4.45	2.59	17.03	0.050
Limit							33	2

8. Occupied Bandwidth

8.1 Test Standard and Limit

8.1.1 Test Standard

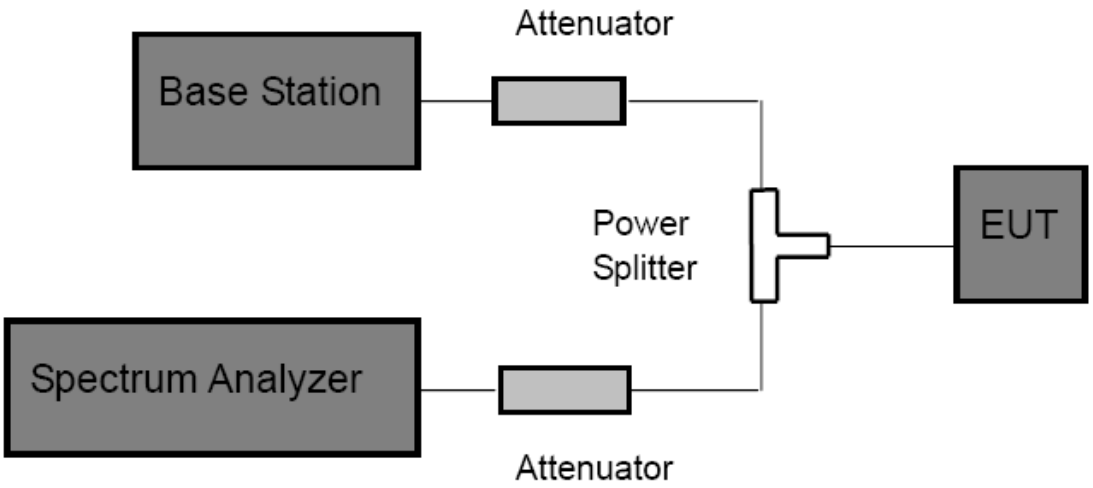
FCC Part 2: 2.1049
FCC Part 22H : 22.913 (a)
FCC Part 24E: 24.232 (c)

8.1.2 Test Requirement

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 99% power and -26dBC occupied bandwidths.

8.2 Test Setup



8.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) The resolution bandwidth of the Spectrum Analyzer is set to at least 1% of the occupied bandwidth.
(3) The low, middle and the high channels are selected to perform tests respectively.
(4) Set the frequency range of the Spectrum Analyzer suitably to capture the waveform; search peak; make a line whose value is 26dB lower than the peak; mark two points which the line intersected the waveform at; finally record the delta of the two points as the occupied bandwidth and the plot.
(5) Set the Spectrum Analyzer Occupied bandwidth function to measure the 99% occupied bandwidth.

8.4 EUT Operating Condition

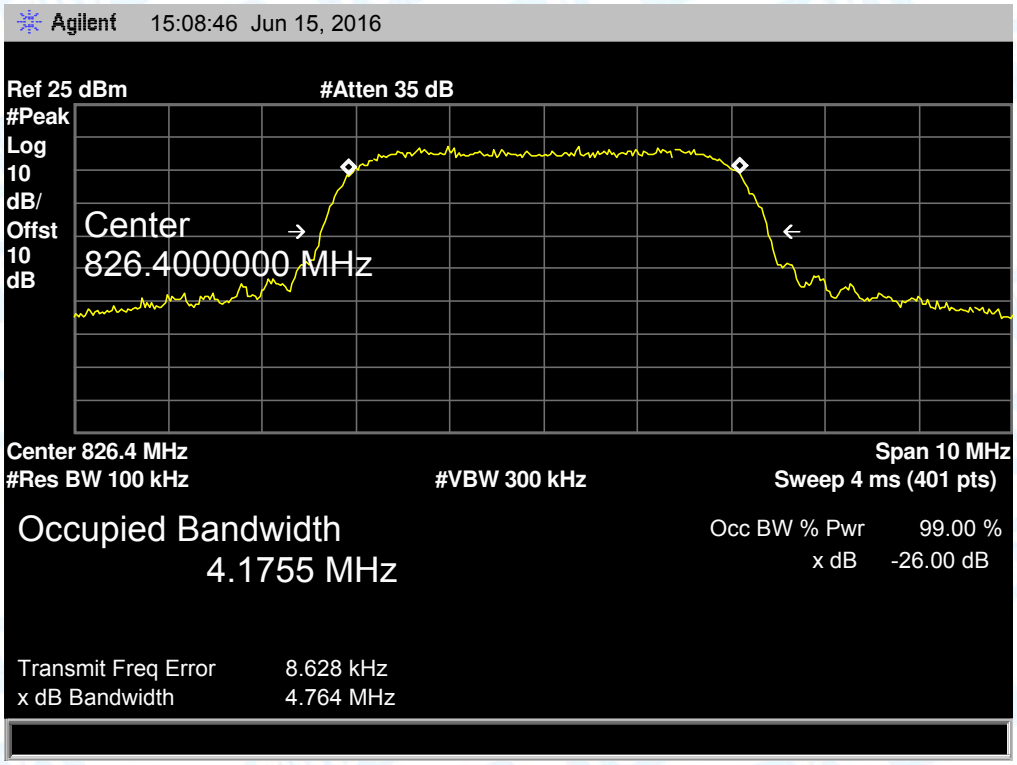
The EUT was continuously connected with the Base station and transmitting in the max power during the test.

8.5 Test Data

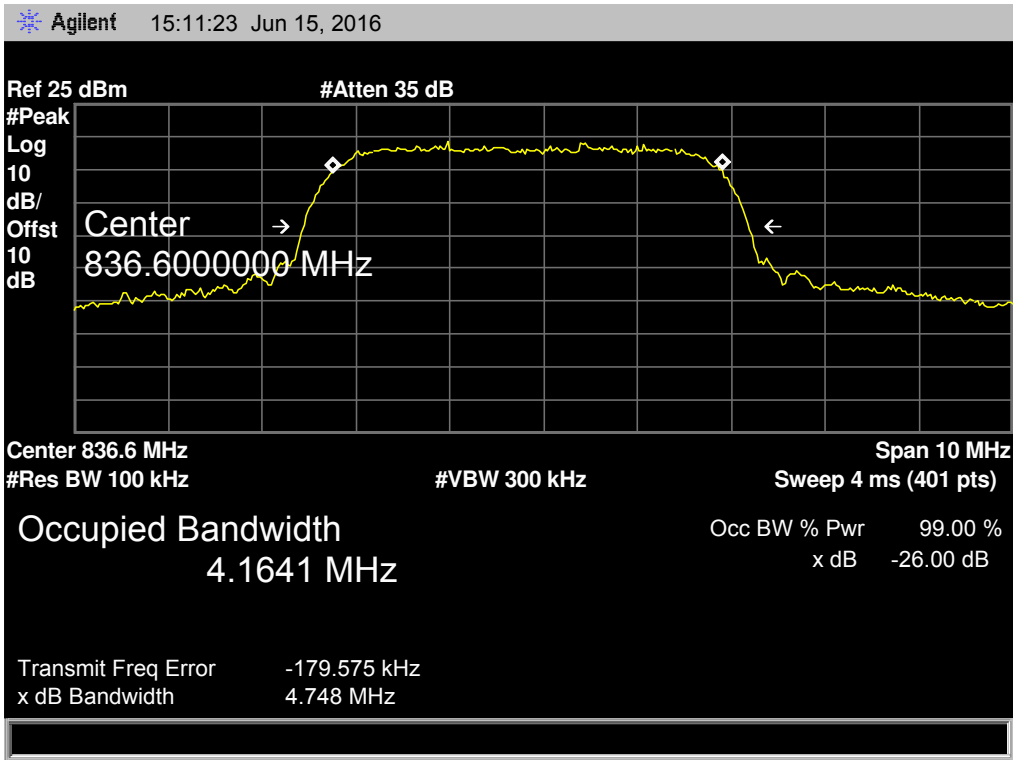
Please refer following pages.

UMTS Band V				
Mode	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**	**-26dB Bandwidth (MHz)**
Band V RMC	4132	826.4	4.1755	4.764
	4183	836.6	4.1641	4.748
	4233	846.6	4.1647	4.735
Band V HSDPA	4132	826.4	4.1667	4.778
	4183	836.6	4.1578	4.758
	4233	846.6	4.1656	4.758
Band V HSUPA	4132	826.4	4.1684	4.764
	4183	836.6	4.1723	4.764
	4233	846.6	4.1700	4.771
UMTS Band II				
Mode	**Channel**	**Frequency (MHz)**	**99% OBW (MHz)**	**-26dB Bandwidth (MHz)**
Band II RMC	9262	1852.4	4.1806	4.768
	9400	1880.0	4.1698	4.743
	9538	1907.6	4.2033	4.852
Band II HSDPA	9262	1852.4	4.1718	4.781
	9400	1880.0	4.1710	4.773
	9538	1907.6	4.2067	4.875
Band II HSUPA	9262	1852.4	4.1829	4.748
	9400	1880.0	4.1636	4.781
	9538	1907.6	4.1970	4.830

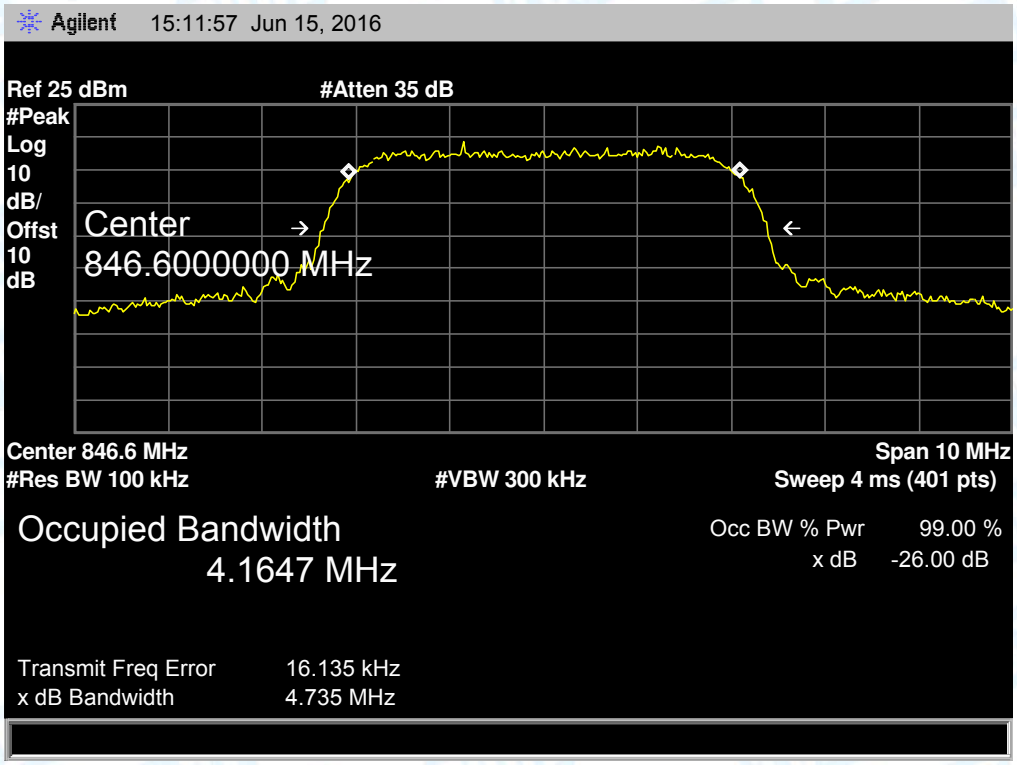
UMTS Band V (RMC)
CH 4132



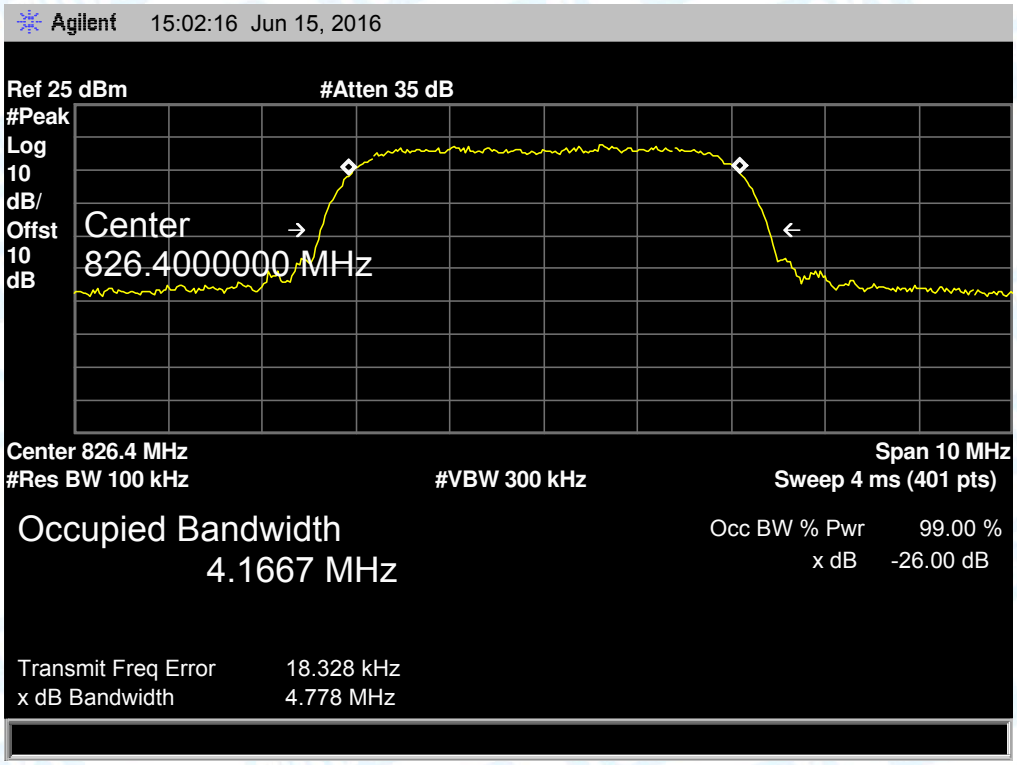
CH 4183



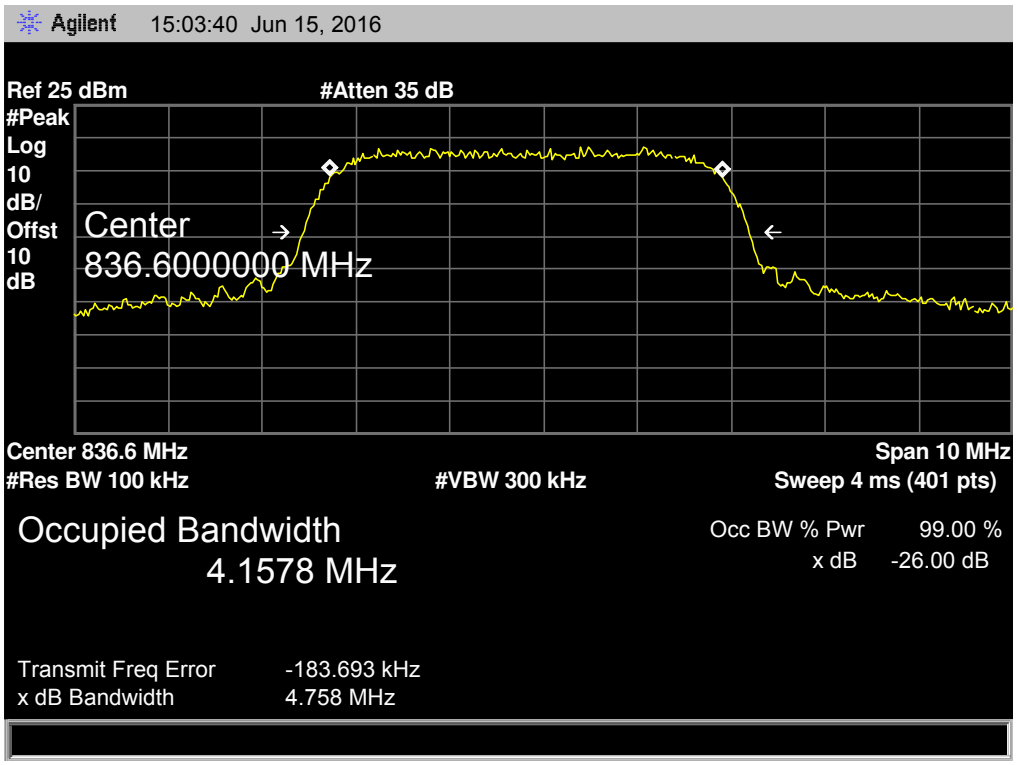
CH 4233


Agilent 15:11:57 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
846.6000000 MHz
Center 846.6 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.1647 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 16.135 kHz
x dB Bandwidth 4.735 MHz

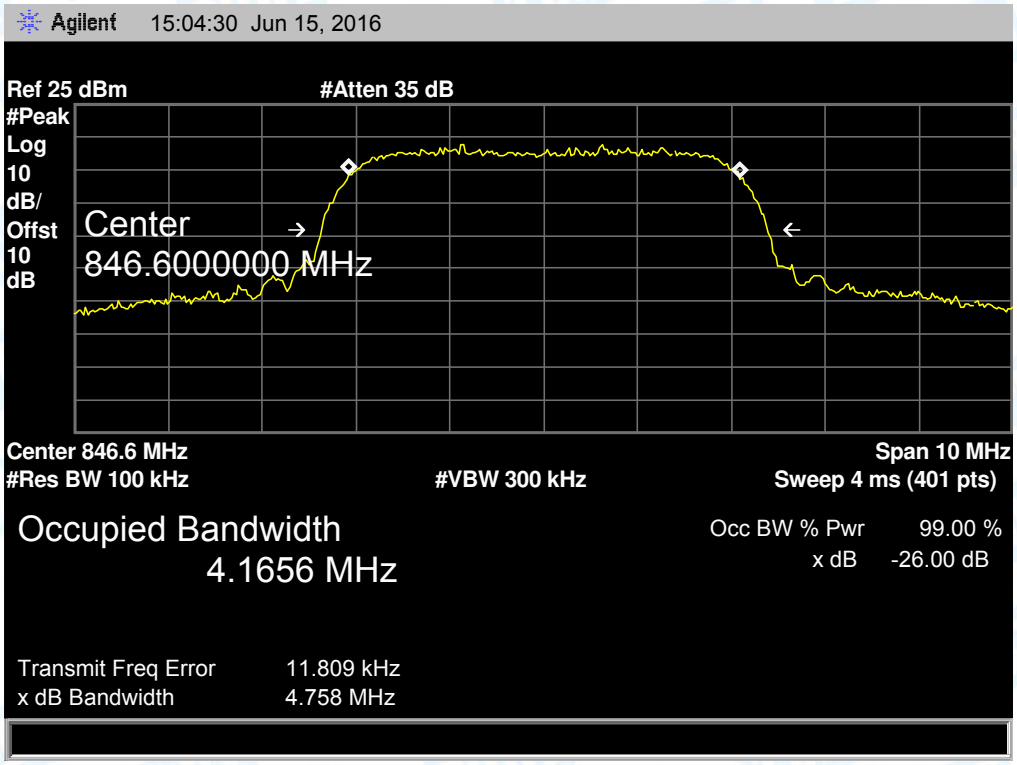
UMTS Band V (HSDPA)
CH 4132



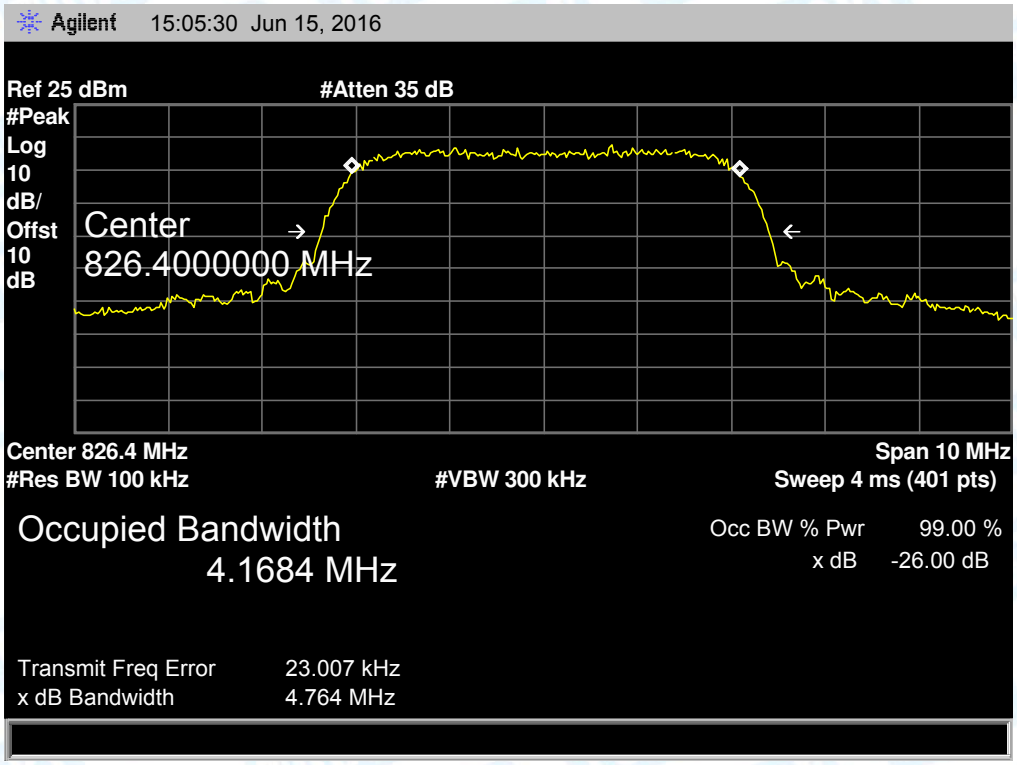
CH 4183



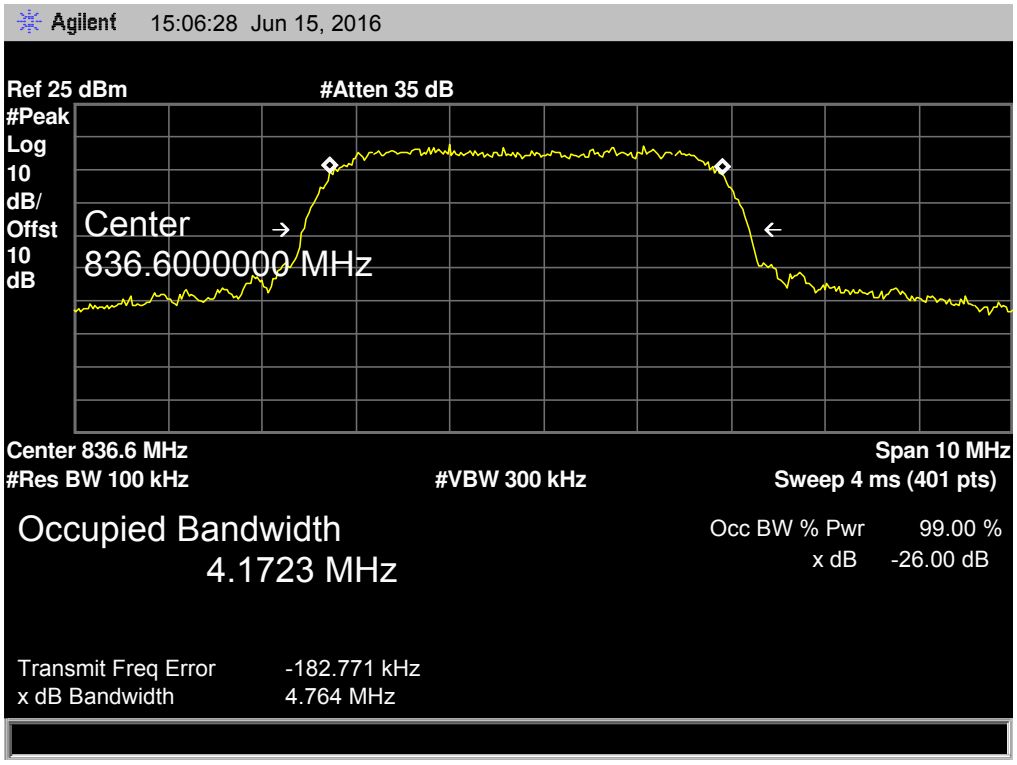
CH 4233


Agilent 15:04:30 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
846.6000000 MHz
Center 846.6 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.1656 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 11.809 kHz
x dB Bandwidth 4.758 MHz

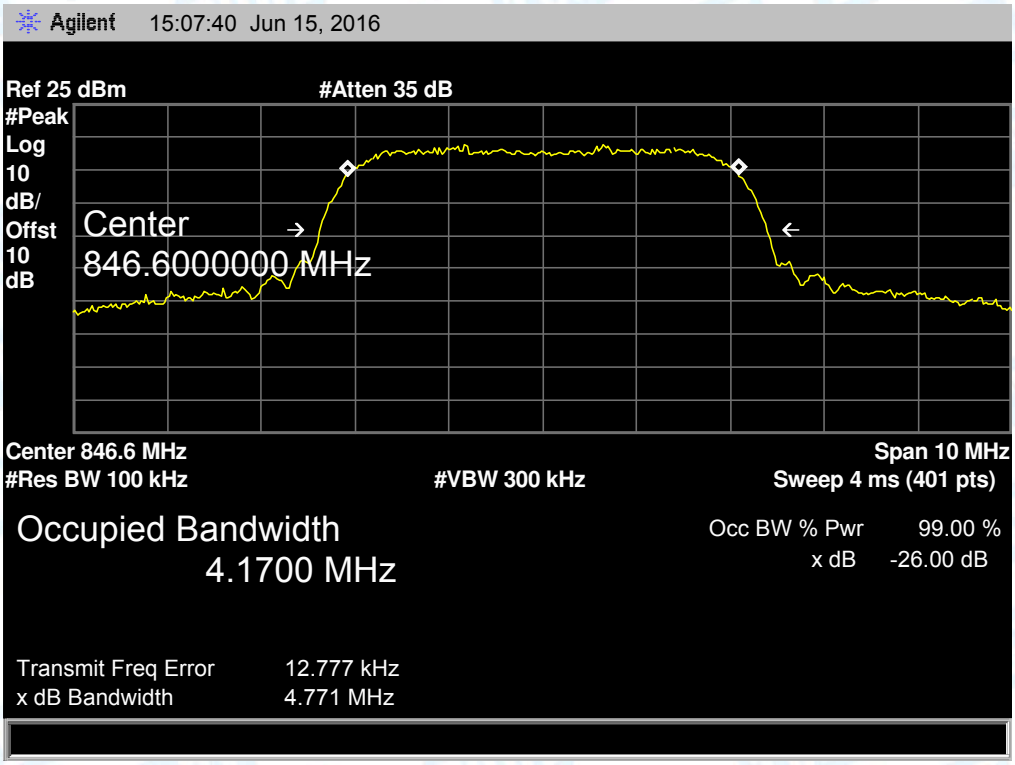
UMTS Band V (HSUPA)
CH 4132



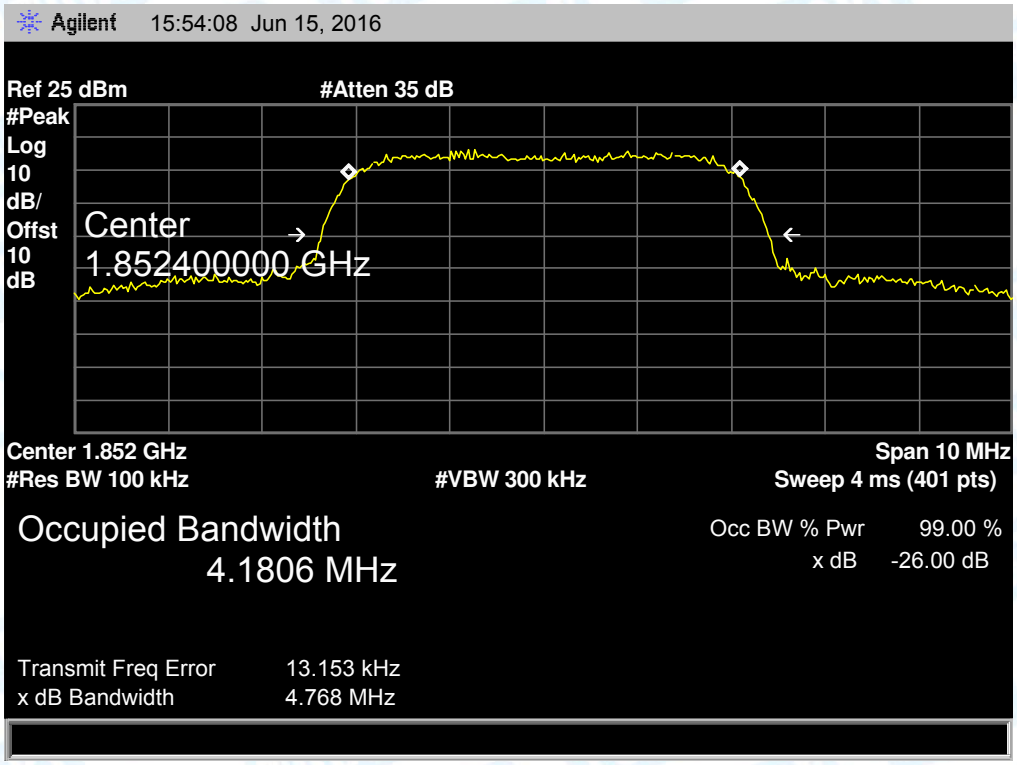
CH 4175



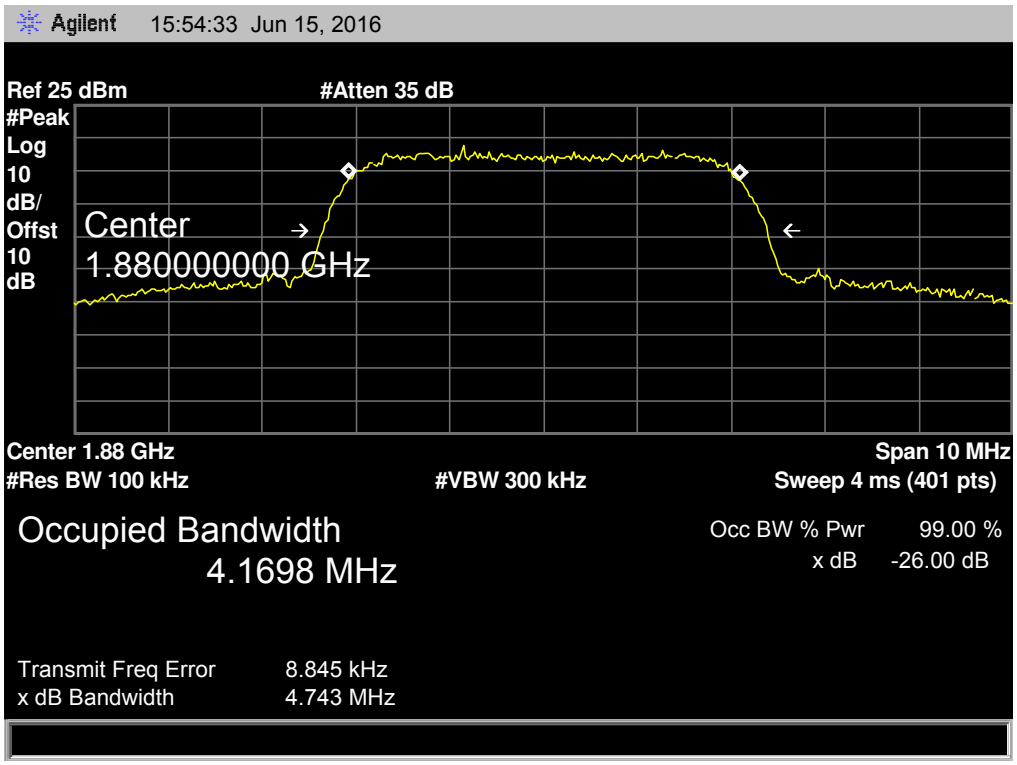
CH 4233


Agilent 15:07:40 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
846.6000000 MHz
Center 846.6 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.1700 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 12.777 kHz
x dB Bandwidth 4.771 MHz

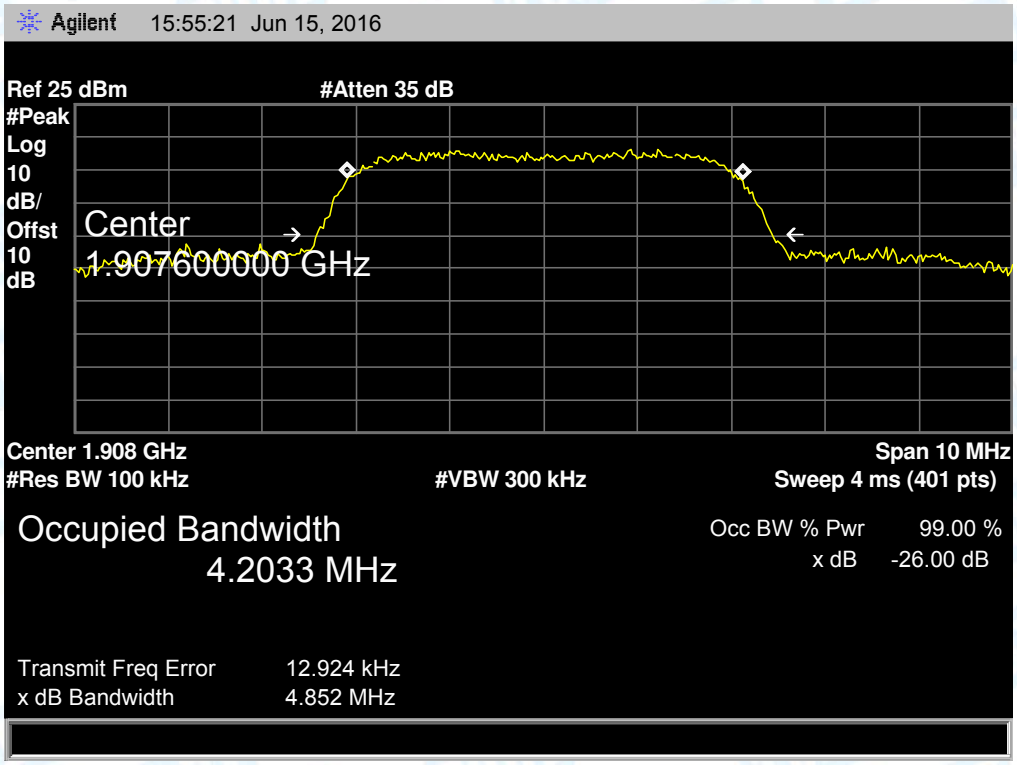
UMTS Band II (RMC)
CH 9262



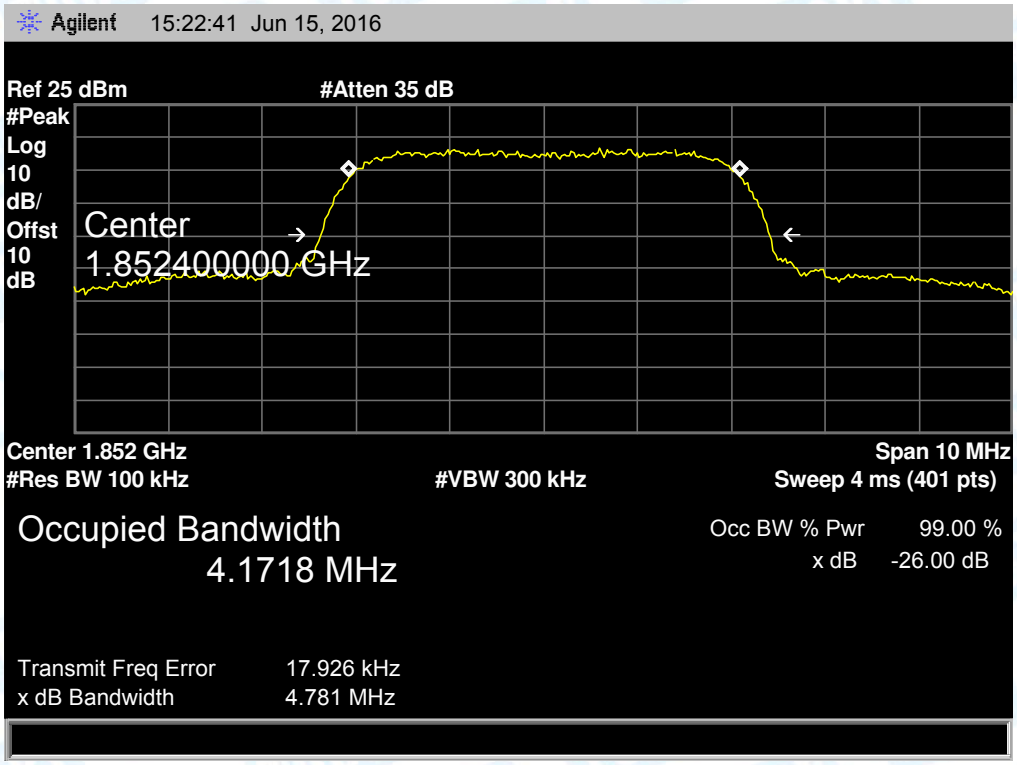
CH 9400



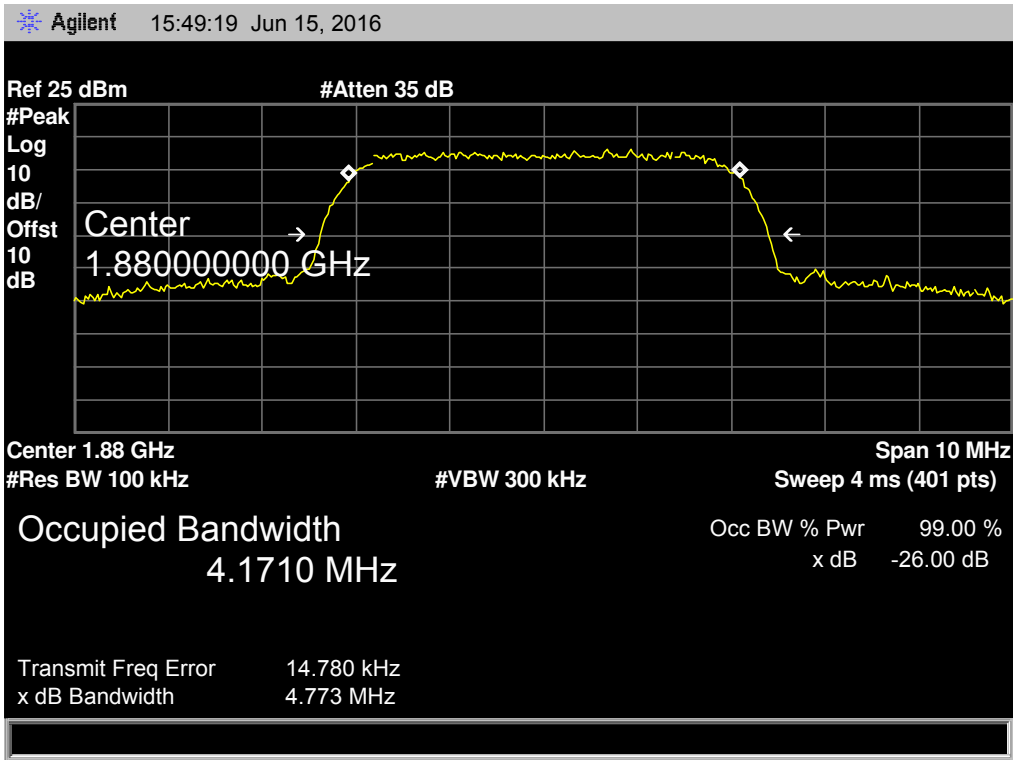
CH 9538


Agilent 15:55:21 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.907600000 GHz
Center 1.908 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.2033 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 12.924 kHz
x dB Bandwidth 4.852 MHz

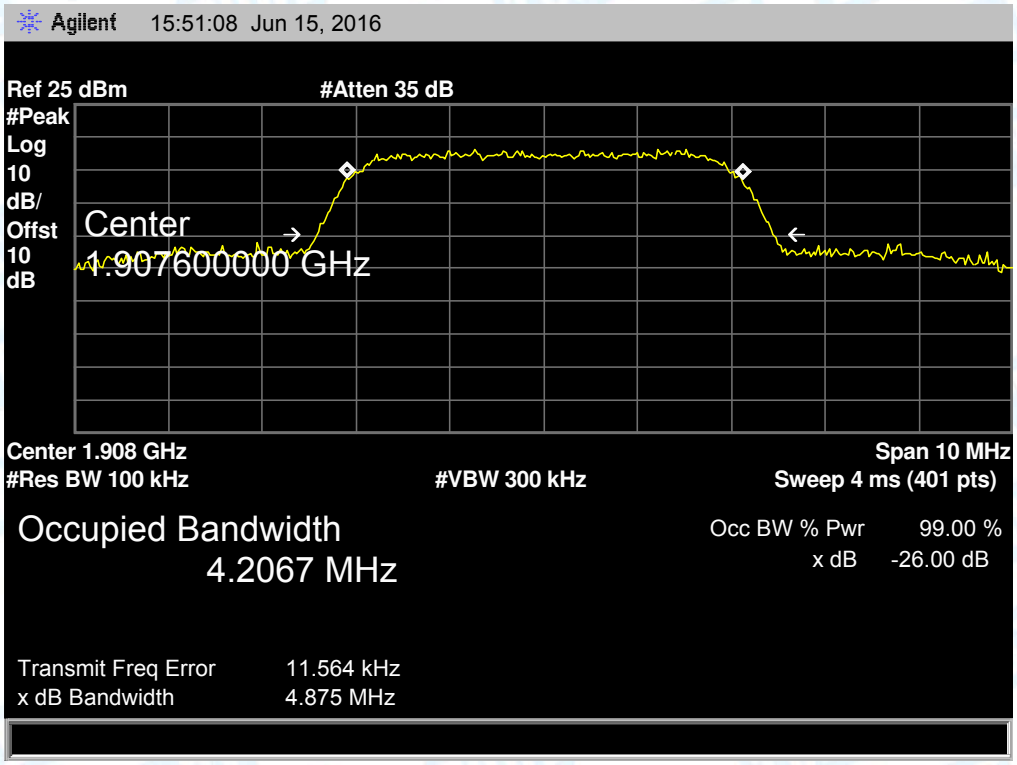
UMTS Band II (HSDPA)
CH 9262



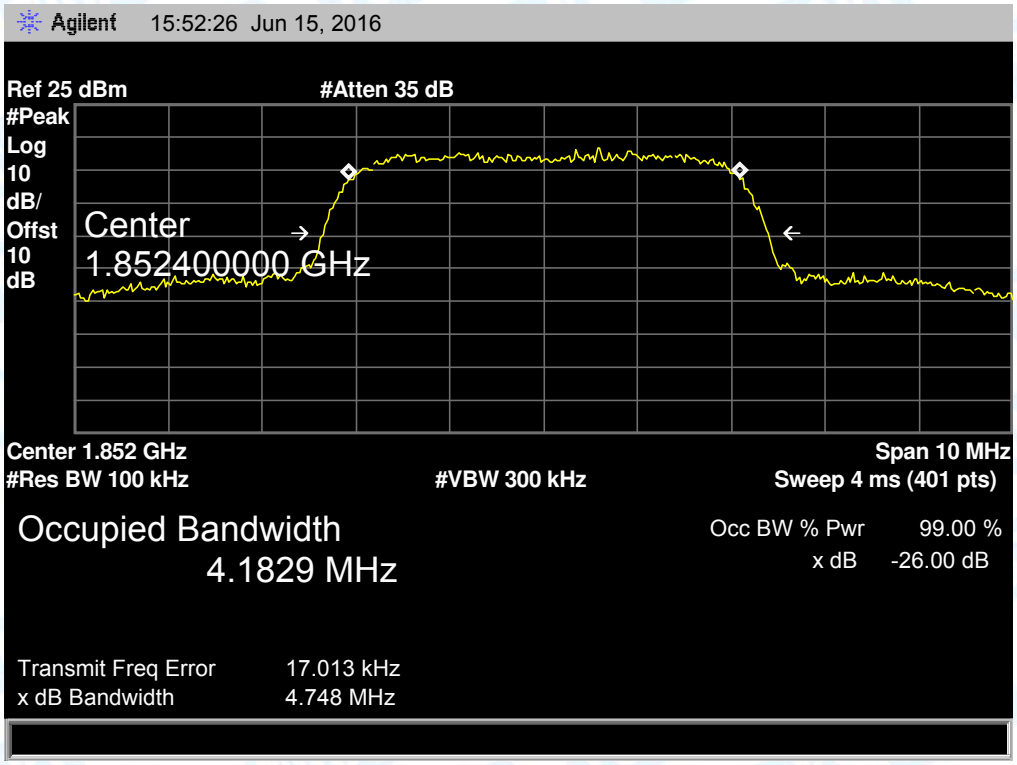
CH 9400



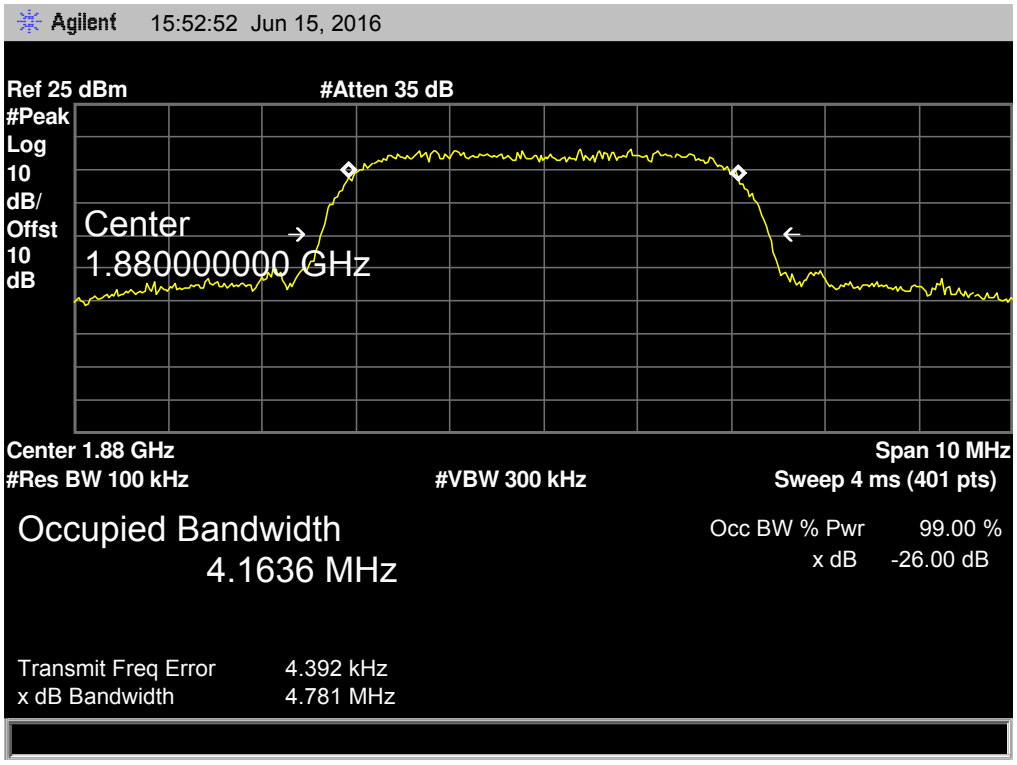
CH 9538


Agilent 15:51:08 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.907600000 GHz
Center 1.908 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.2067 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 11.564 kHz
x dB Bandwidth 4.875 MHz

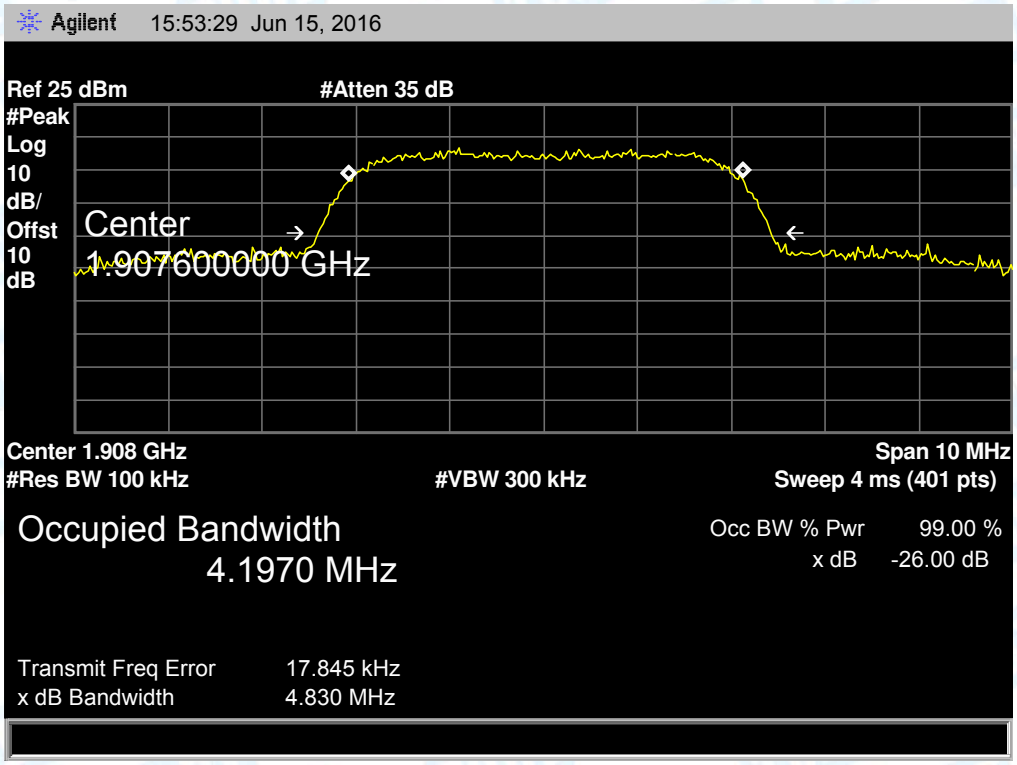
UMTS Band II (HSUPA)
CH 9262



CH 9400



CH 9538


Agilent 15:53:29 Jun 15, 2016
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Center
1.907600000 GHz
Center 1.908 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 10 MHz
Sweep 4 ms (401 pts)
Occupied Bandwidth
4.1970 MHz
Occ BW % Pwr 99.00 %
x dB -26.00 dB
Transmit Freq Error 17.845 kHz
x dB Bandwidth 4.830 MHz

9. Conducted Out of Band Emissions

9.1 Test Standard and Limit

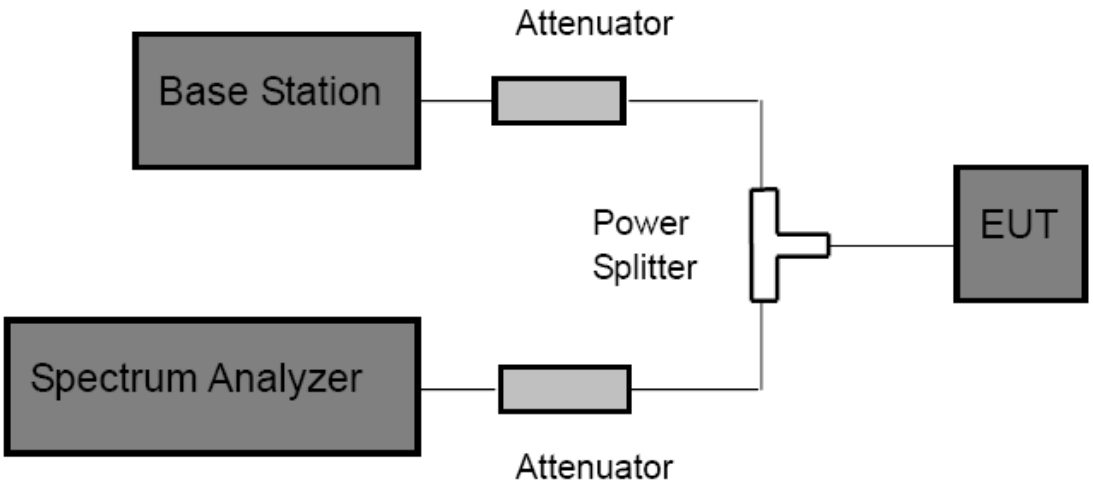
9.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22H: 22.917(a)
FCC Part 24E: 24.238(a)

9.1.2 Test Limit

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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

9.2 Test Setup



9.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) Spectrum Setting:
Frequency bellow 1 GHz: RBW=100 kHz, VBW=300 kHz.
Frequency above 1 GHz: RBW=1 MHz, VBW=3 MHz.
(3) The low, middle and high channels of each band and mode's spurious emissions for 30 MHz to 10th Harmonic were measured by Spectrum analyzer.

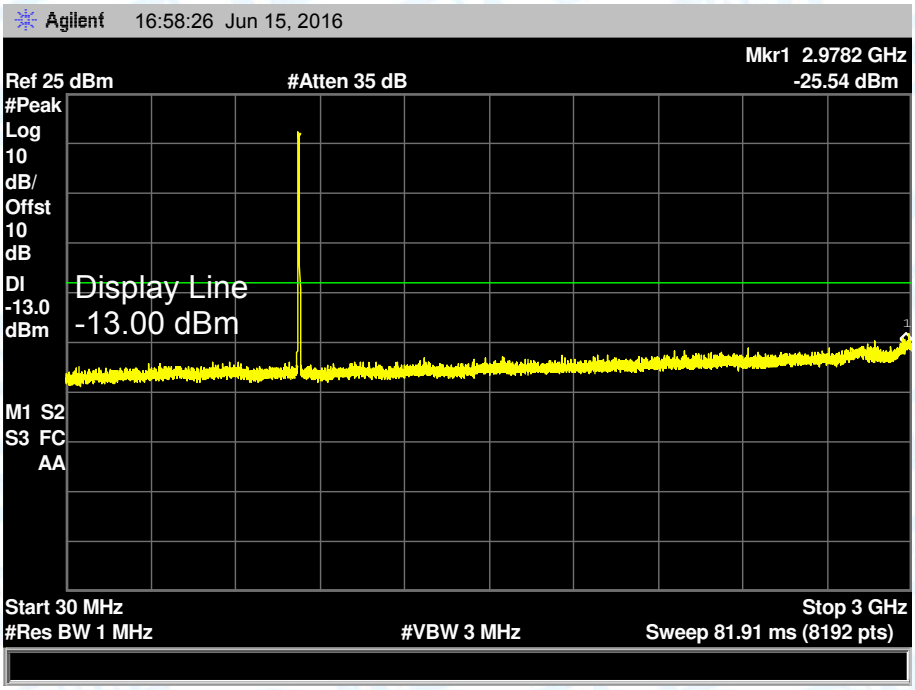
9.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

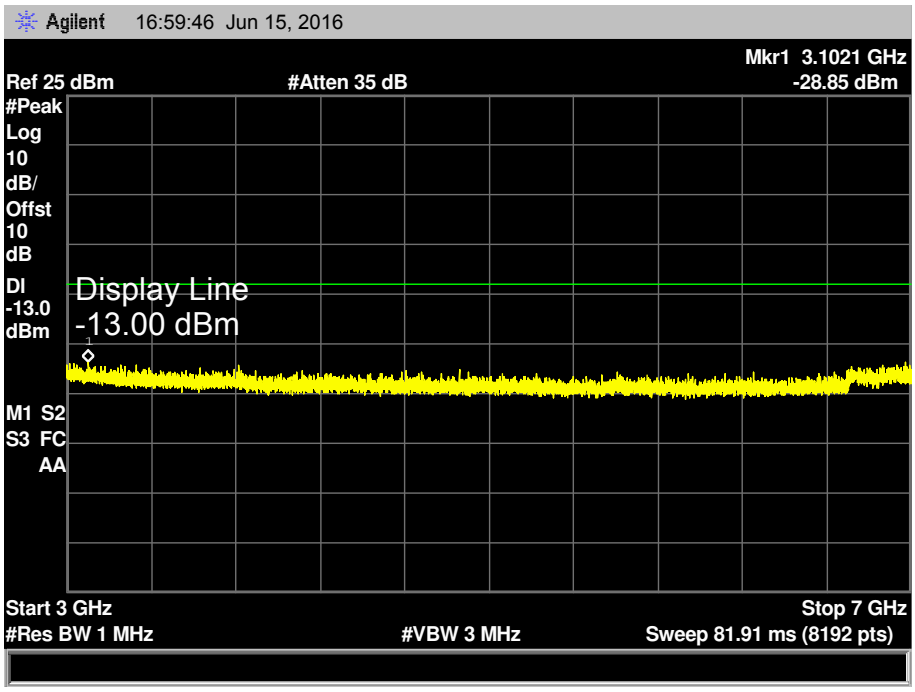
9.5 Test Data

Please refer following plots:

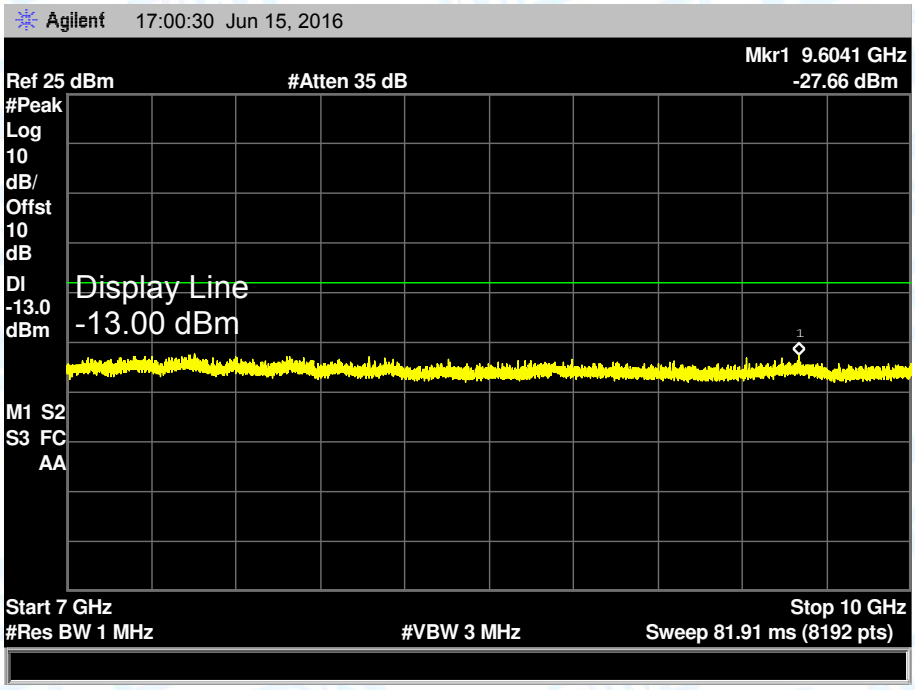
UMTS Band V CH 4132
30 MHz~ 3 GHz



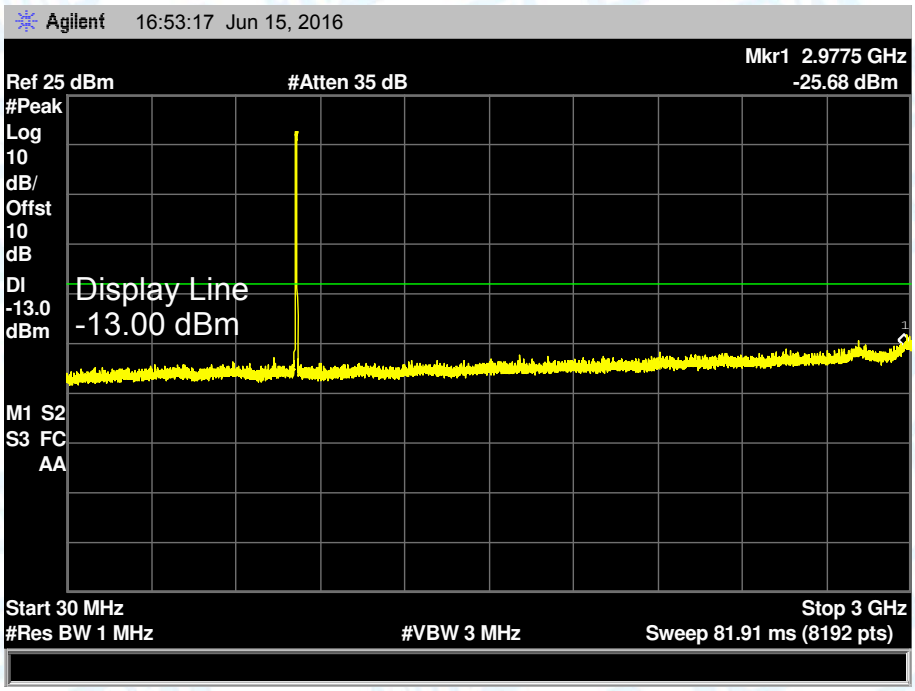
3 GHz~7 GHz



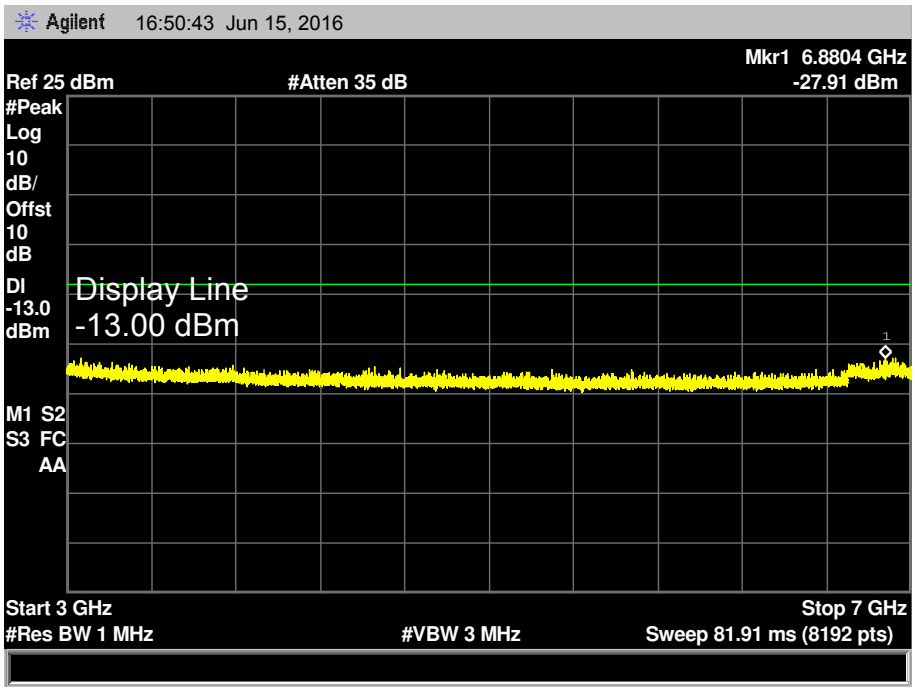
7 GHz~10 GHz


Agilent 17:00:30 Jun 15, 2016
Mkr1 9.6041 GHz
Ref 25 dBm
#Atten 35 dB
-27.66 dBm
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 10 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

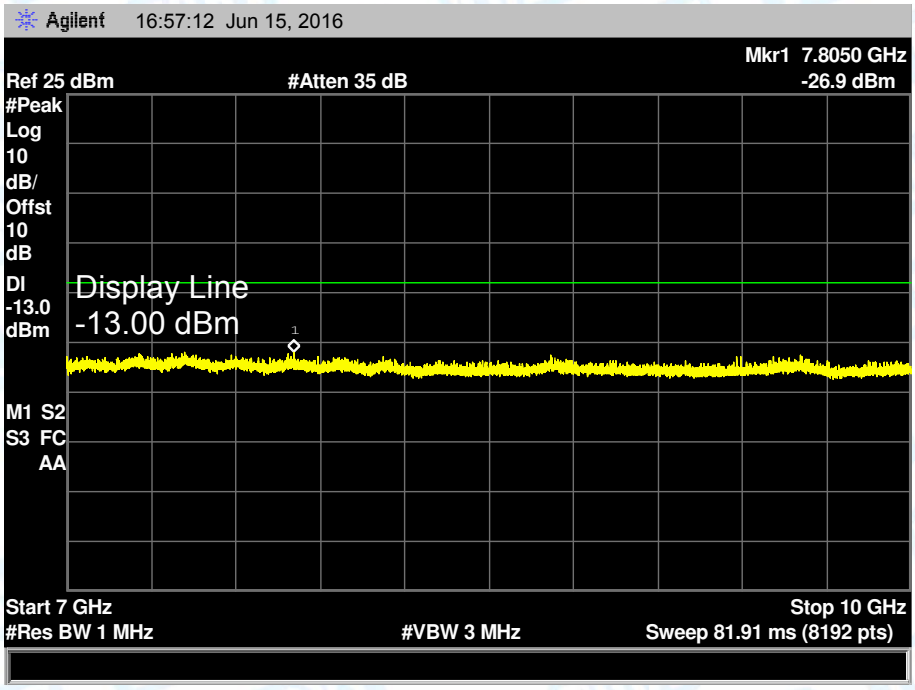
UMTS Band V CH 4175
30 MHz~ 3 GHz



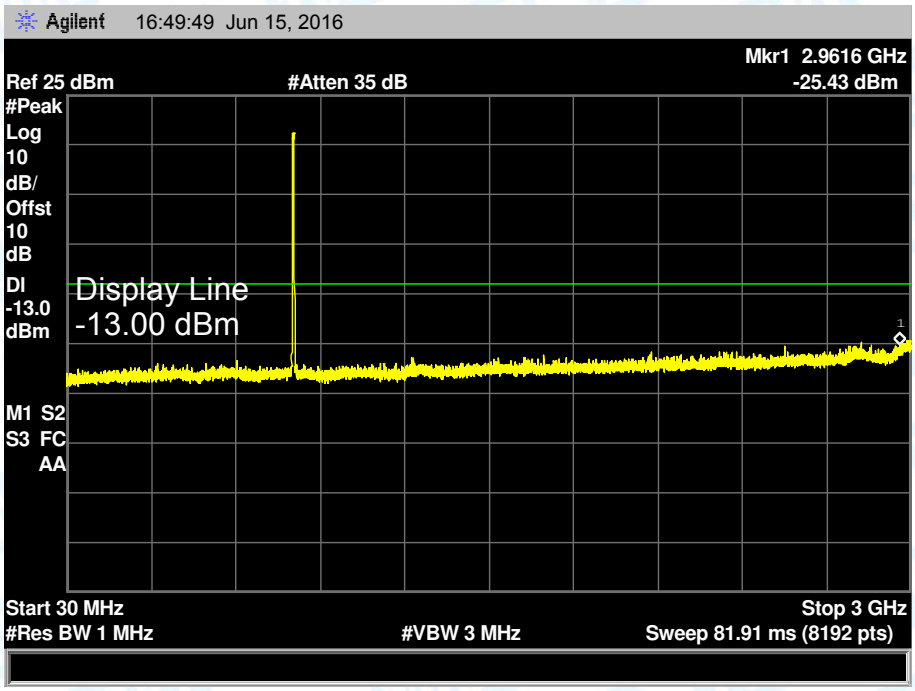
3 GHz~7 GHz



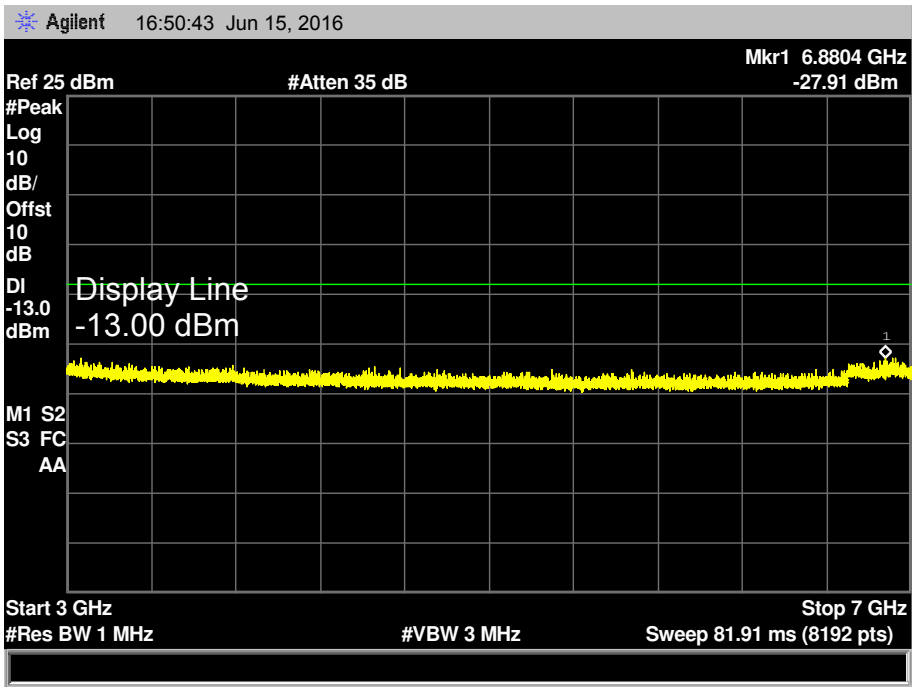
7 GHz~10 GHz


Agilent 16:57:12 Jun 15, 2016
Mkr1 7.8050 GHz
-26.9 dBm
Ref 25 dBm
#Atten 35 dB
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 7 GHz
#Res BW 1 MHz
#VBW 3 MHz
Stop 10 GHz
Sweep 81.91 ms (8192 pts)

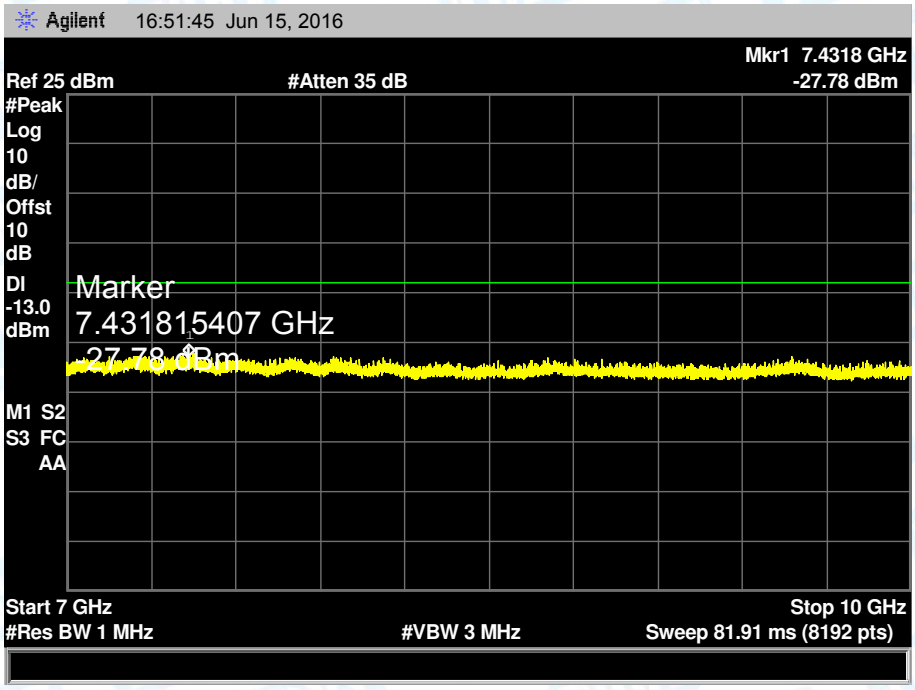
UMTS Band V CH 4233
30 MHz~ 3 GHz



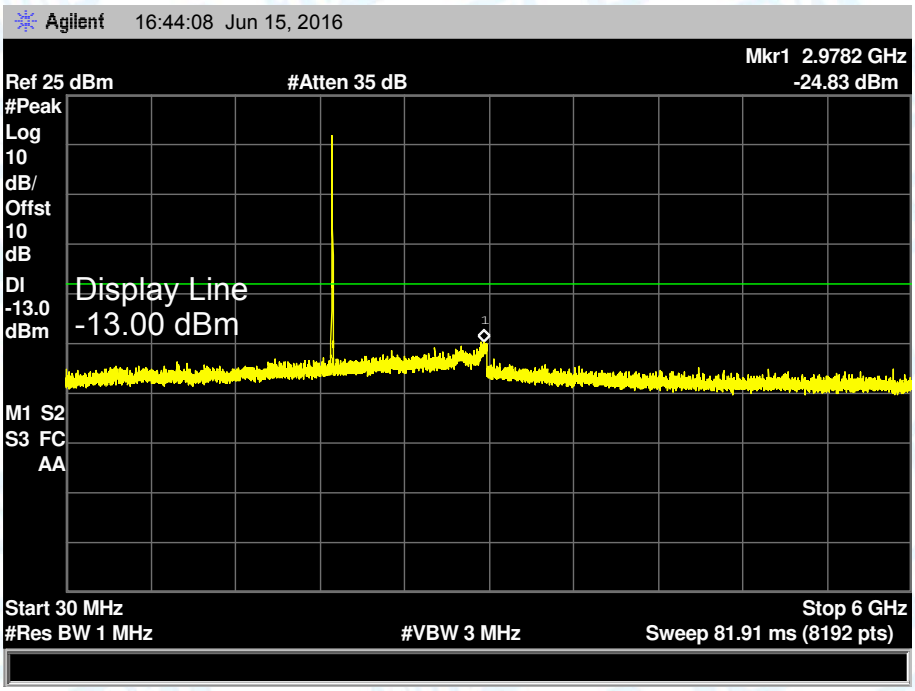
3 GHz~7 GHz



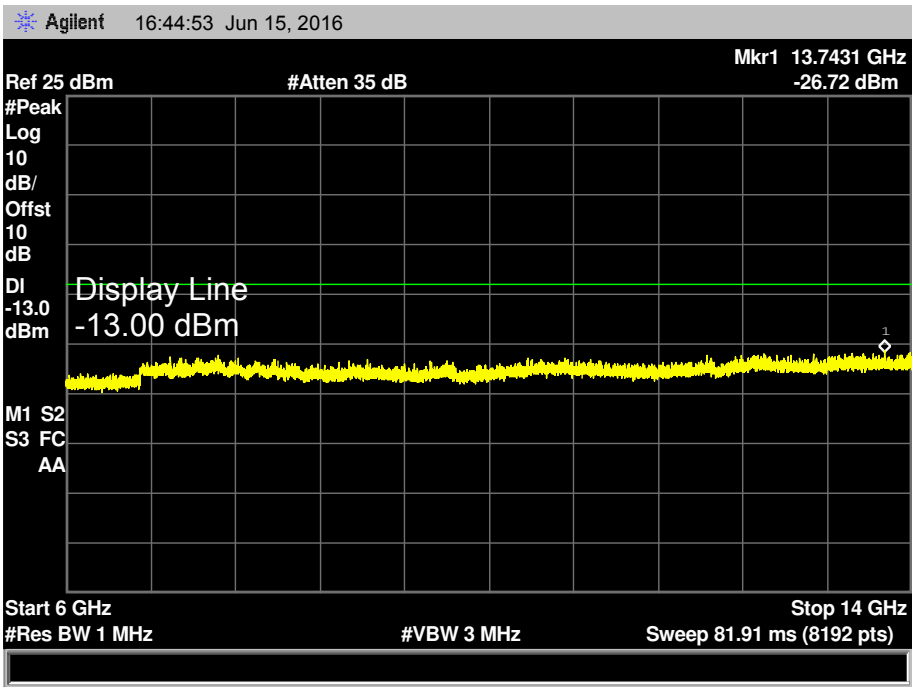
7 GHz~10 GHz


Agilent 16:51:45 Jun 15, 2016
Mkr1 7.4318 GHz
Ref 25 dBm
#Atten 35 dB
-27.78 dBm
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Marker
7.431815407 GHz
-27.78 dBm
M1 S2
S3 FC
AA
Start 7 GHz
Stop 10 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

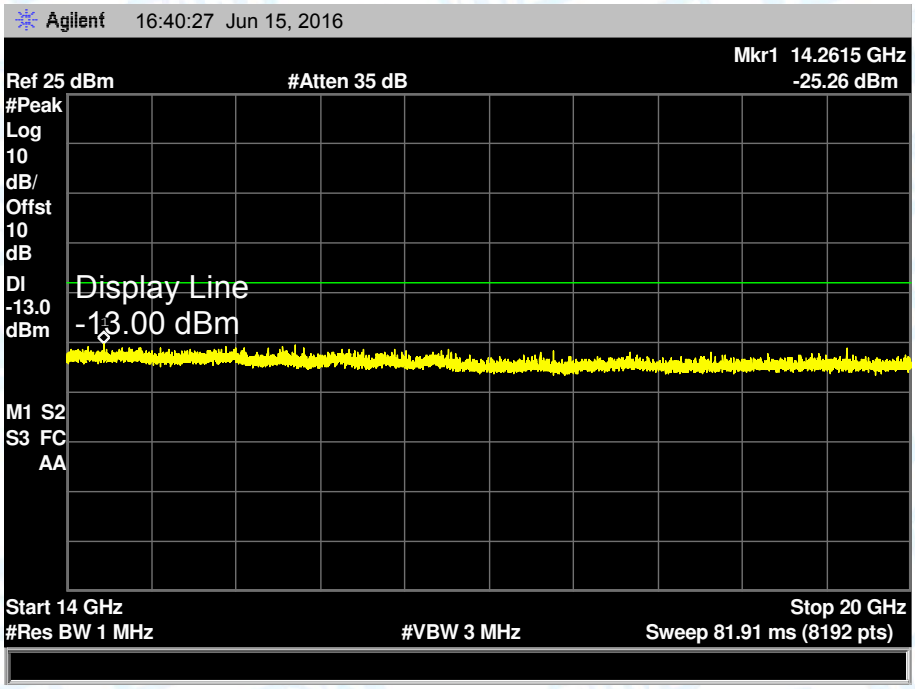
UMTS Band II CH 9262
30 MHz~ 6 GHz



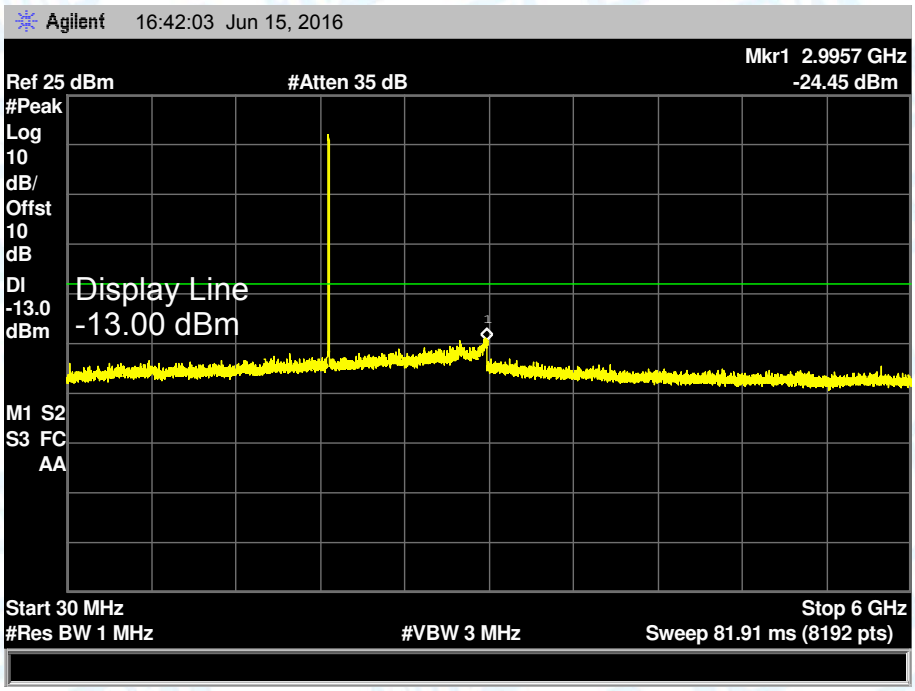
6 GHz~14 GHz



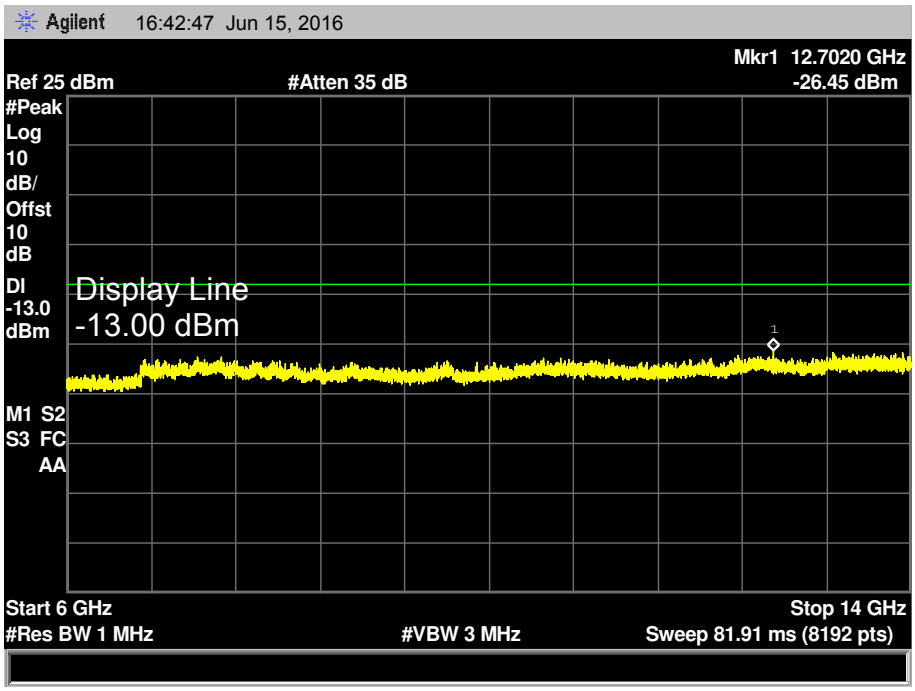
14 GHz~20 GHz


Agilent 16:40:27 Jun 15, 2016
Mkr1 14.2615 GHz
Ref 25 dBm
#Atten 35 dB
-25.26 dBm
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

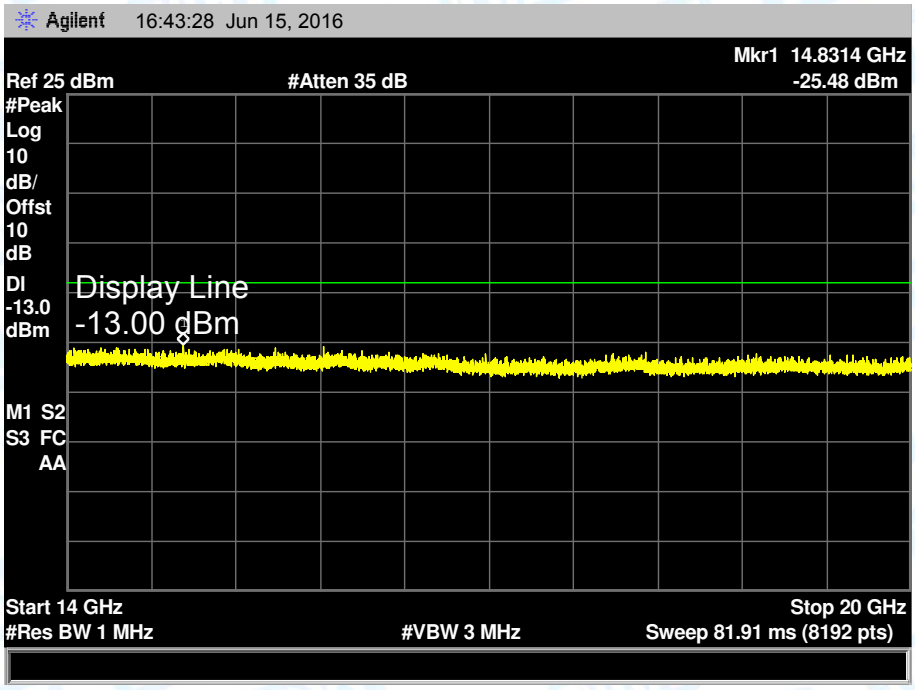
UMTS Band II CH 9400
30 MHz~ 6 GHz



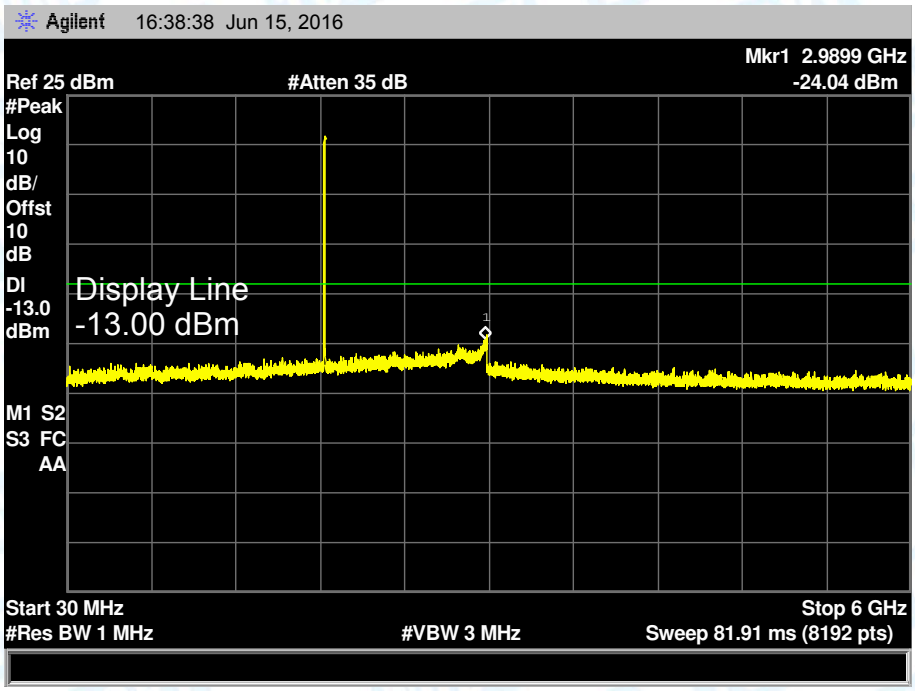
6 GHz~14 GHz



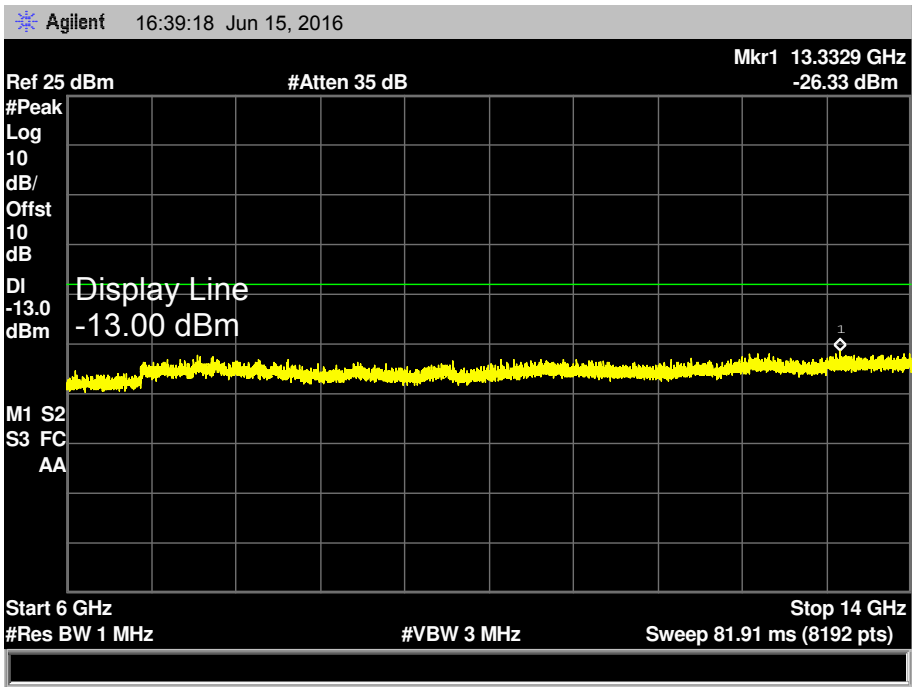
14 GHz~20 GHz


Agilent 16:43:28 Jun 15, 2016
Mkr1 14.8314 GHz
Ref 25 dBm
#Atten 35 dB
-25.48 dBm
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

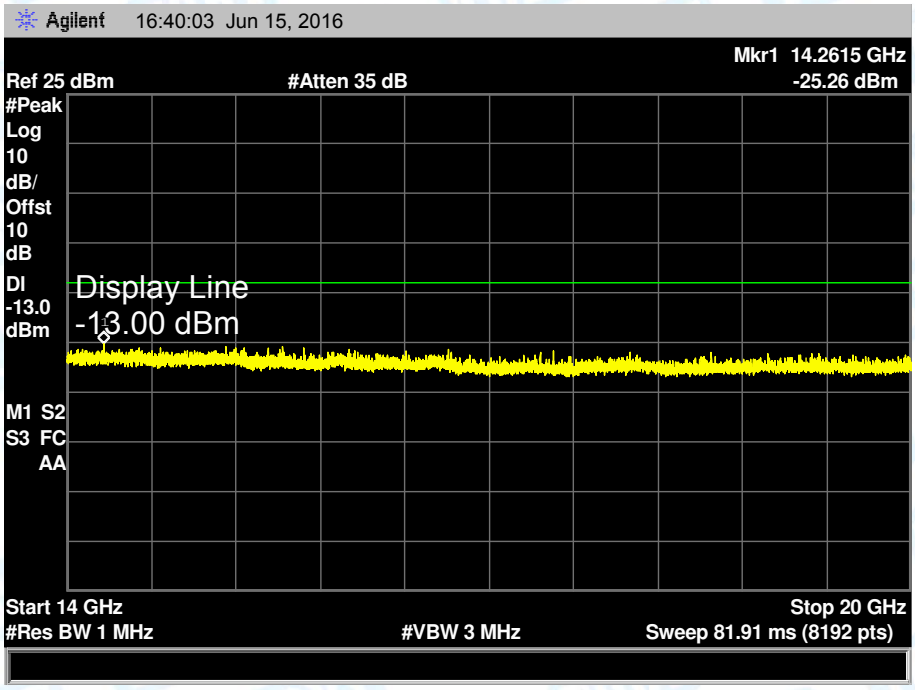
UMTS Band II CH 9538
30 MHz~ 6 GHz



6 GHz~14 GHz



14 GHz~20 GHz


Agilent 16:40:03 Jun 15, 2016
Mkr1 14.2615 GHz
Ref 25 dBm
#Atten 35 dB
-25.26 dBm
#Peak
Log
10
dB/
Offst
10
dB
Dl
-13.0
dBm
Display Line
-13.00 dBm
M1 S2
S3 FC
AA
Start 14 GHz
Stop 20 GHz
#Res BW 1 MHz
#VBW 3 MHz
Sweep 81.91 ms (8192 pts)

10. Band Edge Test

10.1 Test Standard and Limit

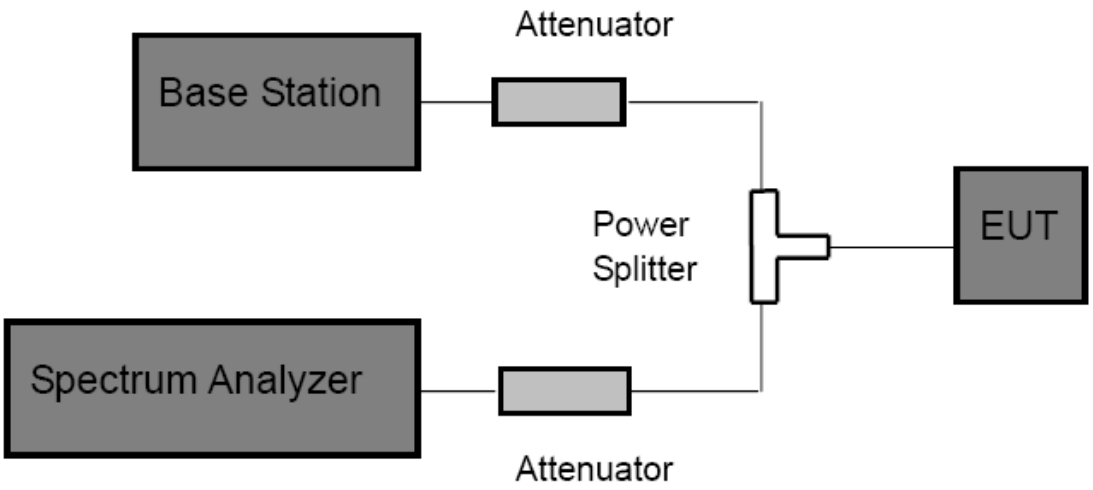
10.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057
FCC Part 22H: 22.917(a)
FCC Part 24E: 24.238(a)

10.1.2 Test Limit

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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

10.2 Test Setup



10.3 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and Base station via power splitter as show in the block diagram above.
(2) Spectrum Setting:
GSM and PCS: RBW=3 kHz, VBW=10 kHz, Span 1 MHz, Detector: Peak Mode.
WCDMA: RBW=100 kHz, VBW=300 kHz, Span 5 MHz, Detector: Peak Mode.
(3) The band edges of low and high channels for the highest RF powers were measured.

10.4 EUT Operating Condition

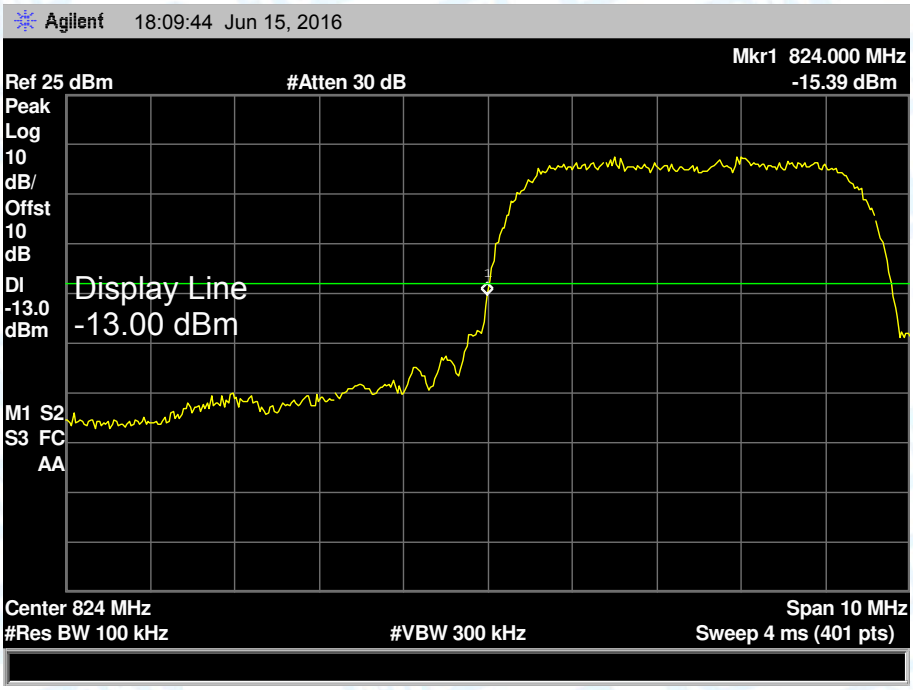
The EUT was continuously connected with the Base station and transmitting in the max power during the test.

10.5 Test Data

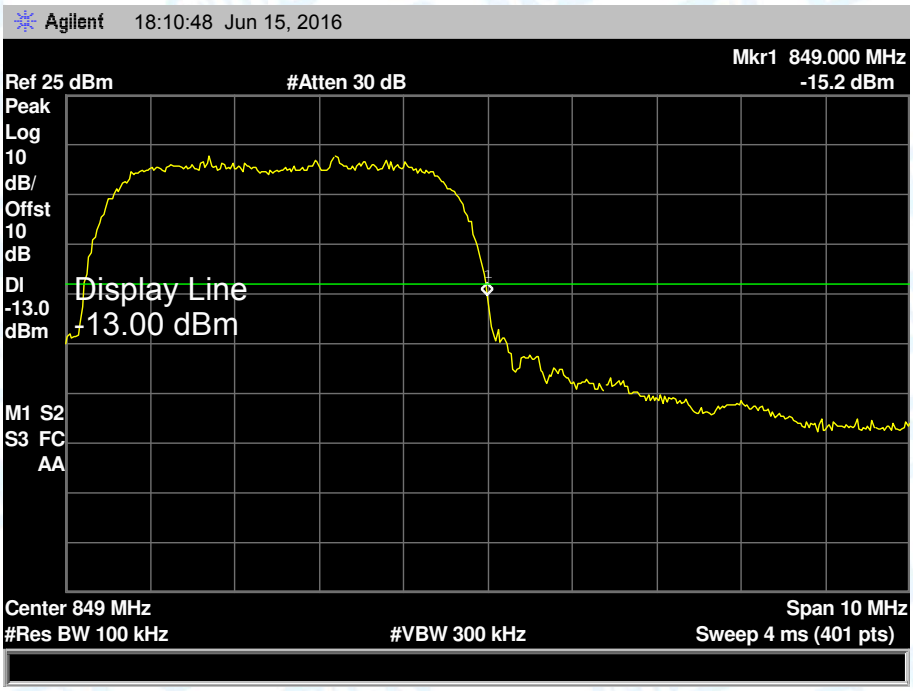
Please refer the following plots:

Band edge emission:

Test Mode:	UMTS Band V 12.2k RMC

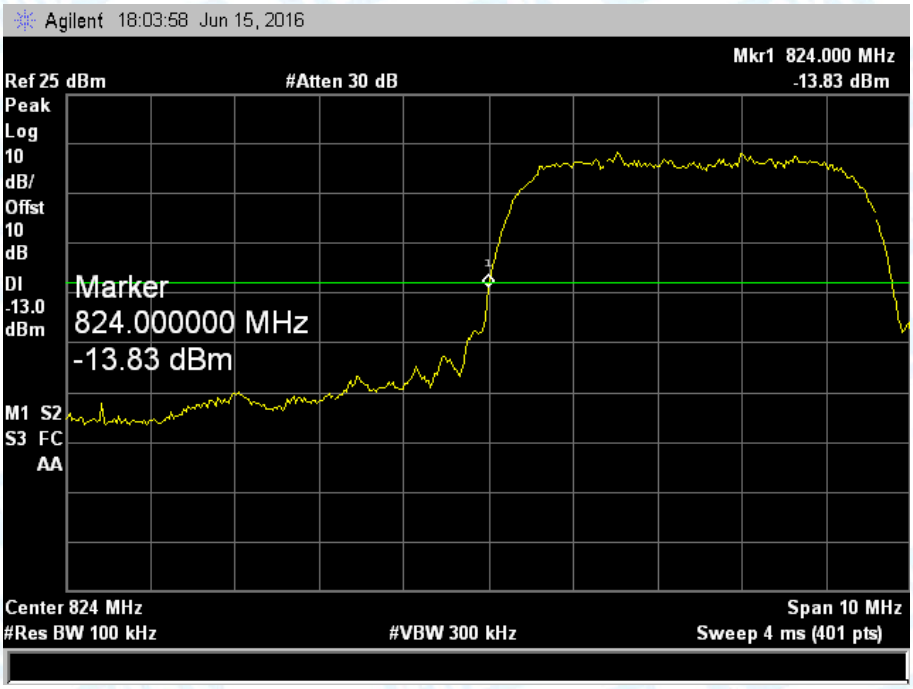


Lowest channel

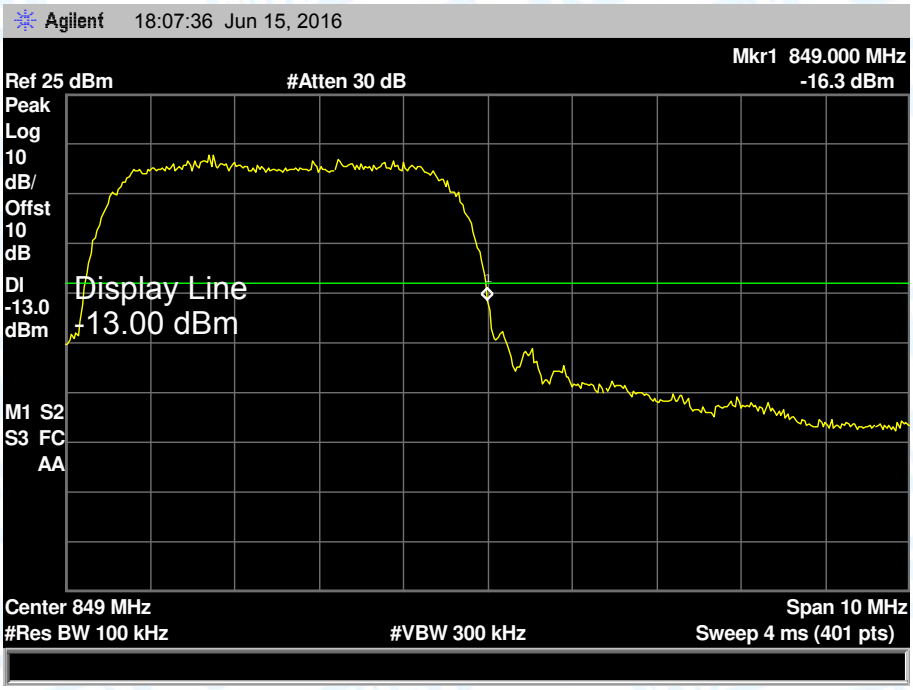


Highest channel

Test Mode:	UMTS Band V HSDPA

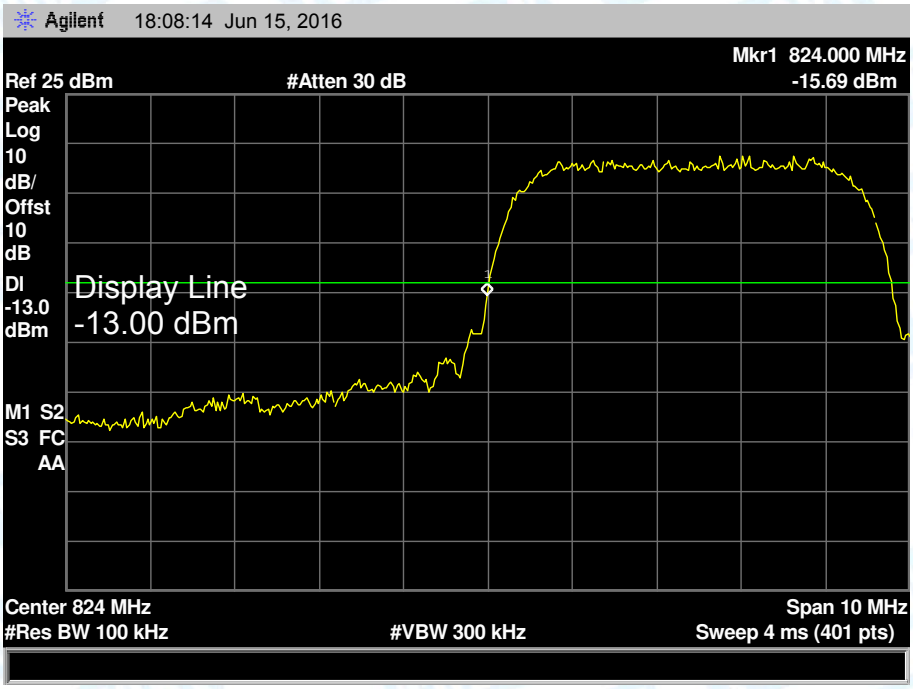


Lowest channel

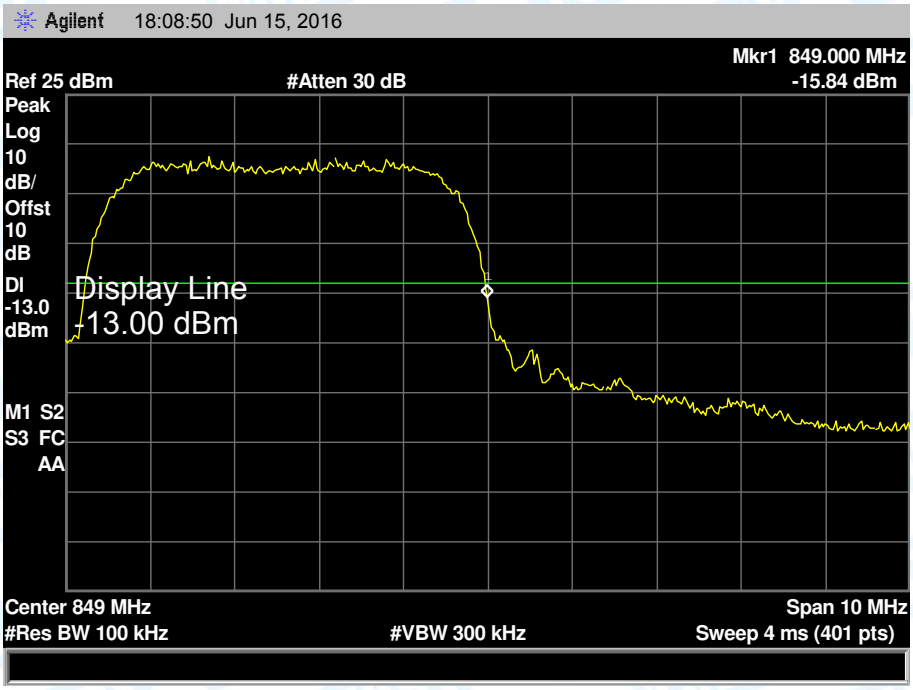


Highest channel

Test Mode:	UMTS Band V HSUPA

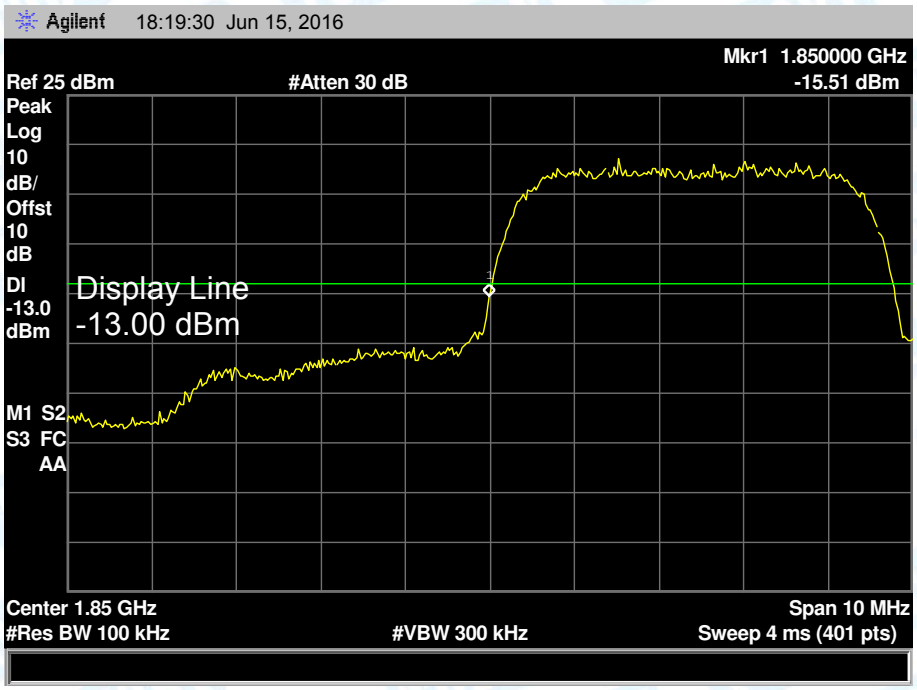


Lowest channel

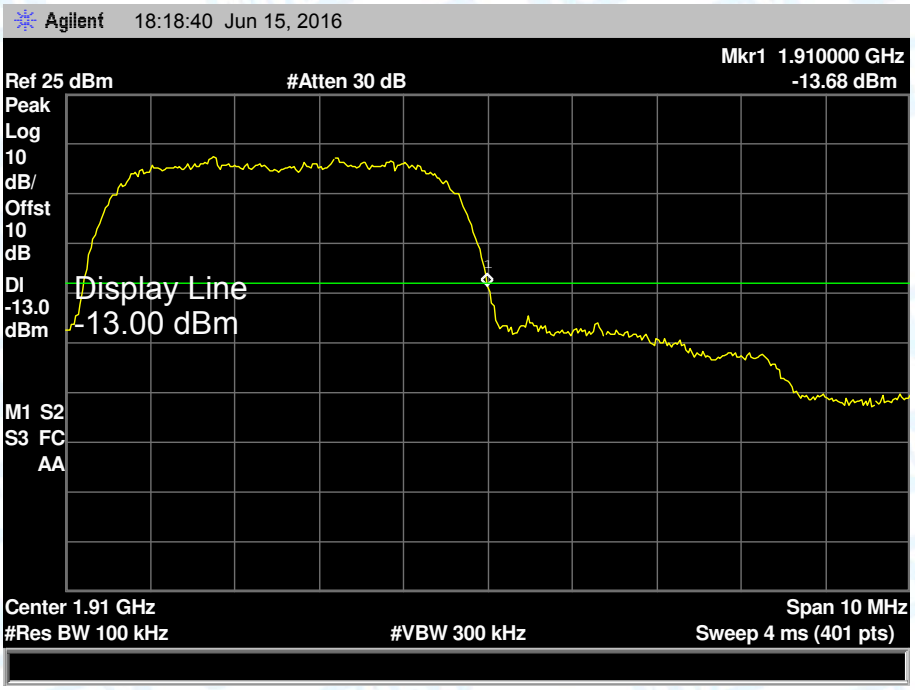


Highest channel

Test Mode:	UMTS Band II 12.2k RMC

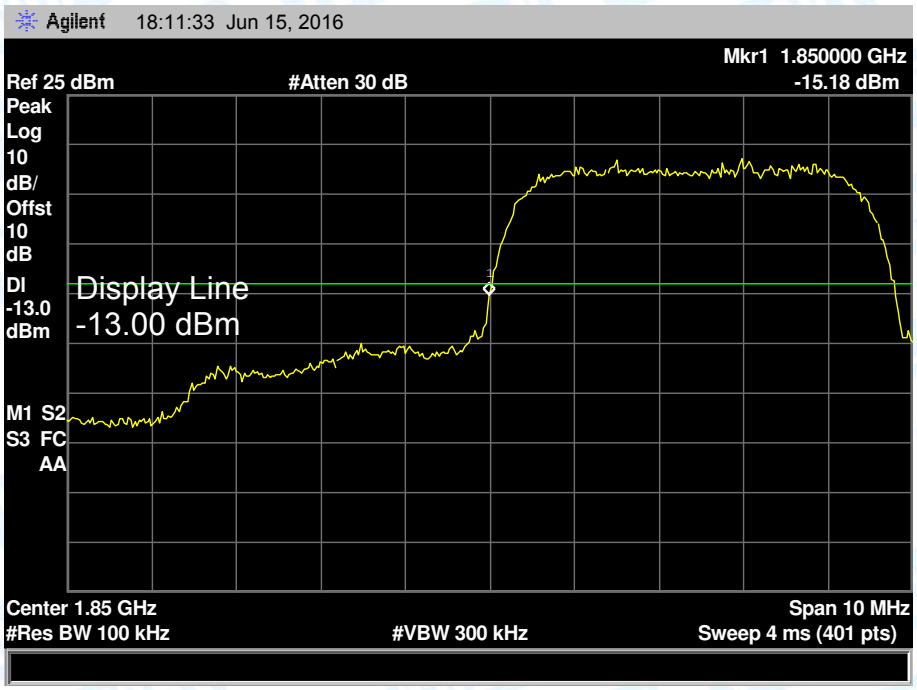


Lowest channel

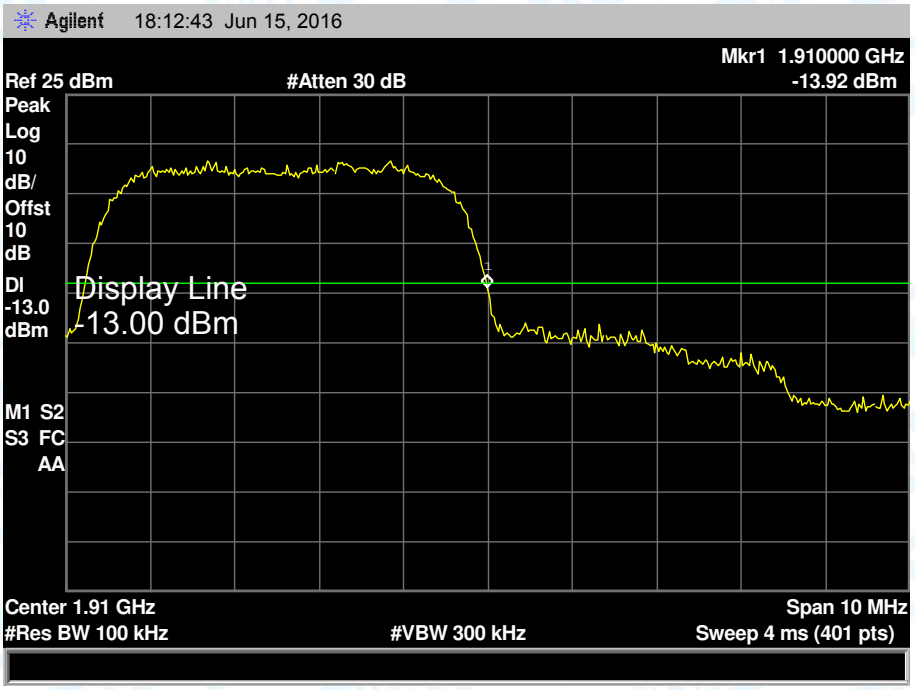


Highest channel

Test Mode:	UMTS Band II HSDPA

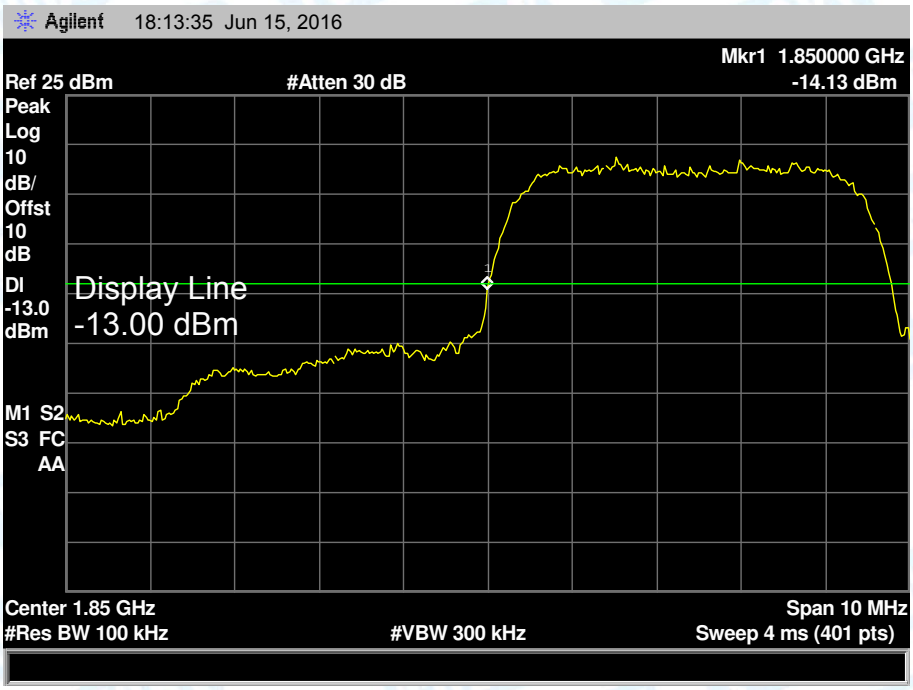


Lowest channel

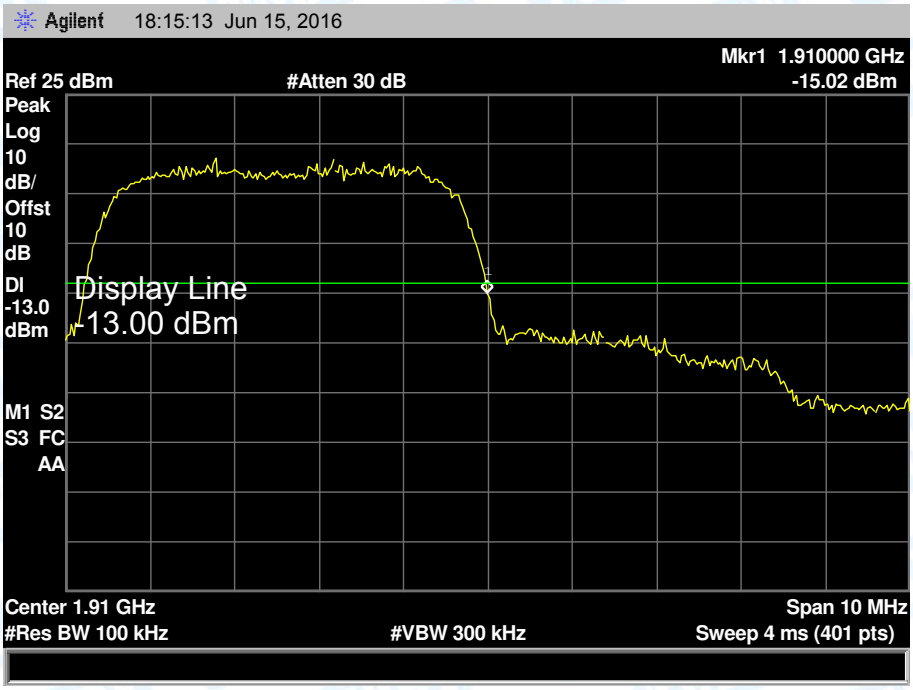


Highest channel

Test Mode:	UMTS Band II HSUPA



Lowest channel



Highest channel

11. Radiated Out Band of Emissions

11.1 Test Standard and Limit

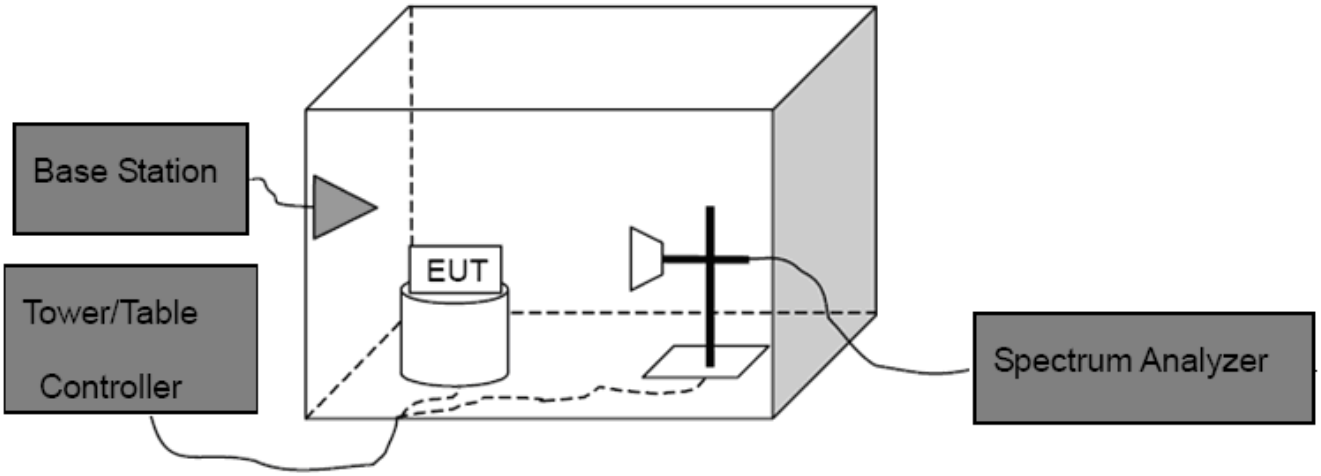
11.1.1 Test Standard

FCC Part 2: 2.1053, 2.1057
FCC Part 22H: 22.917
FCC Part 24E: 24.238

11.1.2 Test Limit

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+10log(P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

11.2 Test Setup



11.3 Test Procedure

(1) The test system setup as show in the block diagram above.
(2) The EUT was placed on an non-conductive rotating platform in an anechoic chamber. The radiated spurious emissions from 30MHz to 10th harmonious of fundamental frequency were measured at 3 m with a test antenna and a spectrum analyzer with RBW=1 MHz, VBW=1 MHz, peak detector settings.
(3) During the measurement, the EUT was enforced in maximum power and linked with a base station. All the spurious emissions at 3m were measured by rotation of the turntable and the test antenna raised and lowered over a range from 1 to 4 meters in both horizontally and vertically polarized orientations.
(4) When found the maximum level of emissions from the EUT. 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.

Spurious emissions in dB=10 log(TX power in Watts/0.001)-the absolute level
Spurious attenuation limit in dB=43+10 log(power out in Watts)

11.4 EUT Operating Condition

The EUT was continuously connected with the Base station and transmitting in the max power during the test.

11.5 Test Data

Please refer the following pages.

Measurement Data (worst case)

Test mode:	UMTS Band V 12.2k RMC		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-30.31	-13.00	Pass
2509.80	V	-28.60		
3346.40	V	-32.00		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-29.32	-13.00	Pass
2509.80	H	-26.31		
3346.40	H	-33.20		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		
Remark: 1. The testing has been conformed to 10*836.6MHz=8,366MHz 2. All other emissions more than 30 dB below the limit.				
Test mode:	**UMTS Band V HSDPA**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-28.36	-13.00	Pass
2509.80	V	--25.09		
3346.40	V	-33.14		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-29.36	-13.00	Pass
2509.80	H	-26.52		
3346.40	H	-32.09		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		
Remark: 1. The testing has been conformed to 10*1880.0MHz=18,800MHz. 2. All other emissions more than 30 dB below the limit.				

Remark：

1. The emission behavior belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	UMTS Band V HSUPA		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
1673.20	Vertical	-29.10	-13.00	Pass
2509.80	V	-27.21		
3346.40	V	-30.21		
4183.00	V	---		
5019.60	V	---		
5856.20	V	---		
1673.20	Horizontal	-29.74	-13.00	Pass
2509.80	H	-28.31		
3346.40	H	-32.56		
4183.00	H	---		
5019.60	H	---		
5856.20	H	---		
Remark: 1. The testing has been conformed to 10*1880.0MHz=18,800MHz. 2. All other emissions more than 30 dB below the limit.				
Test mode:	**UMTS Band II 12.2k RMC**		**Test channel:**	**Middle**
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-28.12	-13.00	Pass
5640.00	V	-25.38		
7520.00	V	-29.01		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-27.69	-13.00	Pass
5640.00	H	-28.33		
7520.00	H	-29.12		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		
Remark: 1. The testing has been conformed to 10*1880.0MHz=18,800MHz. 2. All other emissions more than 30 dB below the limit.				

Remark：

1. The emission behavior belongs to narrowband spurious emission.
2. Remark"---" means that the emission level is too low to be measured
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

Test mode:	UMTS Band II HSDPA		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-27.21	-13.00	Pass
5640.00	V	-20.24		
7520.00	V	-27.10		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-28.21	-13.00	Pass
5640.00	H	-29.34		
7520.00	H	-33.65		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		
Remark: 1. The testing has been conformed to 10*836.6MHz=8,366MHz 2. All other emissions more than 30 dB below the limit.				

Test mode:	UMTS Band II HSUPA		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3760.00	Vertical	-24.13	-13.00	Pass
5640.00	V	-28.75		
7520.00	V	-29.31		
9400.00	V	---		
11280.00	V	---		
13160.00	V	---		
3760.00	Horizontal	-27.43	-13.00	Pass
5640.00	H	-25.31		
7520.00	H	-29.00		
9400.00	H	---		
11280.00	H	---		
13160.00	H	---		
Remark: 1. The testing has been conformed to 10*836.6MHz=8,366MHz 2. All other emissions more than 30 dB below the limit.				

Remark：

4. The emission behavior belongs to narrowband spurious emission.
5. Remark"---" means that the emission level is too low to be measured
6. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

------End of report------