

FCC Radio Test Report

FCC ID: 2AXKF-C003

Original Grant

Report No. : TB-FCC175225
Applicant : Shenzhen Xingmai Digital Co.,Ltd.
Equipment Under Test (EUT)
EUT Name : Beidou+GPS tracker
Model No. : Please see the page of 5
S/N : 19171534261
Brand Name : XINGMAI
Sample ID : 20200804-10_1-01
Receipt Date : 2020-08-24
Test Date : 2020-08-25 to 2020-09-12
Issue Date : 2020-09-12
Standards : FCC Part 2, FCC Part 22 Subpart H, FCC Part 24 Subpart E,
FCC Part 27 ANSI/TIAC63.26: 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 :

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Engineer Manager :

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Ray Lai



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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Revision History

Report No.	Version	Description	Issued Date
TB-FCC175225	Rev.01	Initial issue of report	2020-09-12

1. General Information about EUT

1.1 Client Information

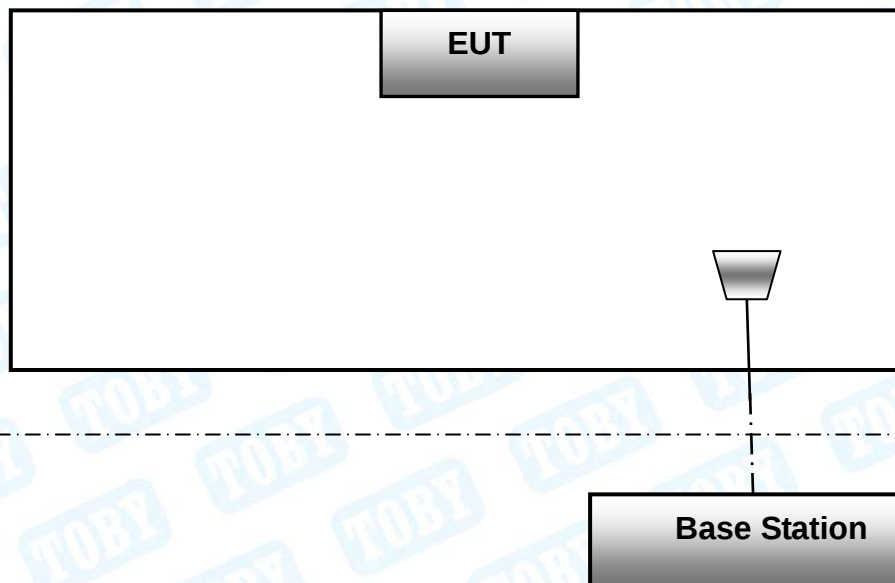
Applicant	:	Shenzhen Xingmai Digital Co.,Ltd.
Address	:	Room 401, Building C, Huali Industrial Park, No. 404, Yu'an 2nd Road, 28 District, Xin'an Street, Bao'an District, Shenzhen, China
Manufacturer	:	Shenzhen Xingmai Digital Co.,Ltd.
Address	:	Room 401, Building C, Huali Industrial Park, No. 404, Yu'an 2nd Road, 28 District, Xin'an Street, Bao'an District, Shenzhen, China

1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Beidou+GPS tracker
Models No.	:	C003, AK-GT01, AK-GT02, AK-GT03, AK-GTZZ, X1, X2, X3, X5, X6, X7, X8, X9, X10, X11, X12, X13, X13B, X13C, X20, X21, X22, X33, X35, X36, X37, X38, X39, X50, X51, X52, X53, X55, X56, X57, X58, X59, X60, XZZ, C001, C002, C003, C005, C006, C007, C008, C009, C10, C11, C12, C13, C15, C16, C17, C18, C19, C20, C21, C22, C23, C25, C26, C27, C28, C29, C30, C31, C32, C33, C35, C36, C37, C38, C39, C50, C51, C52, C53, C55, C56, C57, C58, C59, C60, CZZ, ZZ means digital number
Model Difference	:	All these models are identical in the same PCB, layout and electrical circuit, the only difference is the appearance.
Product Description	:	Frequency Bands: UMTS Band II: TX:1850MHz-1910MHz, RX: 1930MHz-1990MHz UMTS Band IV: TX:1710MHz-1755MHz, RX: 2110MHz-2155MHz UMTS Band V: TX: 824MHz-849MHz, RX: 869MHz-894MHz
		UMTS Band II Power: Cond:22.85dBm EIRP:21.86dBm
		UMTS Band IV Power: Cond:22.20dBm EIRP:22.08dBm
		UMTS Band V Power: Cond:21.92dBm ERP:21.36dBm
		Antenna Gain: Band II: 0.7 dBi FPC Antenna Band IV: 0.7 dBi FPC Antenna Band V: 0.7 dBi FPC Antenna
		Modulation Type: UMTS:QPSK
Power Rating	:	Input: DC 9V-95V or DC 3.7V by Li-ion Battery.
Software Version	:	C003_XM_808_2_9_20200702
Hardware Version	:	20200623

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

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 generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively.

During all testing, EUT is in 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~18GHz for UMTS Band IV.
3. 9kHz~20GHz for UMTS Band II.

Test Channel		
Mode	Channel	Frequency(MHz)
UMTS Band II	9262	1852.40
	9400	1880.00
	9538	1907.60
UMTS Band IV	1312	1712.40
	1413	1732.60
	1513	1752.60
UMTS Band V	4132	826.40
	4183	836.60
	4233	846.60
Test Item		Mode/ Modulation
		UMTS Band II/ UMTS Band IV/ UMTS Band V
RF Output Power		RMC/HSDPA/HSUPA
Peak-Average Ratio		RMC
Occupied Bandwidth		RMC
Frequency Stability		RMC
Conducted Out of Band Emissions		RMC
Band Edge		RMC
Transmitter Radiated Power (EIRP/ERP)		RMC
Radiated Out of Band Emissions		RMC
Note : The antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.		

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, HSDPA, HSUPA functions in UMTS band II /IV/V.
- (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	± 3.50 dB ± 3.10 dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	± 4.60 dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	± 4.50 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.

A2LA Certificate No.: 4750.01

The laboratory has been accredited by American Association for Laboratory Accreditation(A2LA) to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the technical competence in the field of Electrical Testing. And the A2LA Certificate No.: 4750.01. FCC Accredited Test Site Number: 854351.

IC Registration No.: (11950A)

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A.

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		
FCC Part 27 (10-1-05 Edition)	Miscellaneous Wireless Communications Services		
Standard Section	Test Item	Judgment	Remark
2.1046;	Conducted RF Output Power	PASS	N/A
24.232(d); 27.50	Peak-Average Ratio	PASS	N/A
2.1049; 22.917; 24.238; 27.53	99% & -26 dB Occupied Bandwidth	PASS	N/A
2.1055; 22.355; 24.235; 27.54	Frequency Stability	PASS	N/A
2.1051; 2.1057; 22.917; 24.238; 27.53	Conducted Out of Band Emissions	PASS	N/A
2.1051; 2.1057; 22.917; 24.238; 27.53	Band Edge	PASS	N/A
22.913; 24.238; 27.50	Transmitter Radiated Power (EIRP/ERP)	PASS	N/A
2.1051; 2.1057; 22.917; 24.238; 27.53	Radiated Out of Band Emissions	PASS	N/A
Note: N/A is an abbreviation for Not Applicable.			

3. Test Software

Test Item	Test Software	Manufacturer	Version No.
Radiation Emission	EZ-EMC	EZ	FA-03A2RE

4. Test Equipment

Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 06, 2020	Jul. 05, 2021
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.01, 2020	Feb. 28, 2022
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Mar.01, 2020	Feb. 28, 2022
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 07, 2020	Jul. 06, 2021
Pre-amplifier	Sonoma	310N	185903	Mar.01, 2020	Feb. 28, 2021
Pre-amplifier	HP	8449B	3008A00849	Mar.01, 2020	Feb. 28, 2021
Pre-amplifier	SKET	LNPA_1840G-50	SK201904032	Jul. 06, 2020	Jul. 05, 2021
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar.01, 2020	Feb. 28, 2021
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A
Antenna Conducted Emission					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Jul. 06, 2020	Jul. 05, 2021
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 06, 2020	Jul. 05, 2021
MXA Signal Analyzer	Agilent	N9020A	MY49100060	Sep. 16, 2019	Sep. 15, 2020
Vector Signal Generator	Agilent	N5182A	MY50141294	Sep. 16, 2019	Sep. 15, 2020
Analog Signal Generator	Agilent	N5181A	MY50141953	Sep. 16, 2019	Sep. 15, 2020
RF Power Sensor	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO26	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO29	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO31	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17I00015SNO33	Sep. 16, 2019	Sep. 15, 2020
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	144382	Sep. 16, 2019	Sep. 15, 2020
Universal Radio Communication Tester	Rohde&Schwarz	CMU200	103903	Jul. 06, 2020	Jul. 05, 2021

5. Frequency Stability

5.1 Test Standard and Requirement

5.1.1 Test Standard

FCC Part 2.1055
FCC Part 22.355
FCC Part 24.235
FCC Part 27.54

5.1.2 Requirement

According to FCC section 22.355, FCC section 24.235 and FCC section 27.54, 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:

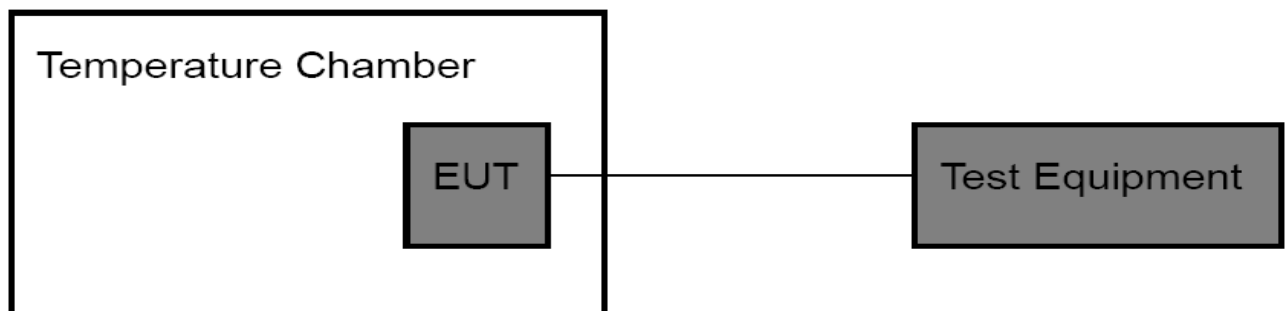
The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .

(2) Primary Supply Voltage:

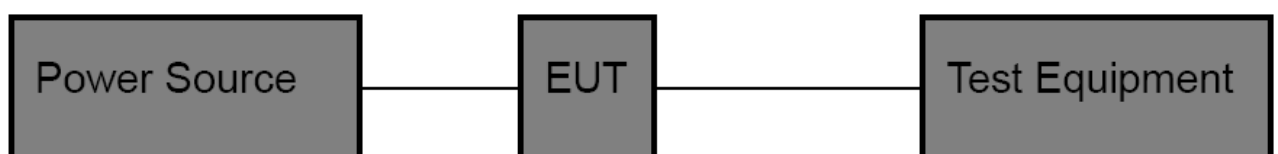
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at input to the cable normally provide with the equipment, or at the power supply terminals if cables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

5.2 Test Setup

For Temperature Test:



For Voltage Test:



5.3 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°C 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°C set up to 50°C 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°C , the testing lowest temperature will be raised in 10°C step until the EUT can be turned on.

Test Procedures for Voltage Variation:

- (1) The EUT was placed in a temperature chamber at $25 \pm 5^{\circ}\text{C}$ and connected with the base station.
- (2) Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.
- (3) The variation in frequency was measured for the worst case.

5.4 Deviation From Test Standard

No deviation

5.5 EUT Operating Condition

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

5.6 Test Data

Please refer to the Attachment A.

6. Conducted RF Output Power

6.1 Test Standard and Limit

6.1.1 Test Standard

FCC Part 2: 2.1046

FCC Part 22H : 22.913 (a)

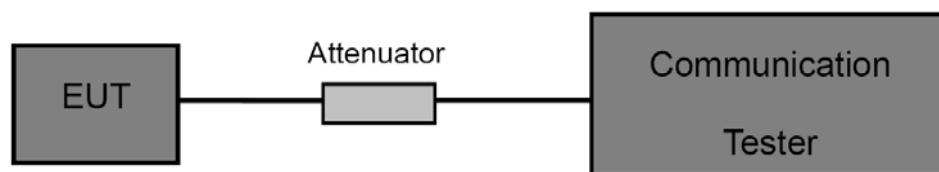
FCC Part 24E: 24.232 (c)

FCC Part 27: 50

6.1.2 Test Limit

UMTS Band II	UMTS Band IV	UMTS Band V
33 dBm (EIRP)	30 dBm (EIRP)	33 dBm (ERP)

6.2 Test Setup



6.3 Test Procedure

- (1) The EUT is coupled to the Base Station with the suitable Attenuator, 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) Then read record the power value from the Base Station in dBm.

6.4 Deviation From Test Standard

No deviation

6.5 EUT Operating Condition

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

6.6 Test Data

Please refer to the Attachment B.

7. Peak-Average Ratio

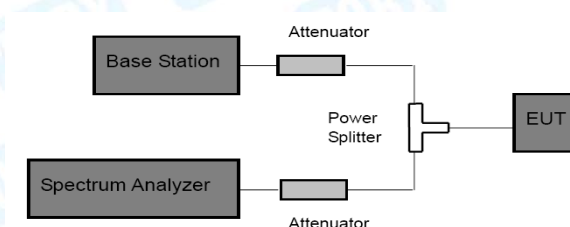
7.1 Test Standard and Limit

- 7.1.1 Test Standard
 - FCC Part 24E: 24.232 (d)
 - FCC Part 27.50

7.1.2 Test Limit

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

7.2 Test Setup



7.3 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.

7.4 Deviation From Test Standard

No deviation

7.5 EUT Operating Condition

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

7.6 Test Data

Please refer to the Attachment C.

8. Radiated Output Power

8.1 Test Standard and Limit

8.1.1 Test Standard

FCC Part 22H: 22.913 (a)

FCC Part 24E: 24.232 (c)

FCC Part 27.50

8.1.2 Test Limit

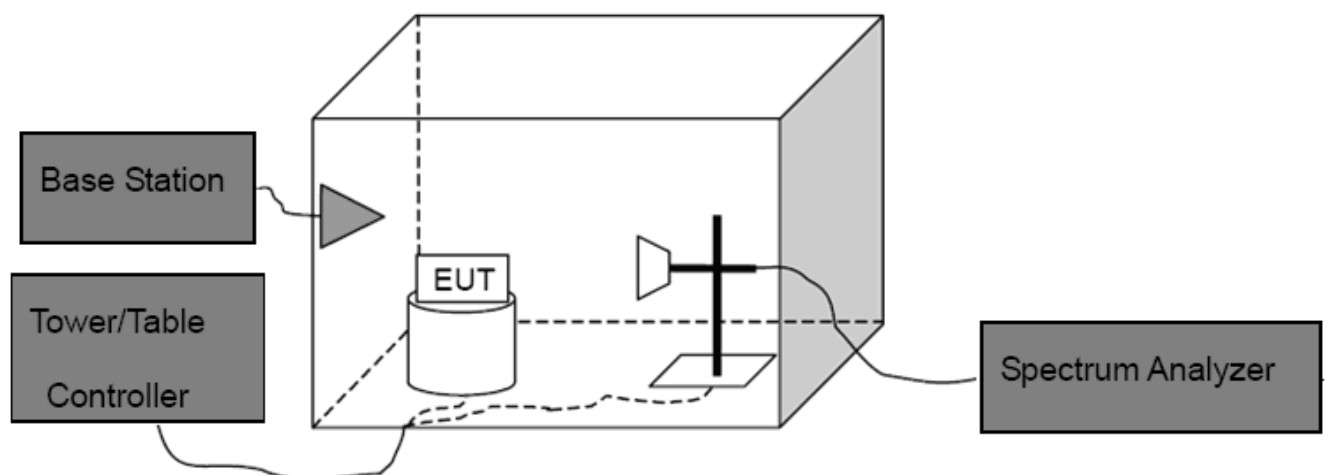
According to FCC Part 22.913 (a), the ERP of Cellular mobile transmitters must not exceed 7 Watts(38.5 dBm).

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

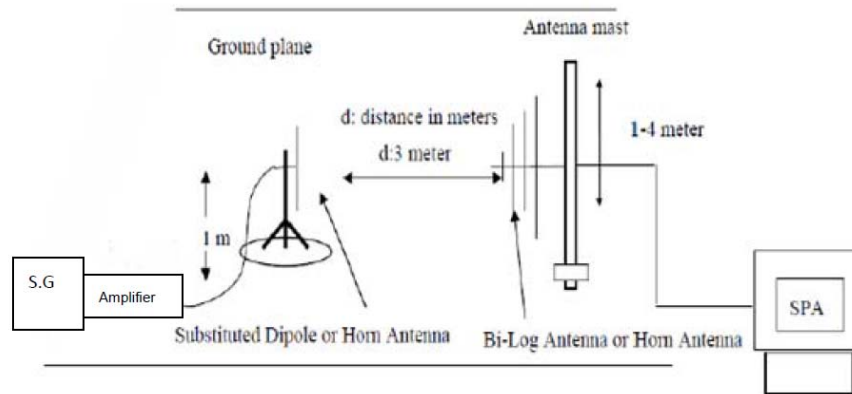
According to FCC Part 27.50 (d)(4),Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

UMTS Band II	UMTS Band IV	UMTS Band V
33 dBm (EIRP)	30 dBm (EIRP)	33 dBm (ERP)

8.2 Test Setup



Above 1G



Substituted Method

8.3 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 C63.26. 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.

Note: In test, the S.G Connect the Pre-amplifier(Sonoma 310N Pre-amplifier for frequency below 1 GHz, HP 8449B Pre-amplifier for frequency above 1 GHz)

Then the EUT's EIRP and ERP was calculated with the correction factor:

$ERP = S.G.Level + Antenna\ Gain\ Cord.(dBd) - Cable\ Loss(dB)$

$EIRP = S.G.Level + Antenna\ Gain\ Cord.(dBi) - Cable\ Loss(dB)$

8.4 Deviation From Test Standard

No deviation

8.5 EUT Operating Condition

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

8.6 Test Data

Please refer to the Attachment D.

9. Occupied Bandwidth

9.1 Test Standard and Limit

9.1.1 Test Standard

FCC Part 2: 2.1049

FCC Part 22H : 22.913 (a)

FCC Part 24E: 24.232 (c)

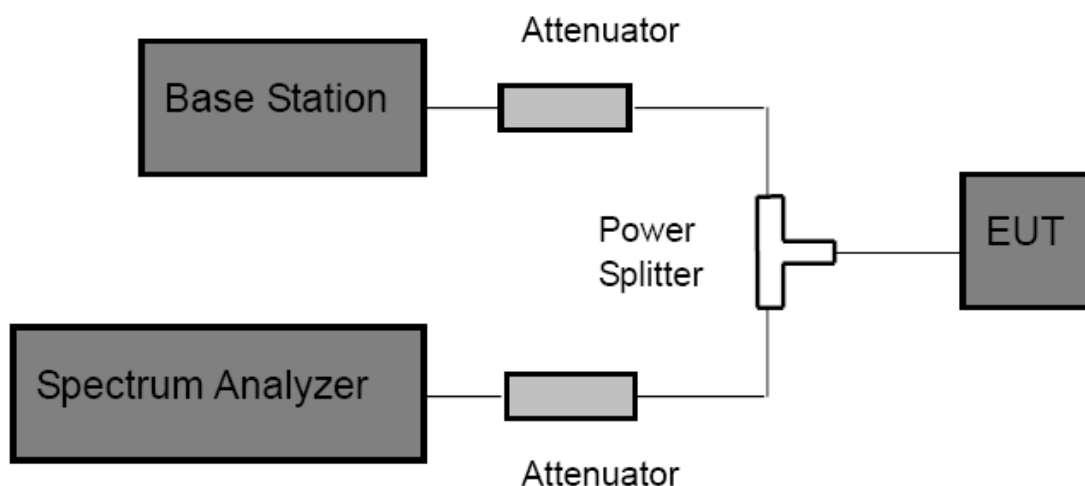
FCC Part 27.53

9.1.2 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.

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) 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.

9.4 Deviation From Test Standard

No deviation

9.5 EUT Operating Condition

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

9.6 Test Data

Please refer to the Attachment E.

10. Conducted Out of Band Emissions

10.1 Test Standard and Limit

10.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057

FCC Part 22H: 22.917(a)

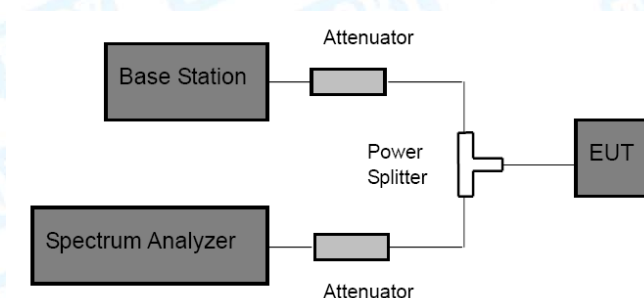
FCC Part 24E: 24.238(a)

FCC Part 27.53

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 $43+10\log(P)$ 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:

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.

10.4 Deviation From Test Standard

No deviation

10.5 EUT Operating Condition

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

10.6 Test Data

Please refer to the Attachment F.

11. Band Edge Test

11.1 Test Standard and Limit

11.1.1 Test Standard

FCC Part 2: 2.1051, 2.1057

FCC Part 22H: 22.917(a)

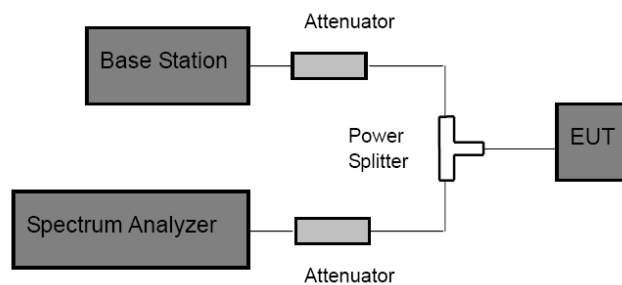
FCC Part 24E: 24.238(a)

FCC Part 27.53

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 $43+10\log(P)$ 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 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: $RBW \geq 1\%$ 26db bandwidth, VBW=3 RBW, Span 1 MHz, Detector: Peak Mode.

WCDMA: $RBW \geq 1\%$ 26db bandwidth, VBW=3 RBW, Span 10 MHz, Detector: Peak Mode.

(3) The band edges of low and high channels for the highest RF powers were measured.

11.4 Deviation From Test Standard

No deviation

11.5 EUT Operating Condition

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

11.6 Test Data

Please refer to the Attachment G.

12. Radiated Out Band of Emissions

12.1 Test Standard and Limit

12.1.1 Test Standard

FCC Part 2: 2.1053, 2.1057

FCC Part 22H: 22.917

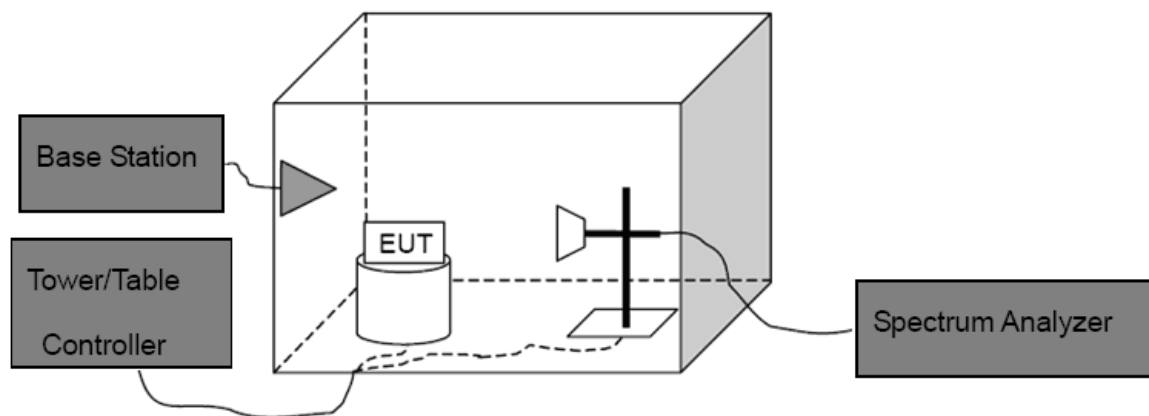
FCC Part 24E: 24.238

FCC Part 27.53

12.1.2 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 $43+10\log(P)$ dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

12.2 Test Setup



12.3 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 10^{th} 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= $10 \log(\text{TX power in Watts}/0.001)$ -the absolute level

Spurious attenuation limit in dB= $43+10 \log(\text{power out in Watts})$

12.4 Deviation From Test Standard

No deviation

12.5 EUT Operating Condition

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

12.6 Test Data

Please refer to the Attachment H.

Attachment A--Frequency Stability

Temperature Variation

Temperature Variation UMTS Band II (CH 9400)		
Temperature (°C)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	5	0.003
-20	7	0.004
-10	10	0.005
0	12	0.006
10	11	0.006
20	8	0.004
30	3	0.002
40	5	0.003
50	7	0.004
60	8	0.004
Limit	2.5 (ppm)	
Result	PASS	

Temperature Variation UMTS Band IV (CH 1413)		
Temperature (°C)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	6	0.003
-20	4	0.002
-10	6	0.004
0	8	0.005
10	7	0.004
20	5	0.003
30	3	0.002
40	6	0.003
50	8	0.005
60	3	0.002
Limit	2.5 (ppm)	
Result	PASS	

Temperature Variation UMTS Band V (CH 4183)		
Temperature (°C)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	5	0.006
-20	3	0.004
-10	6	0.007
0	7	0.008
10	8	0.010
20	4	0.005
30	3	0.004
40	5	0.006
50	5	0.006
60	3	0.004
Limit	2.5 (ppm)	
Result	PASS	

Voltage Variation

Voltage Variation UMTS Band II (CH 9400)		
Voltage (V)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
3.2	10	0.005
3.7	9	0.005
4.2	8	0.004
Limit	2.5 (ppm)	
Result	PASS	

Voltage Variation UMTS Band IV (CH 1413)		
Voltage (V)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
3.2	8	0.005
3.7	7	0.004
4.2	6	0.004
Limit	2.5 (ppm)	
Result	PASS	

Voltage Variation UMTS Band V (CH 4183)		
Voltage (V)	RMC Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
3.2	9	0.011
3.7	8	0.010
4.2	7	0.008
Limit	2.5 (ppm)	
Result	PASS	

Attachment B--Conducted RF Output Power

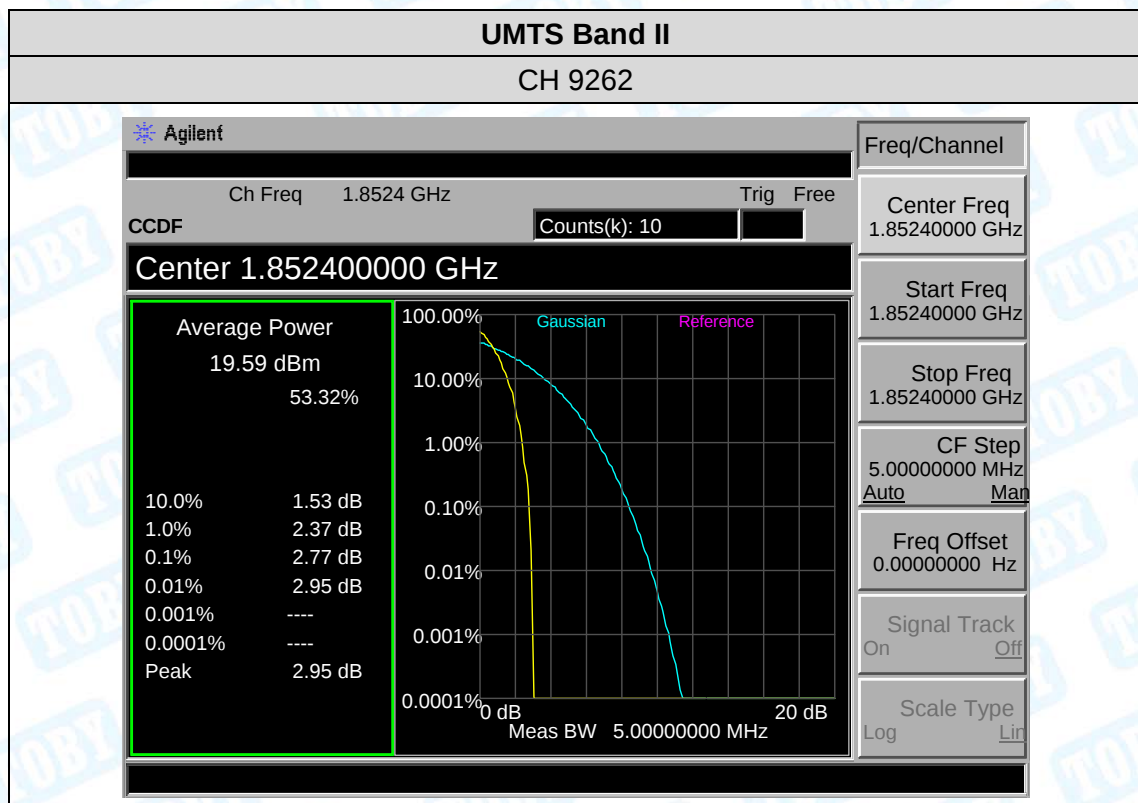
UMTS Band II				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
RCM	9262	1852.4	22.69	0.186
	9400	1880.0	22.85	0.193
	9538	1907.6	22.56	0.180
HSDPA Subtest 1	9262	1852.4	21.74	0.149
	9400	1880.0	21.92	0.156
	9538	1907.6	21.83	0.152
HSDPA Subtest 2	9262	1852.4	21.15	0.130
	9400	1880.0	21.15	0.130
	9538	1907.6	21.06	0.128
HSDPA Subtest 3	9262	1852.4	20.96	0.125
	9400	1880.0	20.89	0.123
	9538	1907.6	20.99	0.126
HSDPA Subtest 4	9262	1852.4	20.54	0.113
	9400	1880.0	20.35	0.108
	9538	1907.6	20.24	0.106
HSUPA Subtest 1	9262	1852.4	21.22	0.132
	9400	1880.0	21.34	0.136
	9538	1907.6	21.16	0.131
HSUPA Subtest 2	9262	1852.4	21.08	0.128
	9400	1880.0	21.09	0.129
	9538	1907.6	21.14	0.130
HSUPA Subtest 3	9262	1852.4	20.96	0.125
	9400	1880.0	20.97	0.125
	9538	1907.6	20.89	0.123
HSUPA Subtest 4	9262	1852.4	20.68	0.117
	9400	1880.0	20.58	0.114
	9538	1907.6	20.67	0.117
HSUPA Subtest 5	9262	1852.4	20.35	0.108
	9400	1880.0	20.45	0.111
	9538	1907.6	20.37	0.109

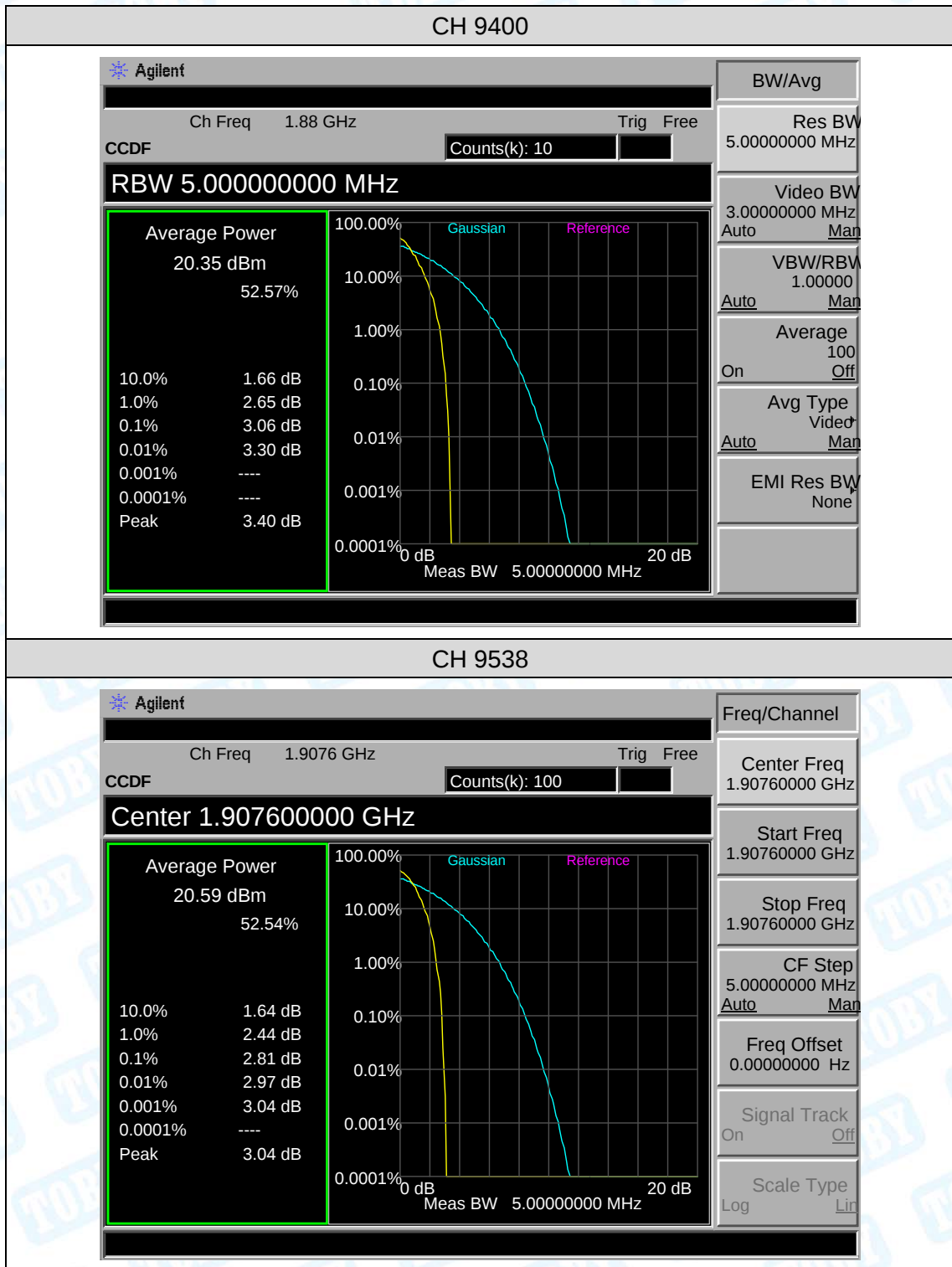
UMTS Band IV				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
RCM	1312	1712.4	22.18	0.165
	1413	1732.6	22.20	0.166
	1513	1752.6	22.14	0.164
HSDPA Subtest 1	1312	1712.4	21.21	0.132
	1413	1732.6	21.34	0.136
	1513	1752.6	21.24	0.133
HSDPA Subtest 2	1312	1712.4	20.96	0.125
	1413	1732.6	20.57	0.114
	1513	1752.6	20.69	0.117
HSDPA Subtest 3	1312	1712.4	20.24	0.106
	1413	1732.6	20.35	0.108
	1513	1752.6	20.42	0.110
HSDPA Subtest 4	1312	1712.4	20.13	0.103
	1413	1732.6	20.24	0.106
	1513	1752.6	20.08	0.102
HSUPA Subtest 1	1312	1712.4	20.86	0.122
	1413	1732.6	20.88	0.122
	1513	1752.6	20.78	0.120
HSUPA Subtest 2	1312	1712.4	20.36	0.109
	1413	1732.6	20.24	0.106
	1513	1752.6	20.43	0.110
HSUPA Subtest 3	1312	1712.4	20.28	0.107
	1413	1732.6	20.36	0.109
	1513	1752.6	20.28	0.107
HSUPA Subtest 4	1312	1712.4	20.12	0.103
	1413	1732.6	20.35	0.108
	1513	1752.6	20.14	0.103
HSUPA Subtest 5	1312	1712.4	20.27	0.106
	1413	1732.6	20.36	0.109
	1513	1752.6	20.47	0.111

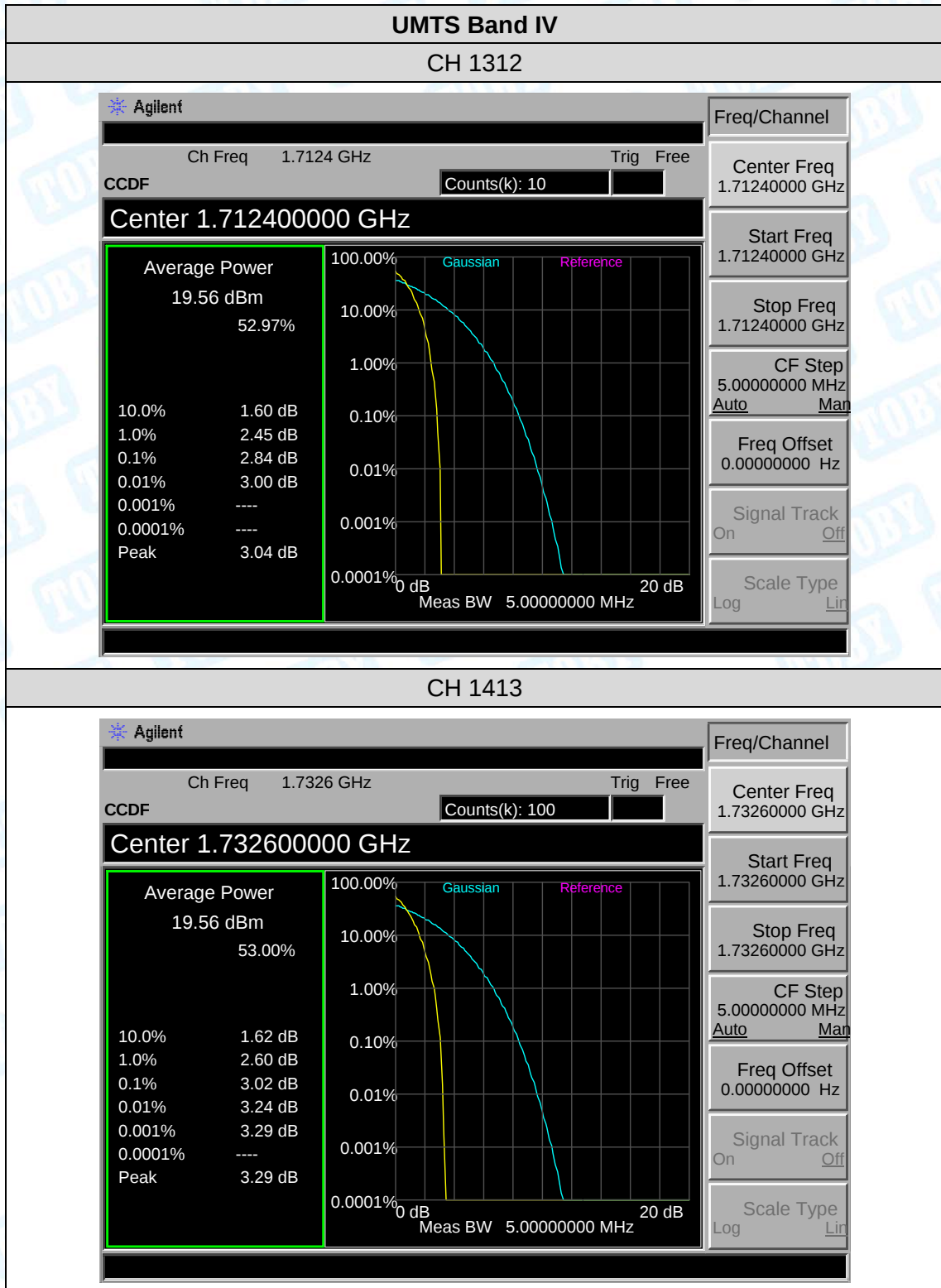
UMTS Band V				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
RMC	4132	826.4	21.66	0.147
	4183	836.6	21.92	0.156
	4233	846.6	21.56	0.143
HSDPA Subtest 1	4132	826.4	21.25	0.133
	4183	836.6	21.35	0.136
	4233	846.6	21.45	0.140
HSDPA Subtest 2	4132	826.4	21.28	0.134
	4183	836.6	21.15	0.130
	4233	846.6	21.09	0.129
HSDPA Subtest 3	4132	826.4	21.05	0.127
	4183	836.6	21.08	0.128
	4233	846.6	21.25	0.133
HSDPA Subtest 4	4132	826.4	20.86	0.122
	4183	836.6	20.89	0.123
	4233	846.6	20.72	0.118
HSUPA Subtest 1	4132	826.4	20.16	0.104
	4183	836.6	20.56	0.114
	4233	846.6	20.17	0.104
HSUPA Subtest 2	4132	826.4	20.96	0.125
	4183	836.6	20.14	0.103
	4233	846.6	20.05	0.101
HSUPA Subtest 3	4132	826.4	20.24	0.106
	4183	836.6	20.16	0.104
	4233	846.6	20.47	0.111
HSUPA Subtest 4	4132	826.4	20.09	0.102
	4183	836.6	20.24	0.106
	4233	846.6	20.31	0.107
HSUPA Subtest 5	4132	826.4	20.08	0.102
	4183	836.6	20.14	0.103
	4233	846.6	20.07	0.102

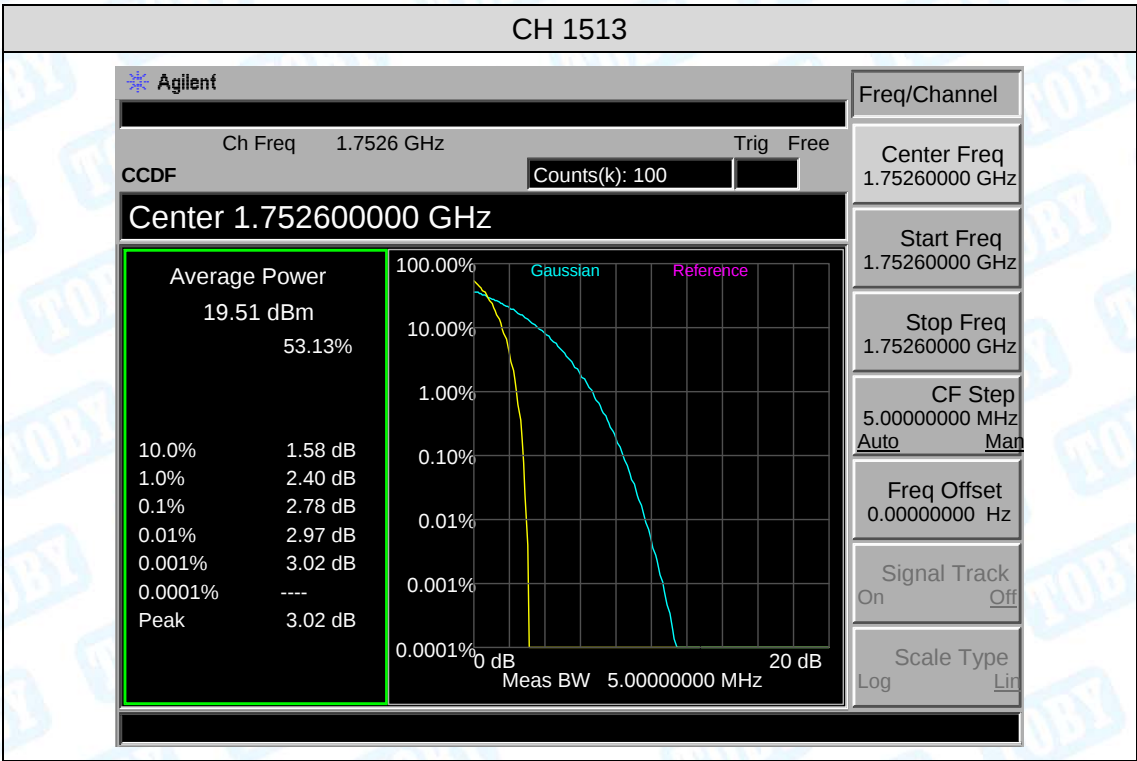
Attachment C--Peak-Average Ratio

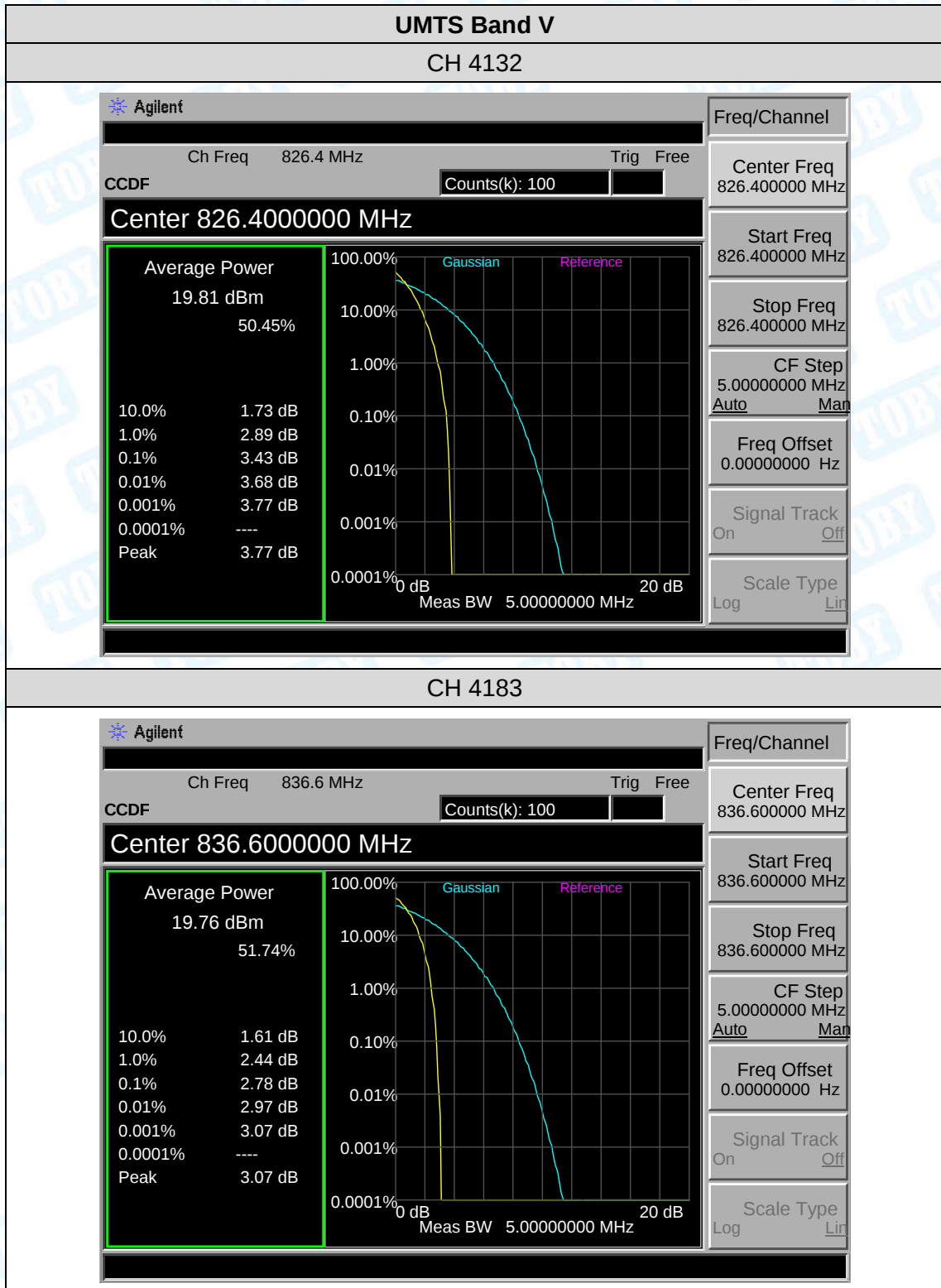
RMC			
Mode	Channel	Frequency (MHz)	Peak-Average Ratio (PAR)
UMTS Band II	9262	1852.4	2.77
	9400	1880.0	3.06
	9538	1907.6	2.81
UMTS Band IV	1312	1712.4	2.84
	1413	1732.6	3.02
	1513	1752.6	2.78
UMTS Band V	4132	826.4	3.43
	4183	836.6	2.78
	4233	846.6	3.34
Limit ≤ 13dB			

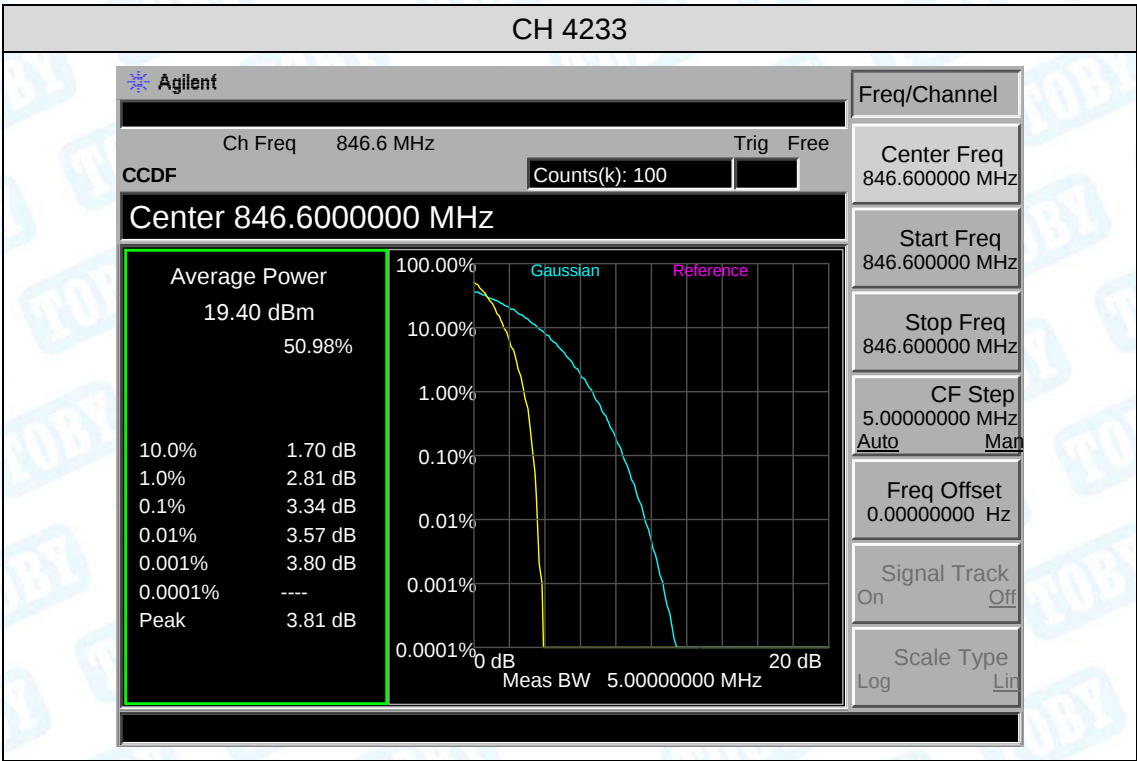












Attachment D-- Radiated Output Power

Measurement Data (worst case)

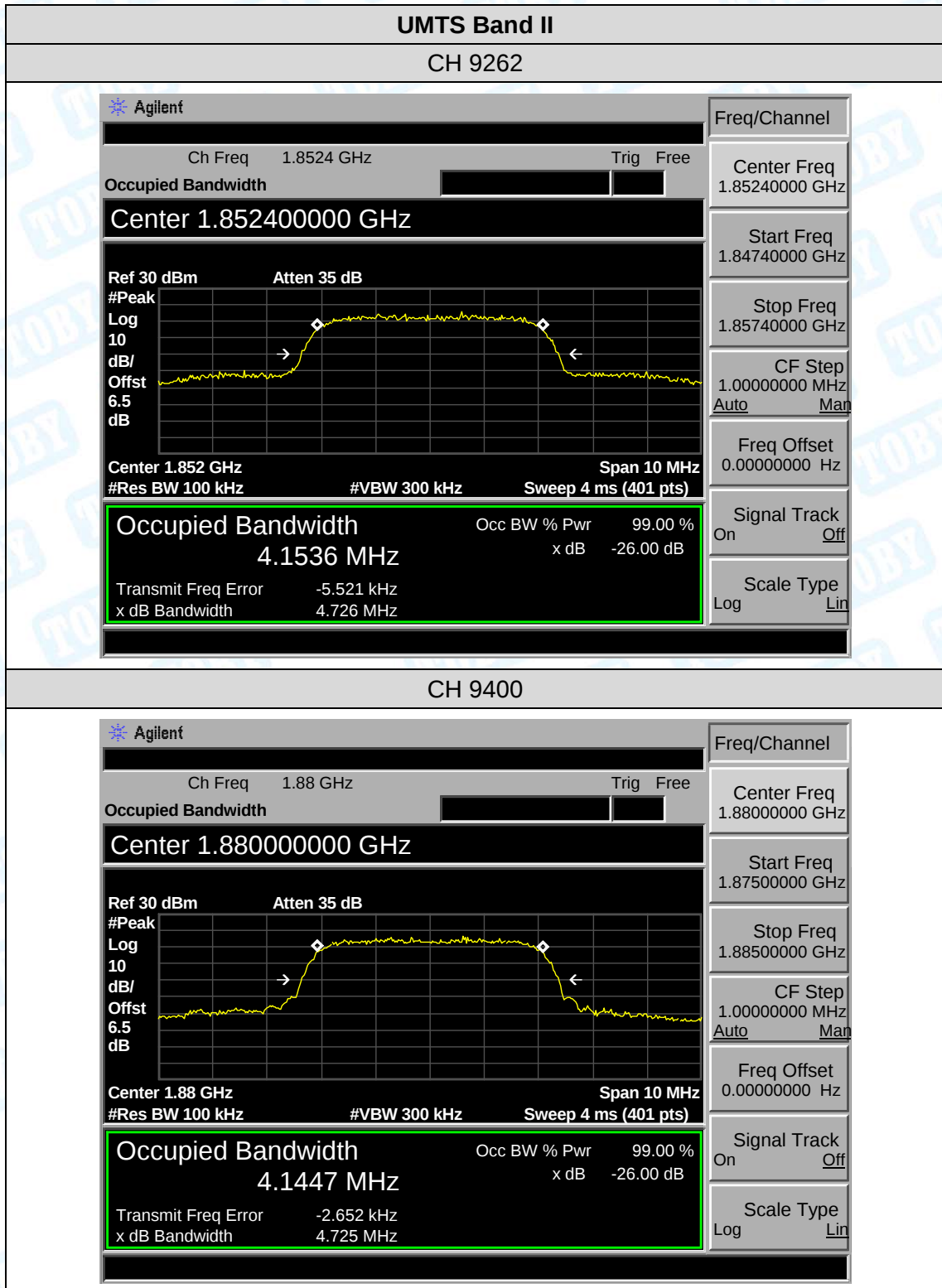
UMTS Band II								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	EIRP Power (dBm)	EIRP Power (W)
RMC	9262	1852.4	H	19.44	5.01	2.59	21.86	0.153
			V	18.54	5.01	2.59	20.96	0.125
	9400	1880.0	H	19.35	4.82	2.59	21.58	0.144
			V	17.45	4.82	2.59	19.68	0.093
	9538	1907.6	H	20.00	4.45	2.59	21.86	0.153
			V	17.41	4.45	2.59	19.27	0.085
Limit							33	2

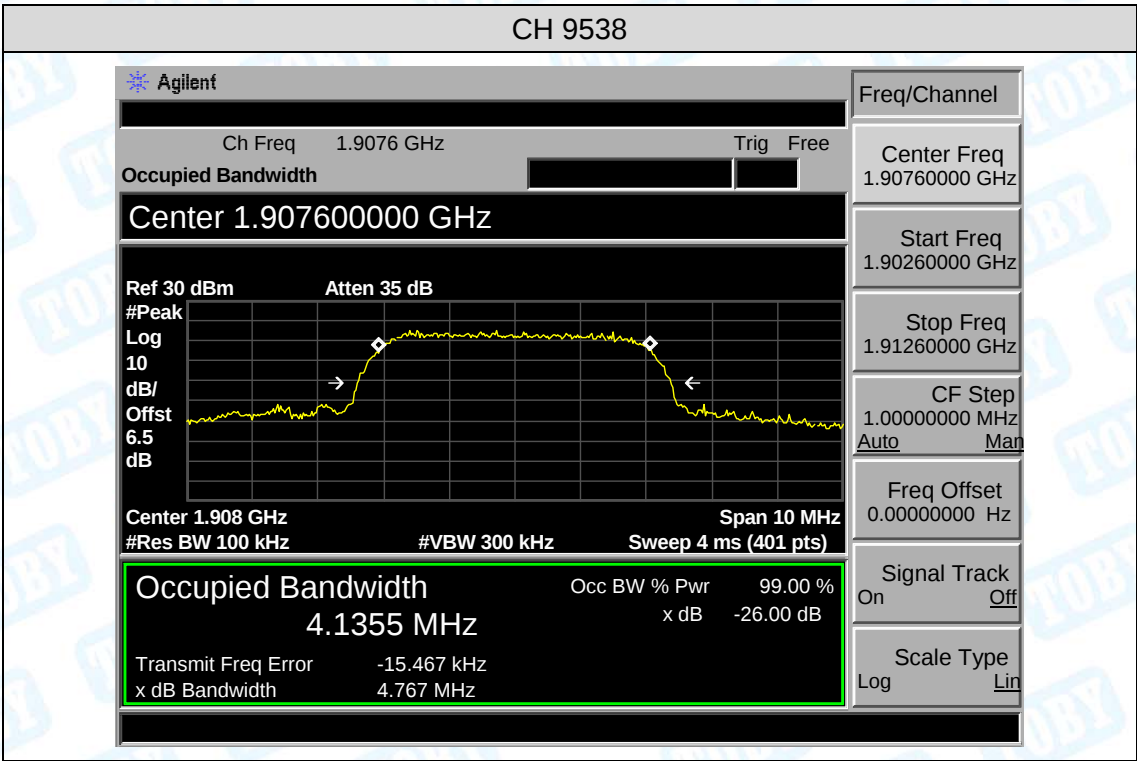
UMTS Band IV								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	EIRP Power (dBm)	EIRP Power (W)
RMC	1312	1712.4	H	19.37	4.98	2.27	22.08	0.161
			V	15.98	4.98	2.27	18.69	0.074
	1413	1732.6	H	19.49	4.76	2.27	21.98	0.158
			V	16.86	4.76	2.27	19.35	0.086
	1513	1752.6	H	19.91	4.21	2.27	21.85	0.153
			V	17.05	4.21	2.27	18.99	0.079
Limit							30	1

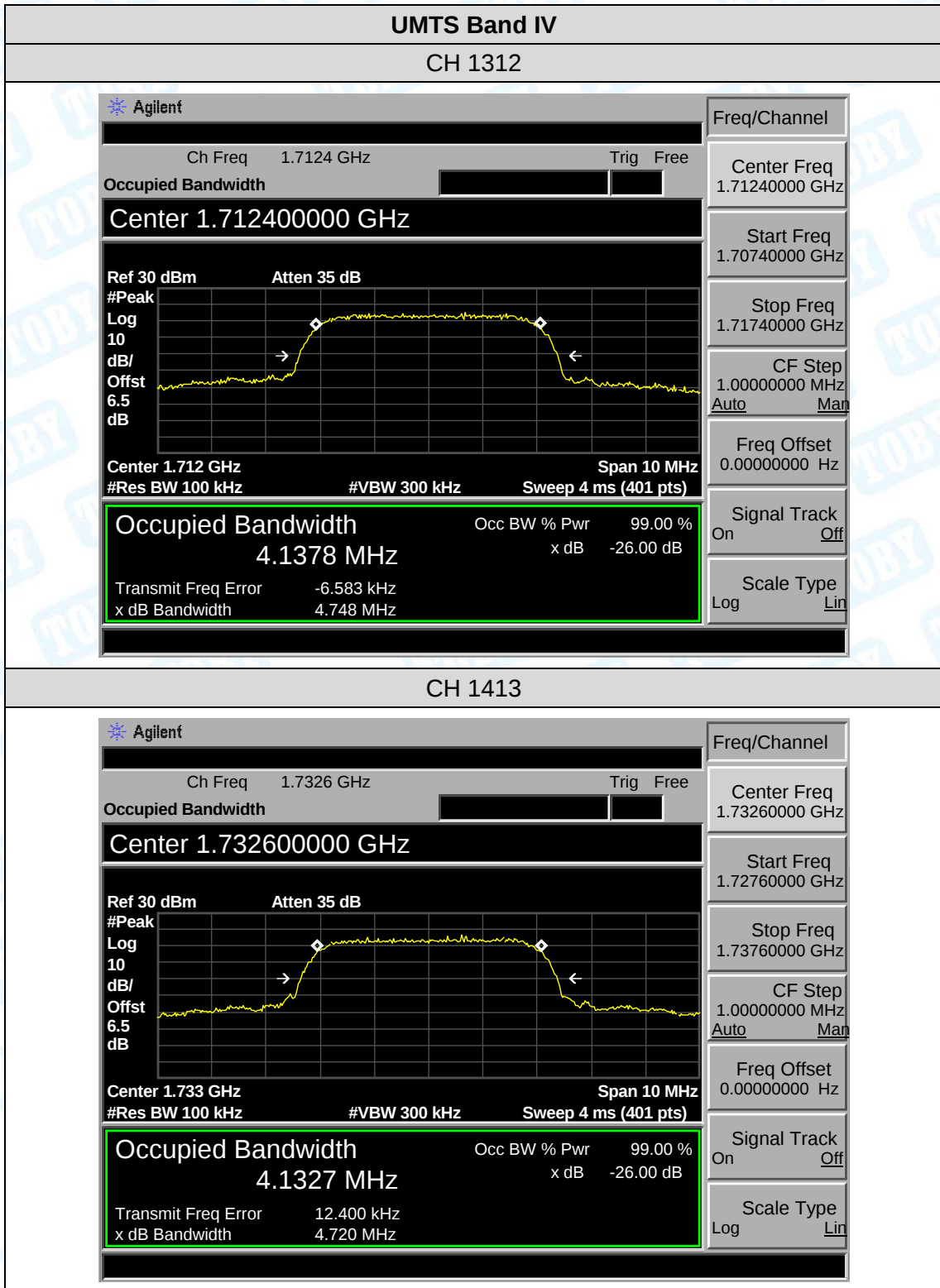
UMTS Band V								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	ERP Power (dBm)	ERP Power (W)
RMC	4132	826.4	H	18.76	3.46	1.26	20.96	0.125
			V	16.05	3.46	1.26	18.25	0.067
	4183	836.6	H	18.69	3.82	1.26	21.25	0.133
			V	16.49	3.82	1.26	19.05	0.080
	4233	846.6	H	18.46	4.16	1.26	21.36	0.137
			V	16.57	4.16	1.26	19.47	0.089
Limit							38.5	7

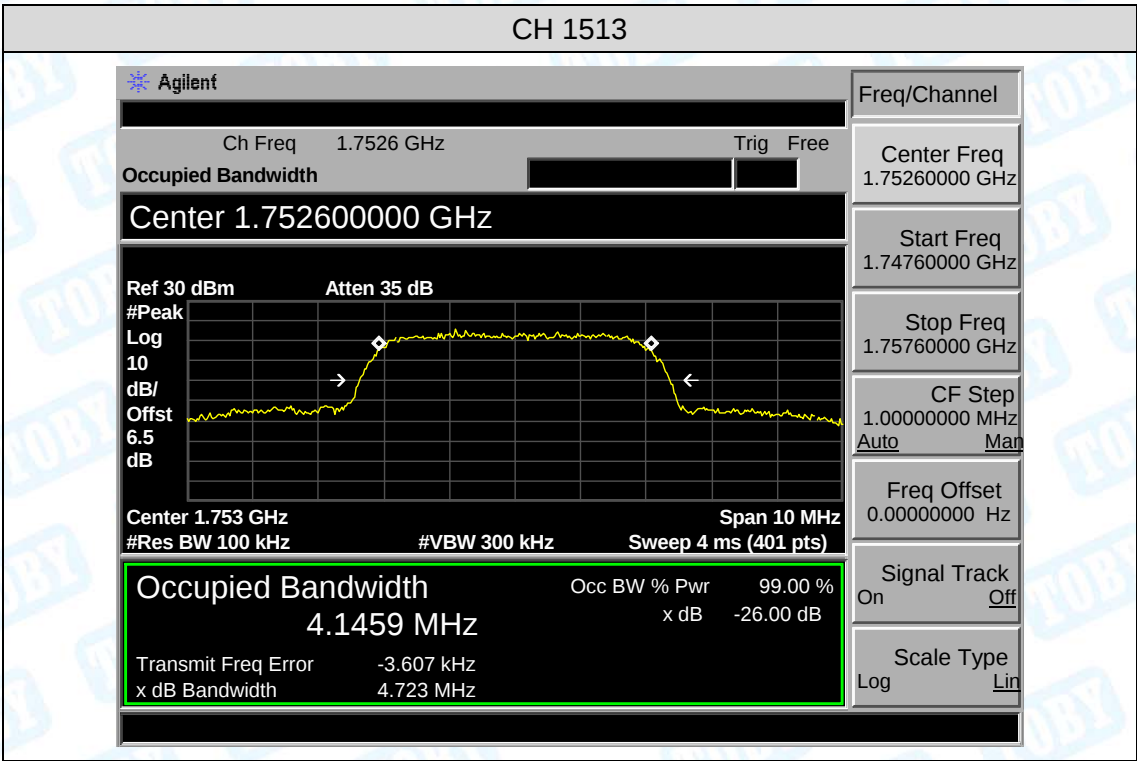
Attachment E--Occupied Bandwidth

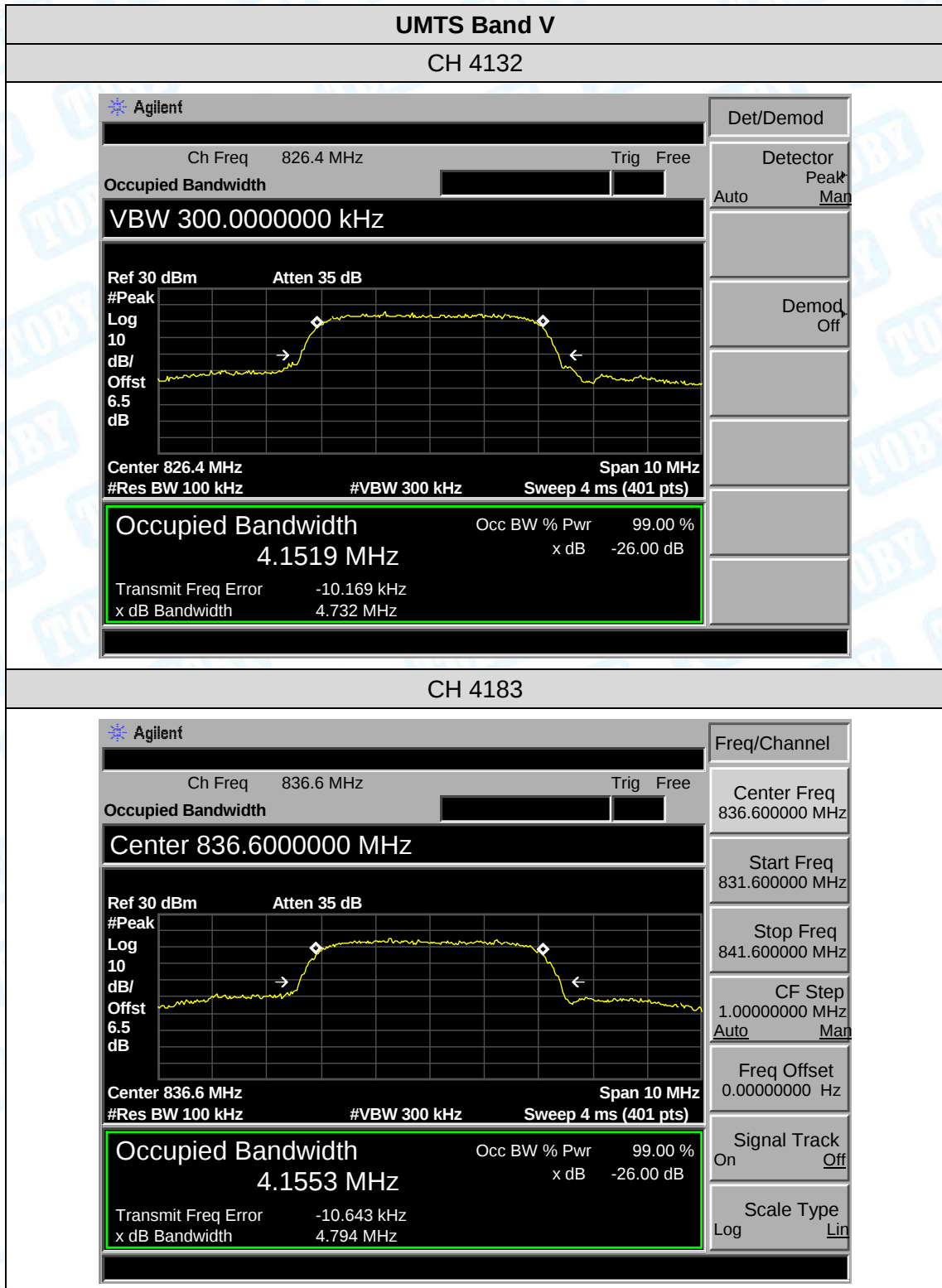
UMTS Band II				
Mode	Channel	Frequency (MHz)	99% OBW (MHz)	-26dB Bandwidth (MHz)
RMC	9262	1852.4	4.1536	4.726
	9400	1880.0	4.1447	4.725
	9538	1907.6	4.1355	4.767
UMTS Band IV				
Mode	Channel	Frequency (MHz)	99% OBW (MHz)	-26dB Bandwidth (MHz)
RMC	1312	1712.4	4.1378	4.748
	1413	1732.6	4.1327	4.720
	1513	1752.6	4.1459	4.723
UMTS Band V				
Mode	Channel	Frequency (MHz)	99% OBW (MHz)	-26dB Bandwidth (MHz)
RMC	4132	826.4	4.1519	4.732
	4183	836.6	4.1553	4.794
	4233	846.6	4.1373	4.727

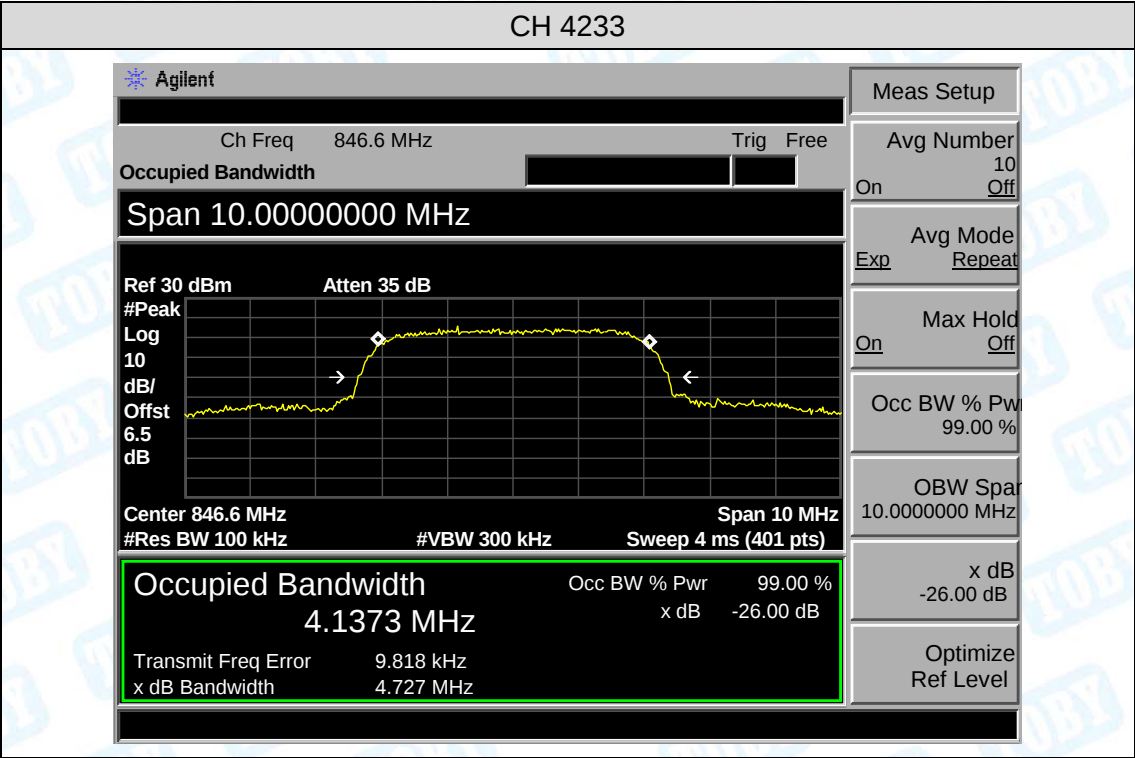




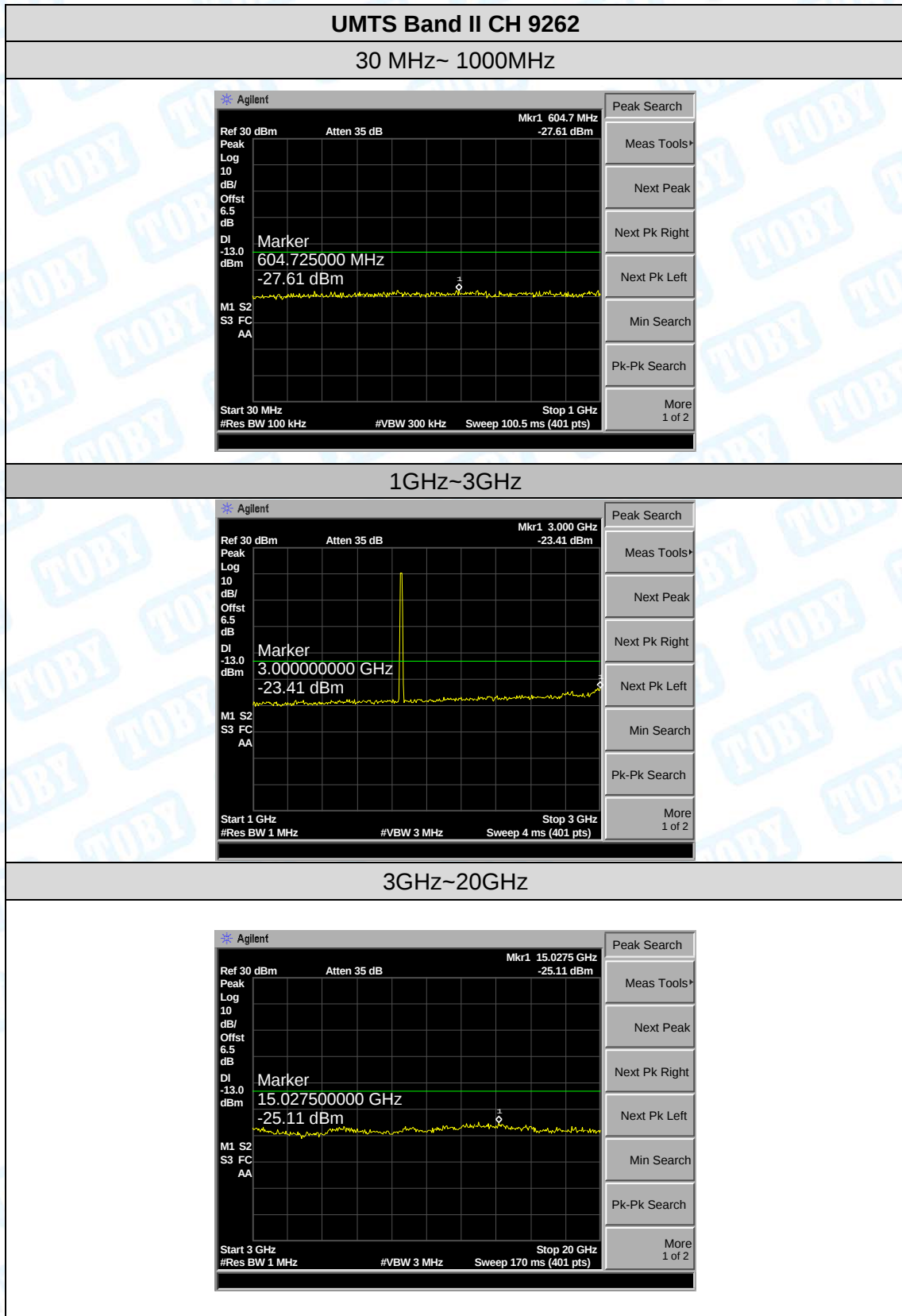






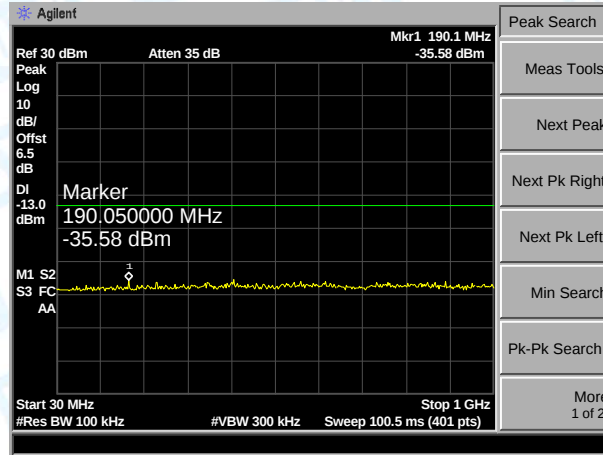


Attachment F--Conducted Out of Band Emissions

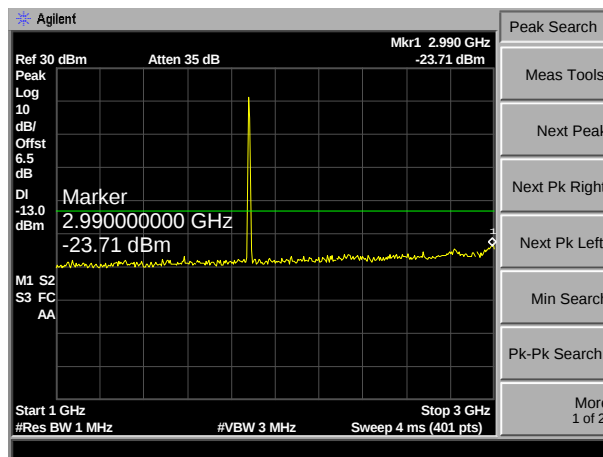


UMTS Band II CH 9400

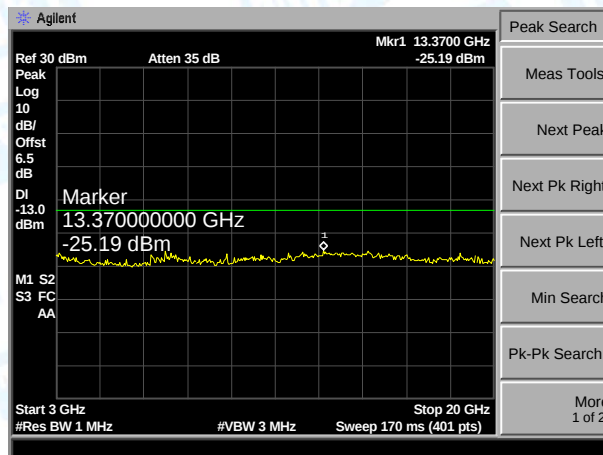
30 MHz~ 1000MHz



1 GHz~3 GHz

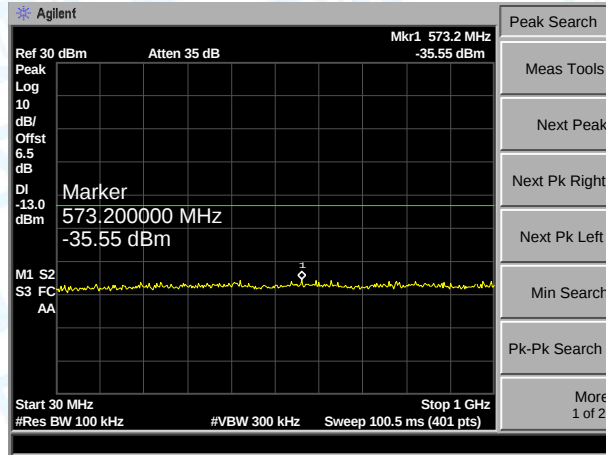


3 GHz~20 GHz

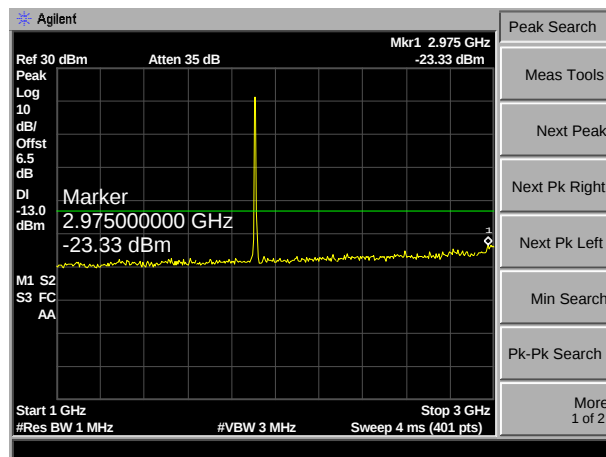


UMTS Band II CH 9538

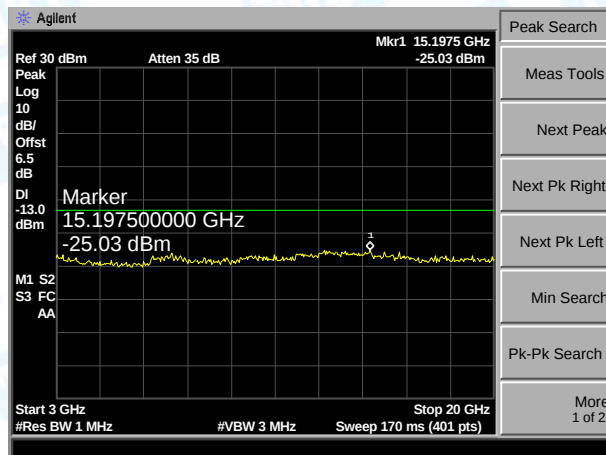
30 MHz~ 1000MHz



1 GHz~3 GHz

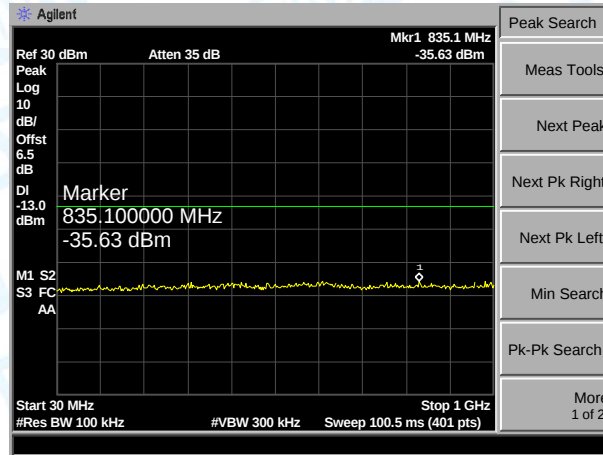


3 GHz~20 GHz

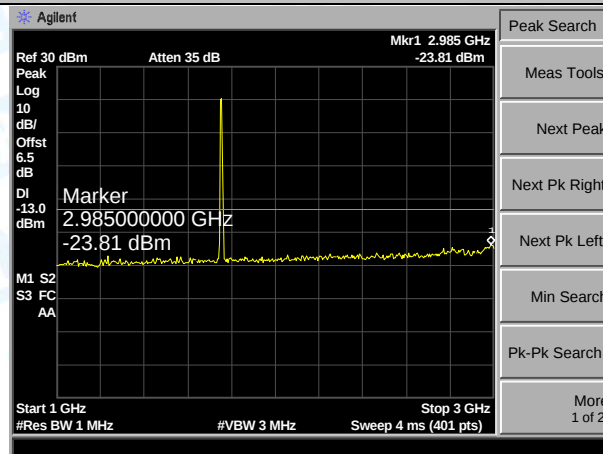


UMTS Band IV CH 1312

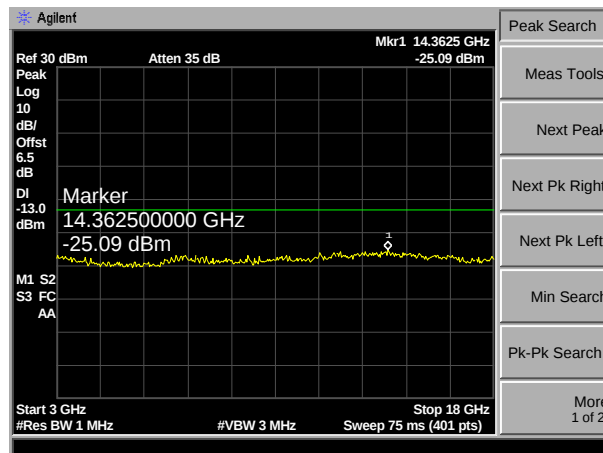
30 MHz~ 1000MHz



1GHz~3GHz

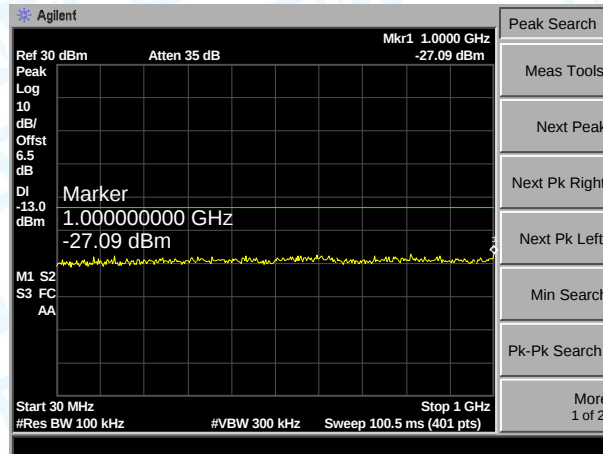


3GHz~18GHz

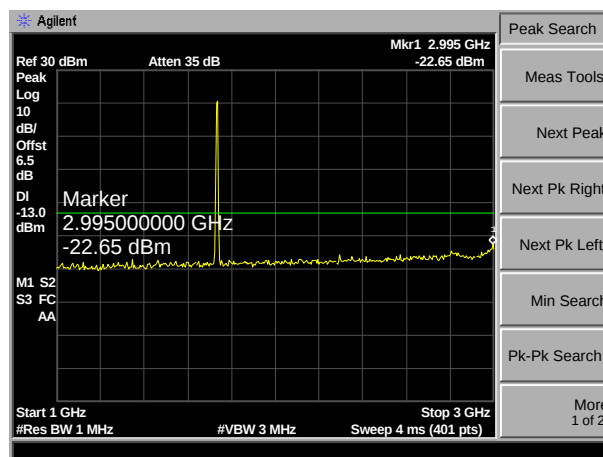


UMTS Band IV CH 1413

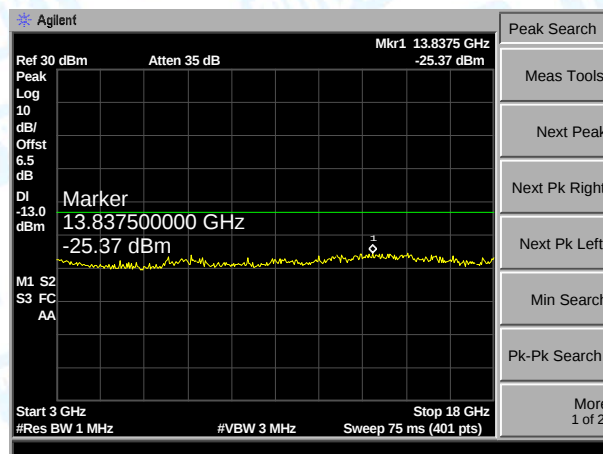
30 MHz~ 1000MHz



1 GHz~3 GHz

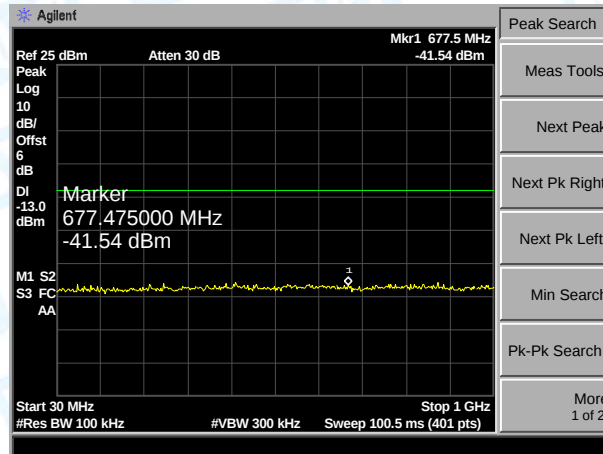


3 GHz~18 GHz

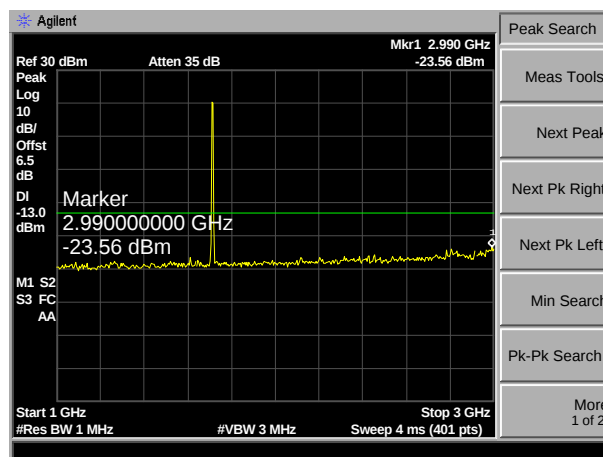


UMTS Band IV CH 1513

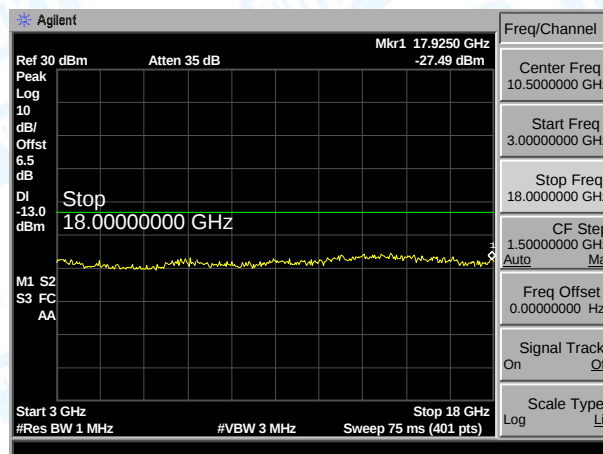
30 MHz~ 1000MHz

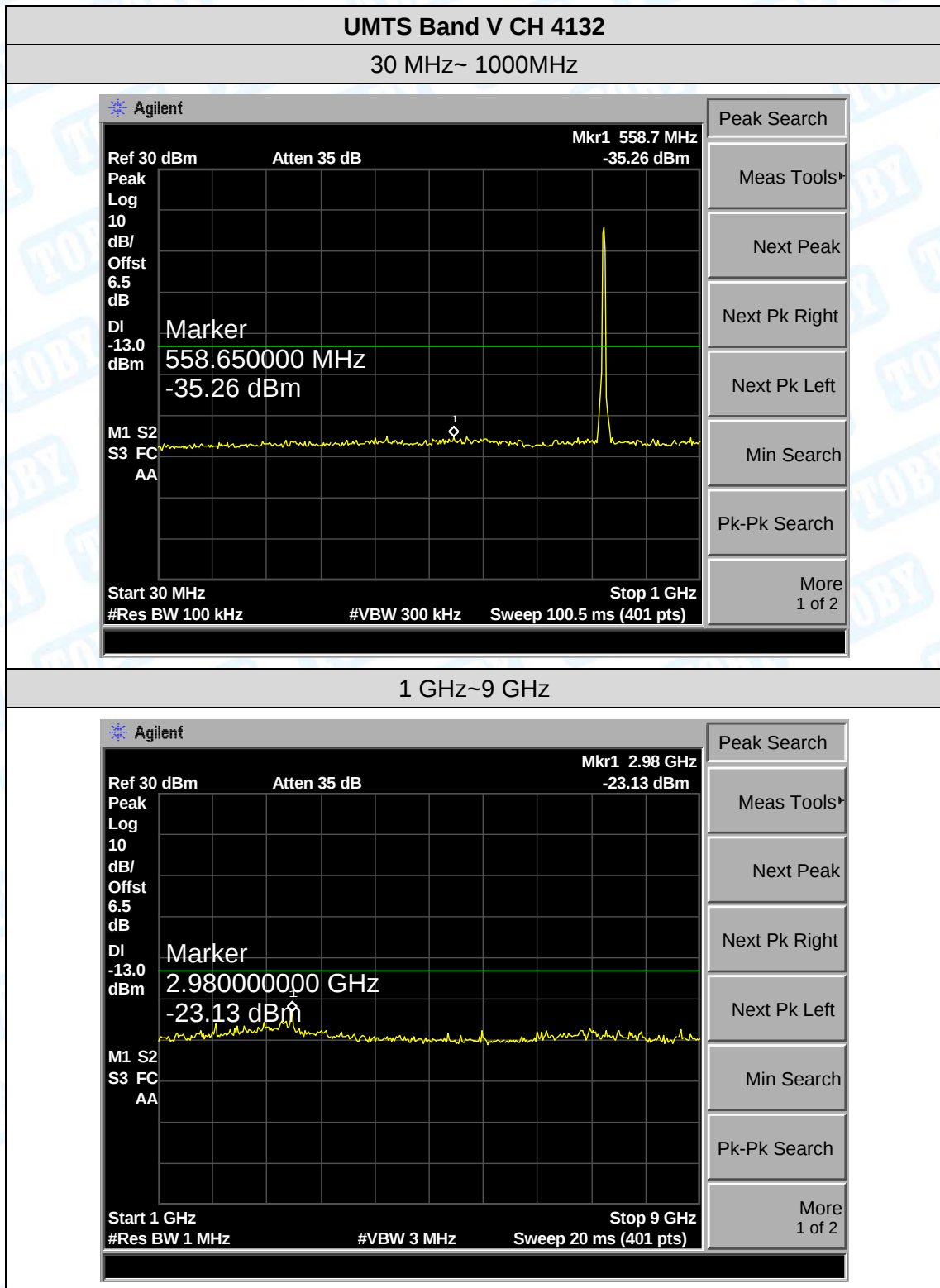


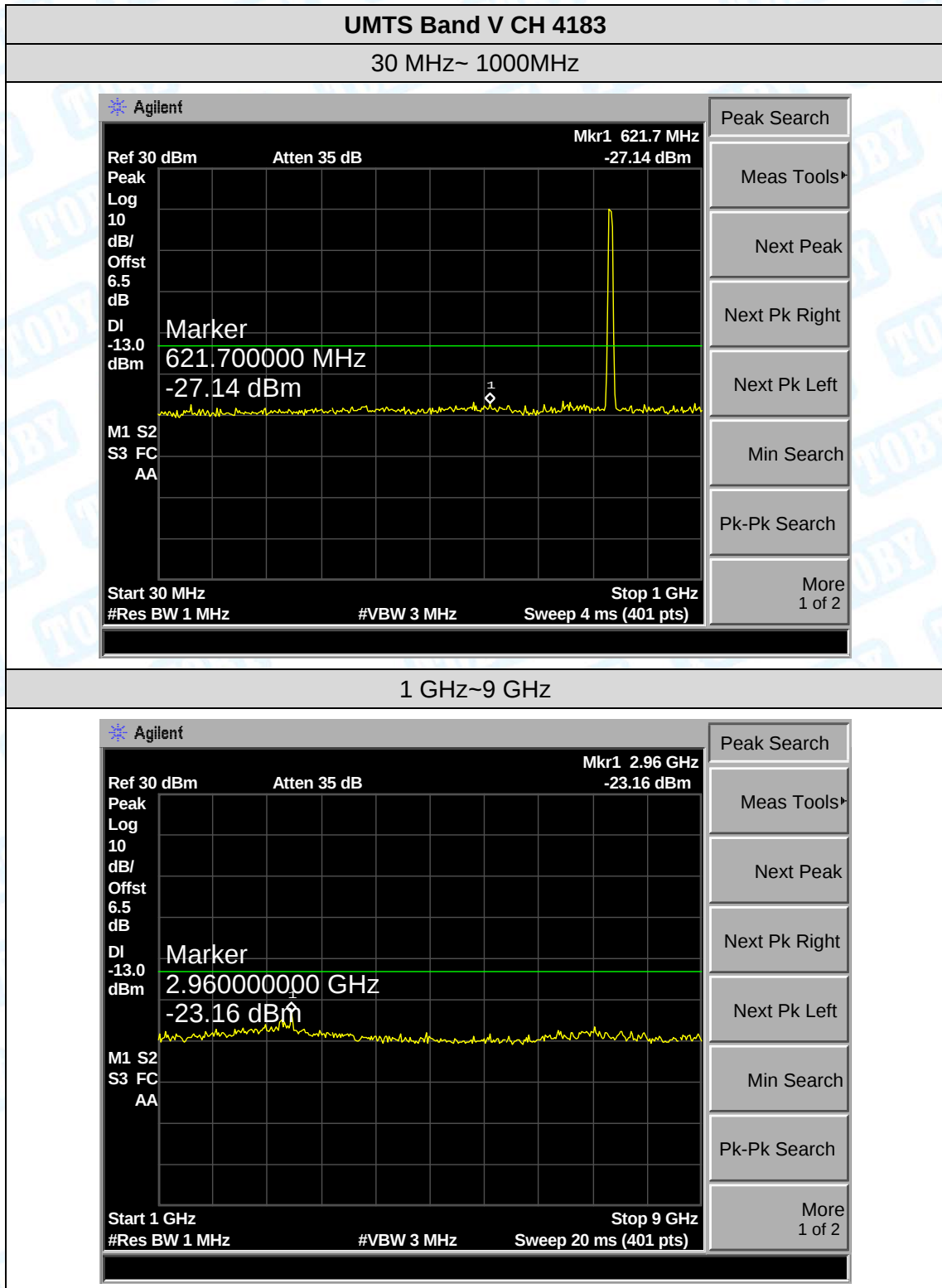
1 GHz~3 GHz

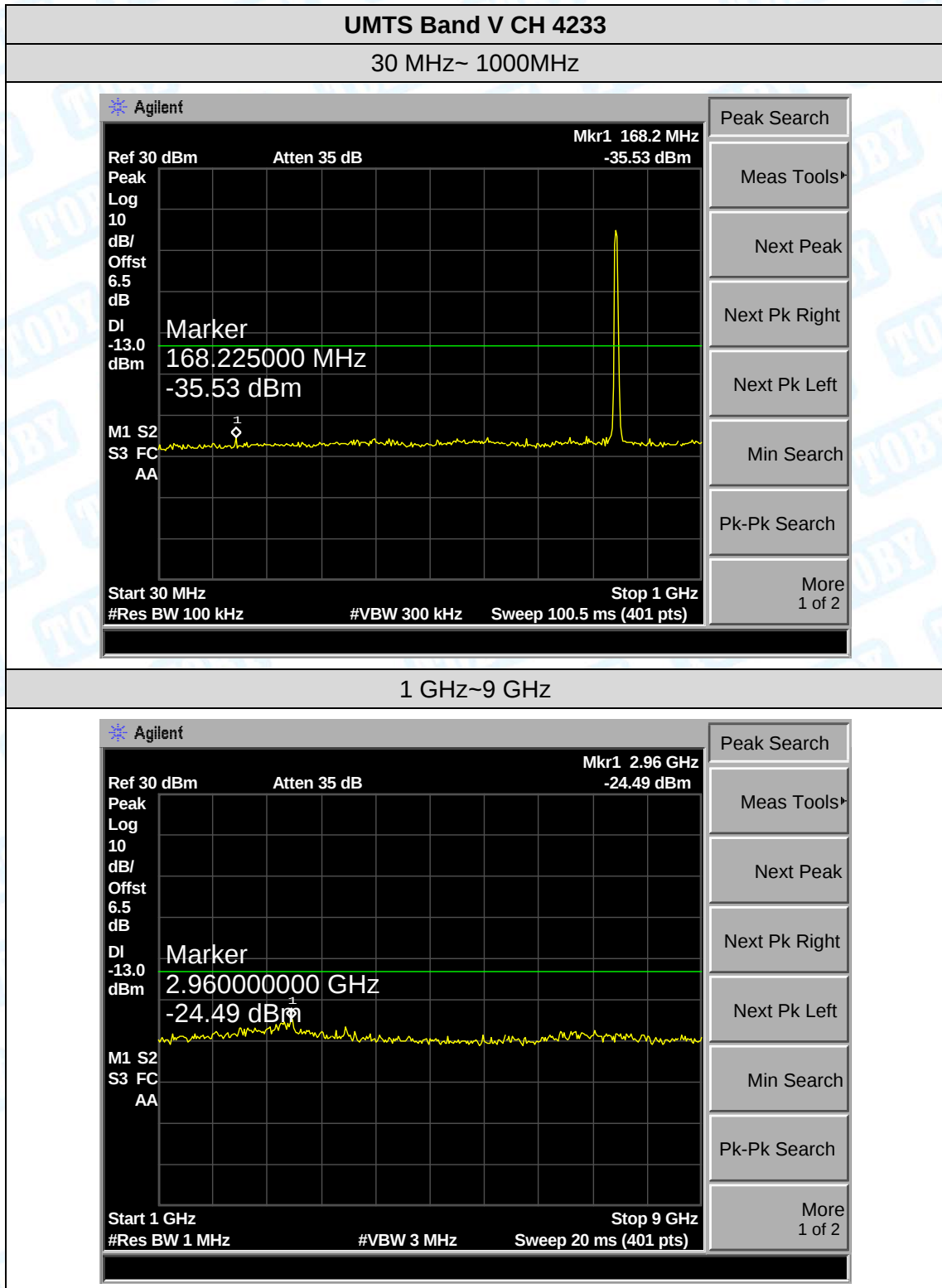


3 GHz~18 GHz



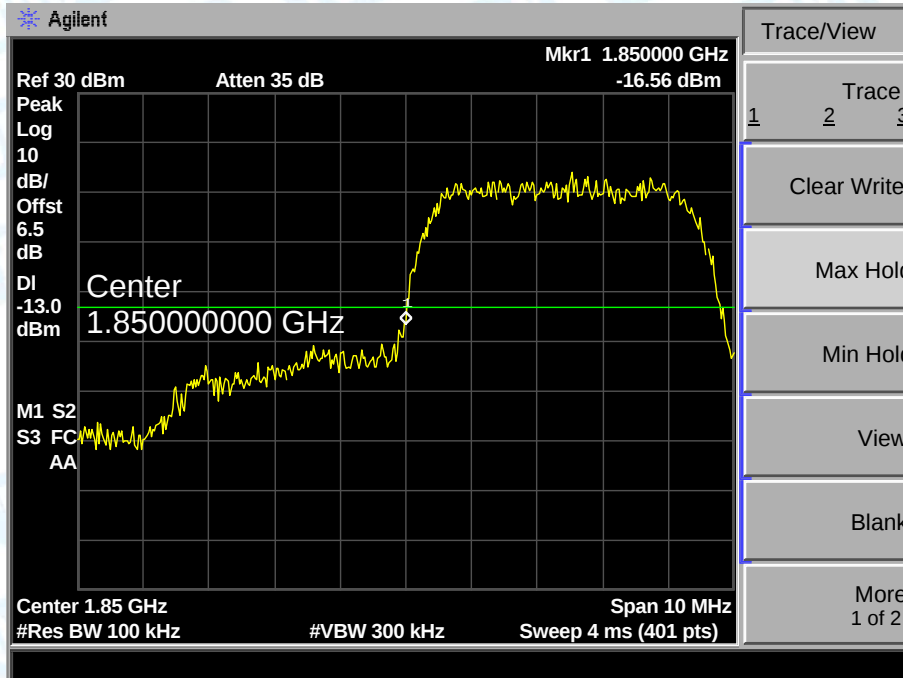






Attachment G-- Band Edge Test

Test Mode:	UMTS Band II RMC
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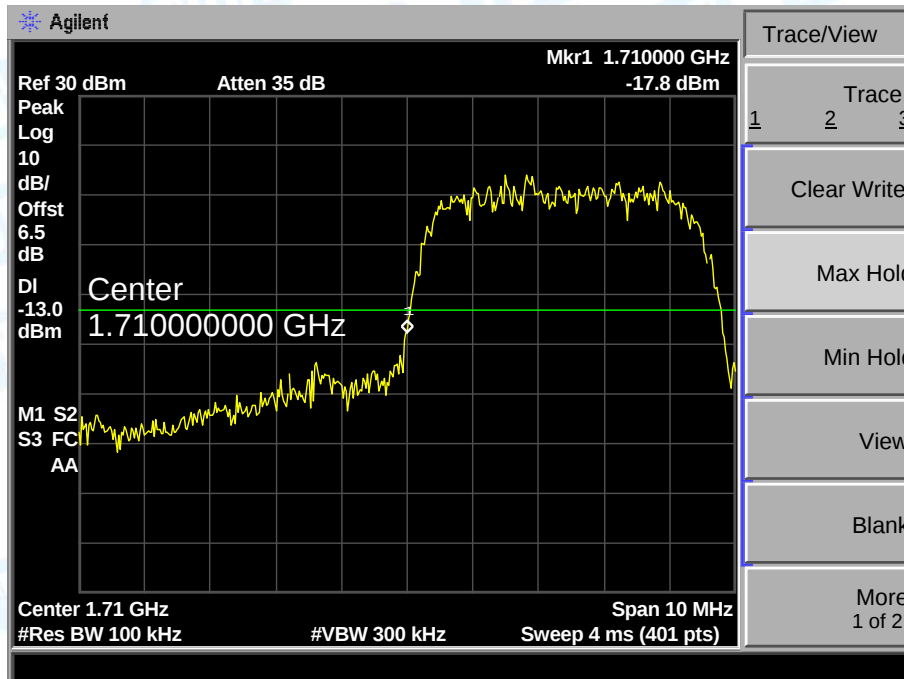


Lowest channel

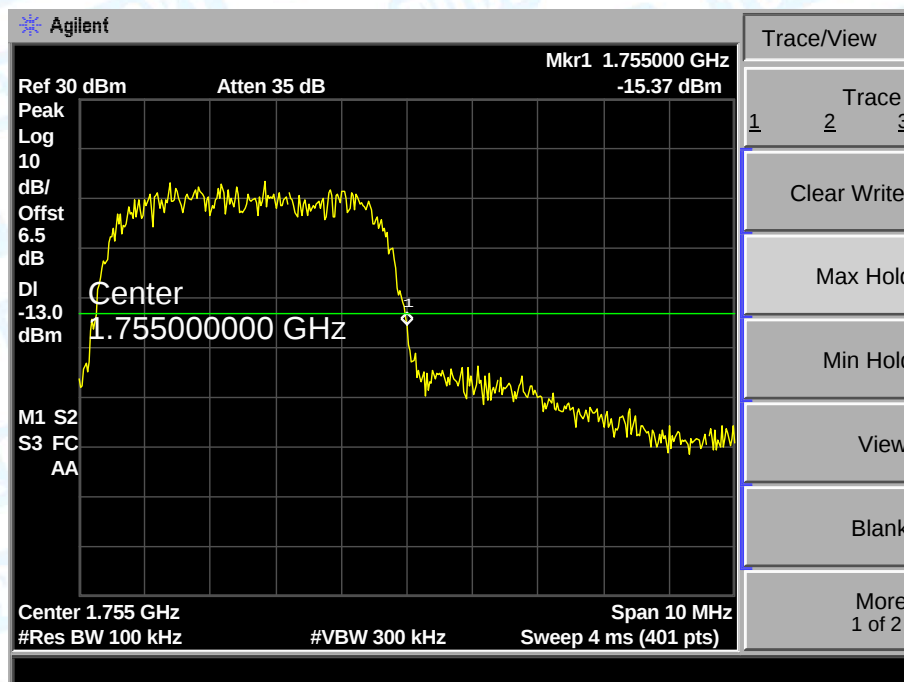


Highest channel

Test Mode:	UMTS Band IV RMC
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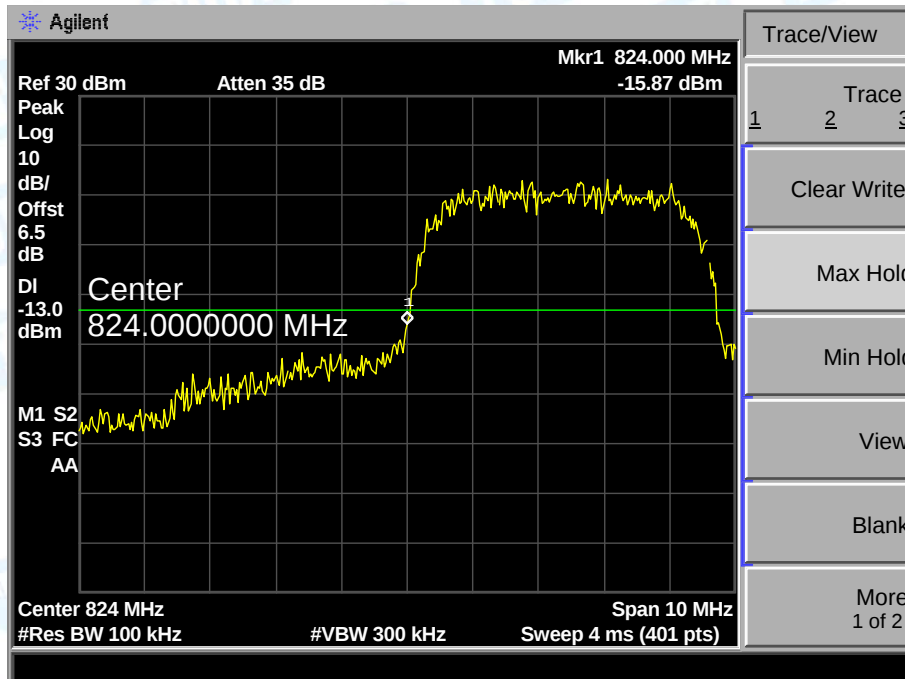


Lowest channel

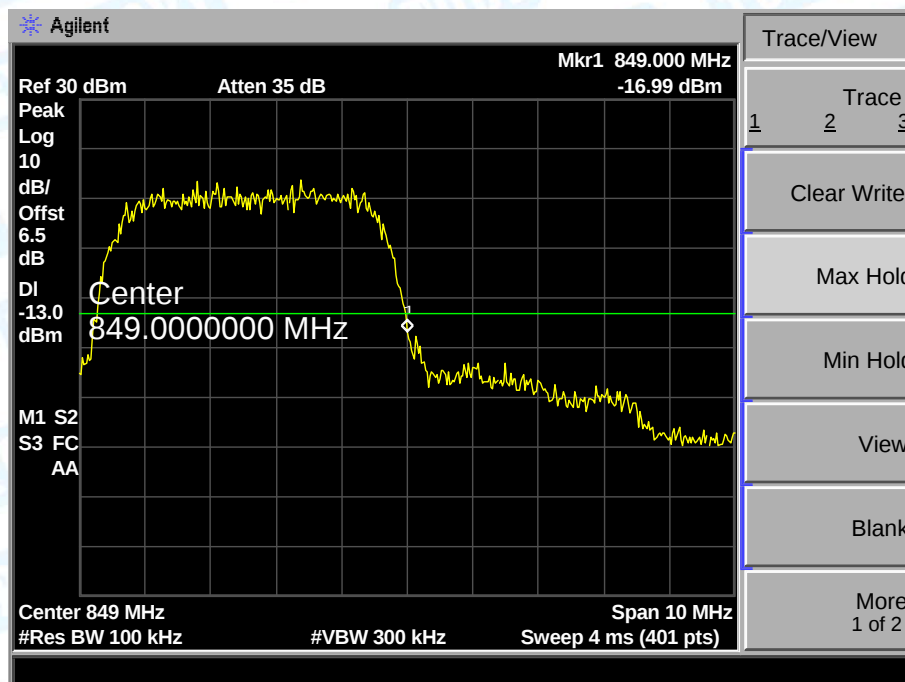


Highest channel

Test Mode:	UMTS Band V RMC
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Lowest channel



Highest channel

Attachment H--Radiated Out Band of Emissions

Measurement Data (worst case)

Test mode:	UMTS Band II RMC						
Channel:	Middle			Date of Test:	2020-09-01		
Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
	Polarization (H&V)	Read Level (dBm)	Antenna Correct Factor (dBi)	Cable Loss (dB)	Emission Level (dBm)		
3760.40	Horizontal	-73.41	14.94	6.12	-52.35	-13.00	Pass
5640.30	H	-69.98	13.87	7.86	-48.25		
7520.40	H	-64.28	14.49	9.54	-40.25		
9400.00	H	---	---	---	---		
11280.00	H	---	---	---	---		
13160.00	H	---	---	---	---		
3760.40	Vertical	-72.26	15.97	6.12	-50.17	-13.00	Pass
5640.30	V	-67.16	13.94	7.86	-45.36		
7520.40	V	-62.39	13.87	9.54	-38.98		
9400.00	V	---	---	---	---		
11280.00	V	---	---	---	---		
13160.00	V	---	---	---	---		
Remark: 1, The testing has been conformed to 10*1880.0MHz=18,800MHz. 2, All other emissions more than 30 dB below the limit. 3, Emission Level= Read Level+ Antenna Correct Factor +Cable Loss							

Test mode:	UMTS Band IV RMC						
Channel:	Middle			Date of Test:	2020-09-01		
Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
	Polarization (H&V)	Read Level (dBm)	Antenna Correct Factor (dBi)	Cable Loss (dB)	Emission Level (dBm)		
3465.25	Horizontal	-69.81	14.70	5.76	-49.35	-13.00	Pass
5197.82	H	-66.26	13.67	7.23	-45.36		
6930.44	H	-61.47	14.27	8.95	-38.25		
8663.00	H	---	---	---	---		
10395.60	H	---	---	---	---		
3465.25	H	---	---	---	---		
5197.82	Vertical	-72.25	15.81	5.76	-50.68	-13.00	Pass
6930.44	V	-67.28	13.80	7.23	-46.25		
8663.00	V	-58.03	13.40	8.95	-35.68		
10395.60	V	---	---	---	---		
3465.25	V	---	---	---	---		
5197.82	V	---	---	---	---		
Remark: 1, The testing has been conformed to 10*1732.6MHz=17326MHz. 2, All other emissions more than 30 dB below the limit. 3, Emission Level= Read Level+ Antenna Correct Factor +Cable Loss							

Test mode:	UMTS Band V RMC						
Channel:	Middle			Date of Test:	2020-09-01		
Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
	Polarization (H&V)	Read Level (dBm)	Antenna Correct Factor (dBi)	Cable Loss (dB)	Emission Level (dBm)		
1673.20	Horizontal	-61.82	7.49	3.97	-50.36	-13.00	Pass
2509.80	H	-60.60	7.03	5.05	-48.52		
3346.40	H	-59.31	12.48	5.98	-40.85		
4183.00	H		---	---	---		
5019.60	H	---	---	---	---		
5856.20	H	---	---	---	---		
1673.20	Vertical	-64.34	8.02	3.97	-52.35	-13.00	Pass
2509.80	V	-57.88	10.47	5.05	-42.36		
3346.40	V	-61.46	16.92	5.98	-38.56		
4183.00	V	---	---	---	---		
5019.60	V	---	---	---	---		
5856.20	V	---	---	---	---		
Remark: 1, The testing has been conformed to 10*836.6MHz=8,366MHz. 2, All other emissions more than 30 dB below the limit. 3, Emission Level= Read Level+ Antenna Correct Factor +Cable Loss							

-----End of the Report-----