

# FCC Radio Test Report

## FCC ID: 2AQ7C-M100-A

### Original Grant

**Report No.** : TB-FCC173477  
**Applicant** : SHENZHEN TOVISION TECHNOLOGY CO.,LTD  
**Equipment Under Test (EUT)**  
**EUT Name** : Wireless base unit  
**Model No.** : M100-A  
**Series Model No.** : N/A  
**Brand Name** : ----  
**Sample ID** : TBBJ-20200509-02-1#  
**Receipt Date** : 2020-06-01  
**Test Date** : 2020-06-02 to 2020-06-29  
**Issue Date** : 2020-06-30  
**Standards** : FCC Part 2, FCC Part 22 Subpart H, FCC Part 24 Subpart E  
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** :



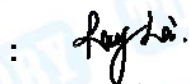
Jack Deng

**Engineer Supervisor**



Ivan Su

**Engineer Manager**



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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# 1. General Information about EUT

## 1.1 Client Information

<b>Applicant</b>	:	SHENZHEN TOVISION TECHNOLOGY CO.,LTD
<b>Address</b>	:	5B1, Building 4, Fuhong industrial park, Fuhai street, Bao'an District, SHENZHEN City, CHINA
<b>Manufacturer</b>	:	SHENZHEN TOVISION TECHNOLOGY CO.,LTD
<b>Address</b>	:	5B1, Building 4, Fuhong industrial park, Fuhai street, Bao'an District, SHENZHEN City, CHINA

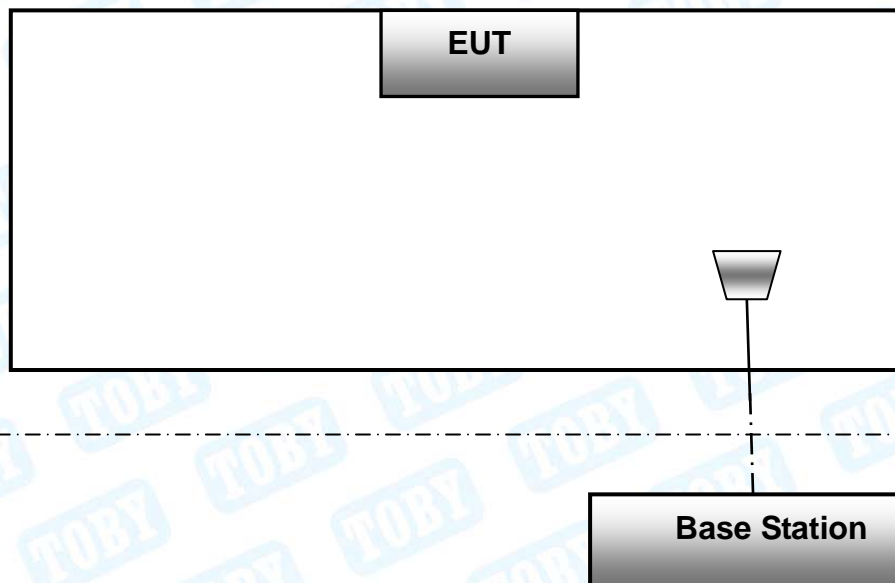
## 1.2 General Description of EUT (Equipment Under Test)

<b>EUT Name</b>	:	Wireless base unit
<b>Models No.</b>	:	M100-A
<b>Model Difference</b>	:	N/A
<b>Product Description</b>	:	Frequency Bands: UMTS FDD Band II; UMTS FDD Band V
	:	UMTS Band II Power:      Cond:21.77dBm    ERP:22.04dBm
	:	UMTS Band V Power:      Cond:22.14dBm    EIRP:21.02dBm
	:	Antenna Gain:              2 dB Dipole Antenna
	:	Modulation Type:          UMTS:QPSK
<b>FCC Operating Frequency</b>	:	UMTS Band II: 1852.40MHz-1907.60MHz UMTS Band V: 826.40MHz-846.60MHz
<b>Emission Designator</b>	:	UMTS Band V: 4M20F9W, UMTS Band II: 4M15F9W
<b>Power Rating</b>	:	DC 12*1.5V AA Battery. DC 6V from DC Port.
<b>Software Version</b>	:	M100_LB_V005
<b>Hardware Version</b>	:	M100_M_V03
<b>Connecting I/O Port(S)</b>	:	Please refer to the User's Manual

**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 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
Test Mode		Description
HSDPA UMTS Band V		highest , middle, lowest channels
HSUPA UMTS Band V		highest , middle, lowest channels
HSDPA UMTS Band II		highest , middle, lowest channels
HSUPA UMTS Band II		highest , middle, lowest channels
<b>Note : The antenna gain provided by the applicant, the adapter and verified for the RF conduction test provided by TOBY test lab.</b>		

**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 HSDPA, HSUPA 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 <sub>Lab</sub> )
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		
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
<b>Note:</b> 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. 13, 2019	Jul. 12, 2020
EMI Test Receiver	Rohde & Schwarz	ESPI	100010/007	Jul. 13, 2019	Jul. 12, 2020
Spectrum Analyzer	Rohde & Schwarz	FSV40-N	102197	Jul. 13, 2019	Jul. 12, 2020
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar.01, 2020	Feb. 28, 2021
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar.01, 2020	Feb. 28, 2021
Horn Antenna	ETS-LINDGREN	BBHA 9170	BBHA9170582	Aug.07, 2019	Aug. 06, 2020
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-059	Jul. 13, 2019	Jul. 12, 2020
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. 27, 2019	Jul. 26, 2020
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. 13, 2019	Jul. 12, 2020
Spectrum Analyzer	Rohde & Schwarz	ESCI	100010/007	Jul. 13, 2019	Jul. 12, 2020
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	17100015SNO26	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO29	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO31	Sep. 16, 2019	Sep. 15, 2020
	DARE!! Instruments	RadiPowerRPR3006W	17100015SNO33	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. 13, 2019	Jul. 12, 2020



## 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

#### 5.1.2 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:

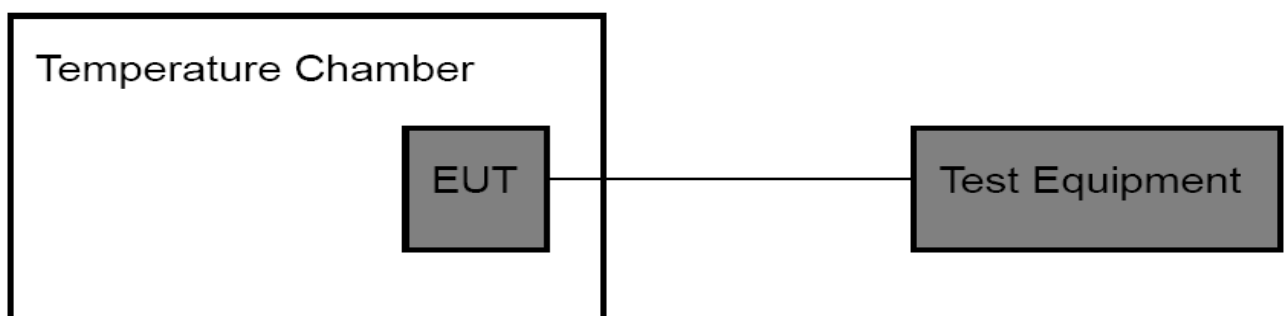
The temperature is varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .

(2) Primary Supply Voltage:

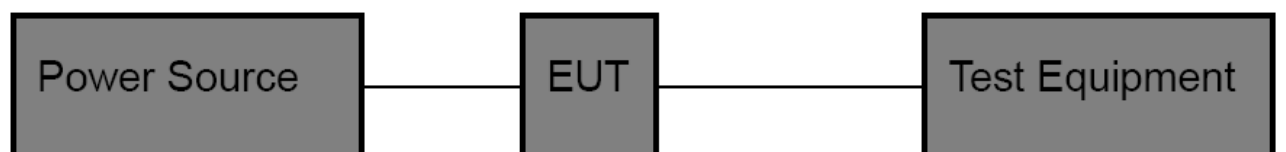
For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at input to the cable normally provide with the equipment, or at the power supply terminals if cables 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  $-30^{\circ}\text{C}$  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  $10^{\circ}\text{C}$  set up to  $50^{\circ}\text{C}$  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  $-30^{\circ}\text{C}$ , the testing lowest temperature will be raised in  $10^{\circ}\text{C}$  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

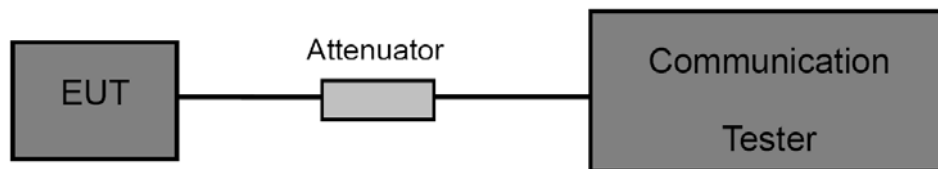
FCC Part 22H : 22.913 (a)

FCC Part 24E: 24.232 (c)

#### 6.1.2 Test Limit

GSM850/UMTS Band V	PCS 1900/UMTS Band II
38.5 dBm (ERP)	33 dBm (EIRP)

### 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

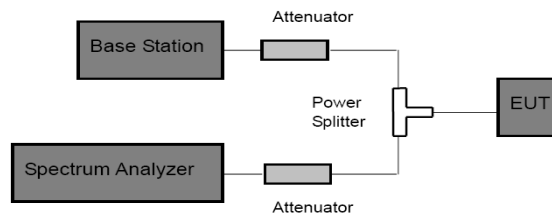
FCC Part 24E: 24.232 (d)

#### 7.1.2 Test Limit

### PCS 1900 /UMTS Band II

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)

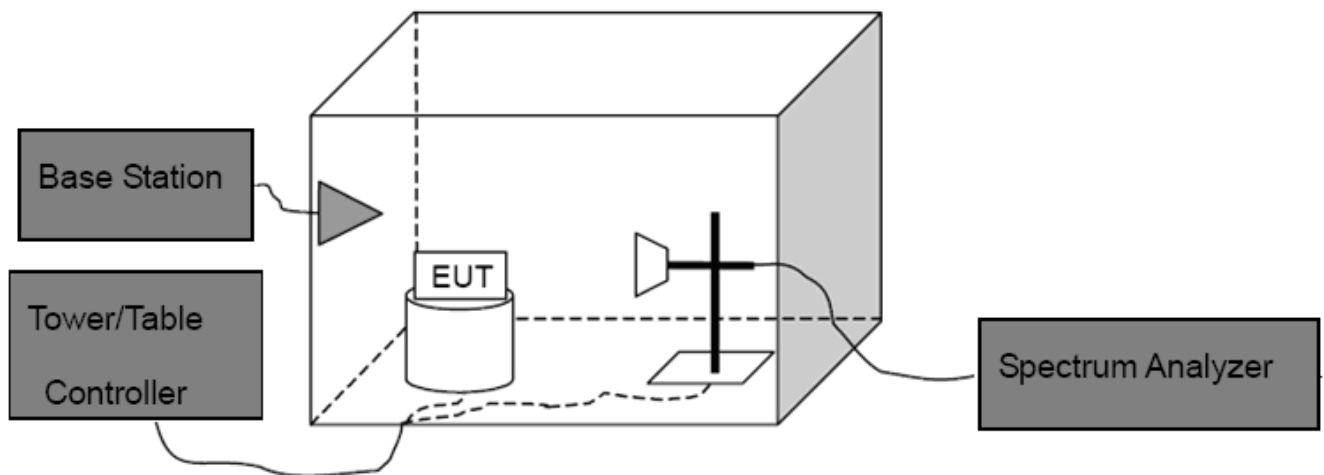
#### 8.1.2 Test Limit

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.

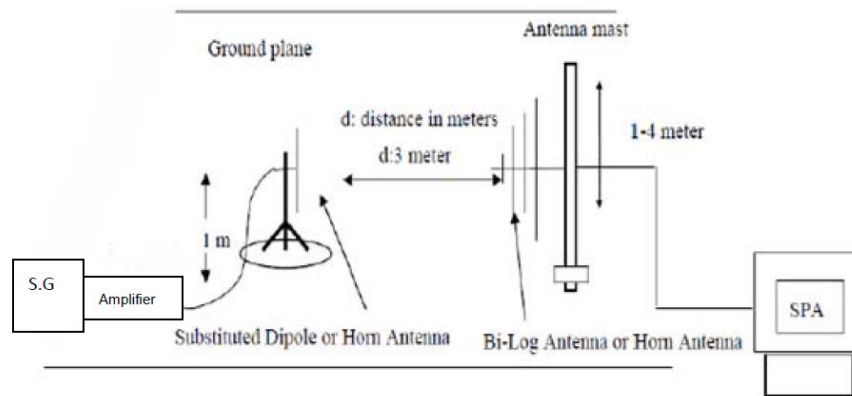
Cellular Band		PCS Band	
GSM 850	UMTS Band V	PCS 1900	UMTS Band II
38.5 dBm (ERP)		33 dBm (EIRP)	

### 8.2 Test Setup



Above 1G





**Substituted Method**

**8.3 Test Procedure**

- (1) The EUT was placed on a 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)

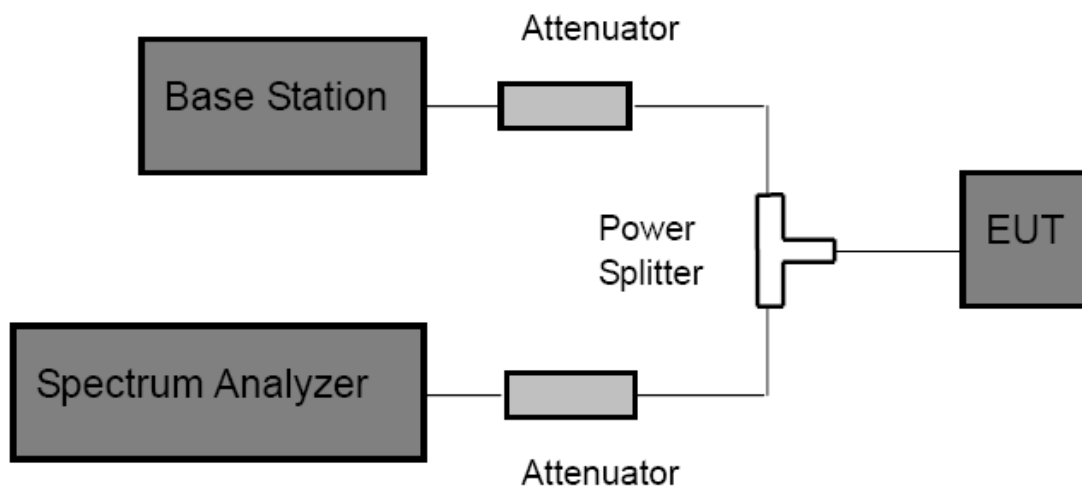
FCC Part 24E: 24.232 (c)

#### 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

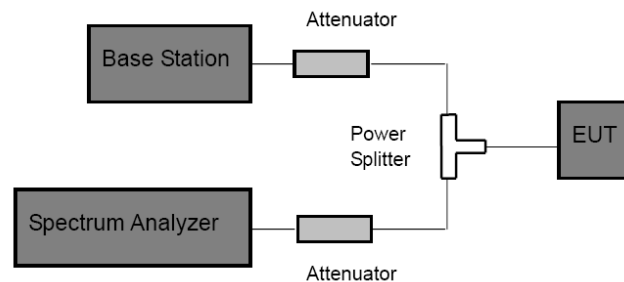
FCC Part 22H: 22.917(a)

FCC Part 24E: 24.238(a)

#### 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 10<sup>th</sup> 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

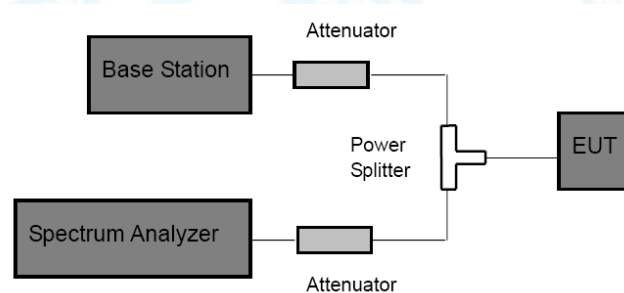
FCC Part 22H: 22.917(a)

FCC Part 24E: 24.238(a)

#### 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

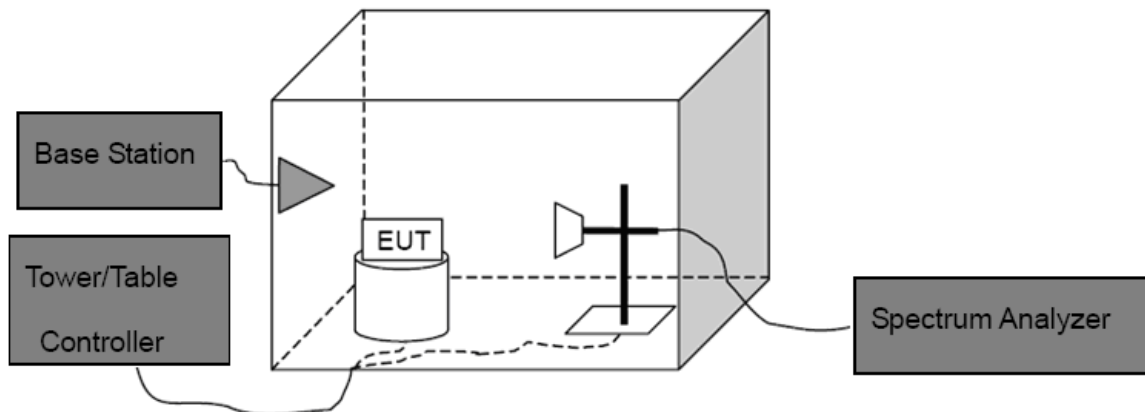
FCC Part 22H: 22.917

FCC Part 24E: 24.238

#### 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<sup>th</sup> 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)



## 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 V (CH 4183)		
Temperature (°C)	HSDPA Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	26	0.031
-20	29	0.035
-10	30	0.036
0	32	0.038
10	20	0.024
20	25	0.030
30	19	0.023
40	21	0.025
50	23	0.027
60	27	0.032
<b>Limit</b>	<b>2.5 (ppm)</b>	
<b>Result</b>	<b>PASS</b>	

Temperature Variation UMTS Band II (CH 9400)		
Temperature (°C)	HSDPA Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
-30	19	0.010
-20	18	0.010
-10	20	0.011
0	21	0.011
10	23	0.012
20	19	0.010
30	21	0.011
40	22	0.012
50	19	0.010
60	20	0.011
<b>Limit</b>	<b>2.5 (ppm)</b>	
<b>Result</b>	<b>PASS</b>	



### Voltage Variation

Voltage Variation UMTS Band V (CH 4182)		
Voltage (V)	HSDPA Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
4.5	26	0.031
6.0	28	0.033
6.5	34	0.041
<b>Limit</b>	<b>2.5 (ppm)</b>	
<b>Result</b>	<b>PASS</b>	

Voltage Variation UMTS Band II (CH 9400)		
Voltage (V)	HSDPA Mode	
	Freq. Dev. (Hz)	Deviation (ppm)
4.5	25	0.013
6.0	27	0.014
6.5	29	0.015
<b>Limit</b>	<b>2.5 (ppm)</b>	
<b>Result</b>	<b>PASS</b>	

## Attachment B--Conducted RF Output Power

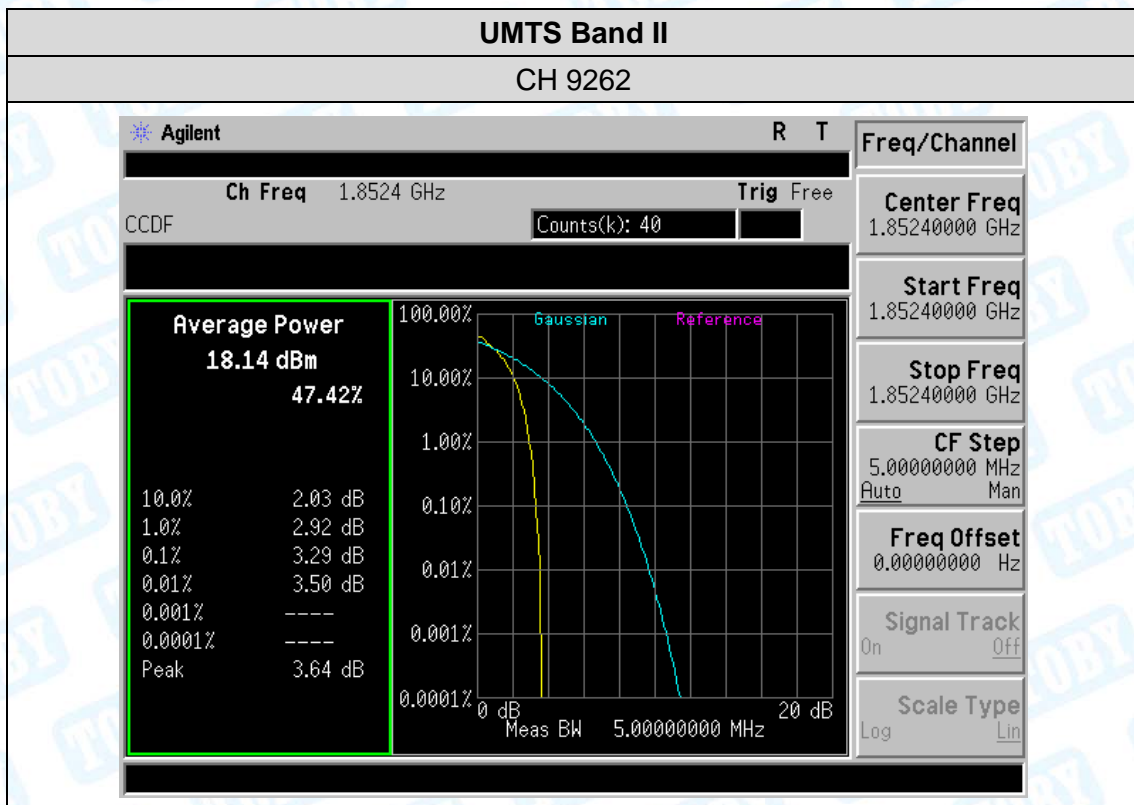
UMTS Band V				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
HSDPA Subtest 1	4132	826.4	21.99	0.158
	4183	836.6	22.08	0.161
	4233	846.6	22.14	0.164
HSDPA Subtest 2	4132	826.4	21.96	0.157
	4183	836.6	22.01	0.159
	4233	846.6	21.86	0.153
HSDPA Subtest 3	4132	826.4	20.68	0.117
	4183	836.6	20.49	0.112
	4233	846.6	20.67	0.117
HSDPA Subtest 4	4132	826.4	20.13	0.103
	4183	836.6	20.06	0.101
	4233	846.6	20.19	0.104
HSUPA Subtest 1	4132	826.4	21.96	0.157
	4183	836.6	22.13	0.163
	4233	846.6	22.01	0.159
HSUPA Subtest 2	4132	826.4	21.06	0.128
	4183	836.6	21.96	0.157
	4233	846.6	21.86	0.153
HSUPA Subtest 3	4132	826.4	21.06	0.128
	4183	836.6	21.08	0.128
	4233	846.6	21.12	0.129
HSUPA Subtest 4	4132	826.4	20.69	0.117
	4183	836.6	20.86	0.122
	4233	846.6	20.98	0.125
HSUPA Subtest 5	4132	826.4	20.45	0.111
	4183	836.6	20.36	0.109
	4233	846.6	20.58	0.114



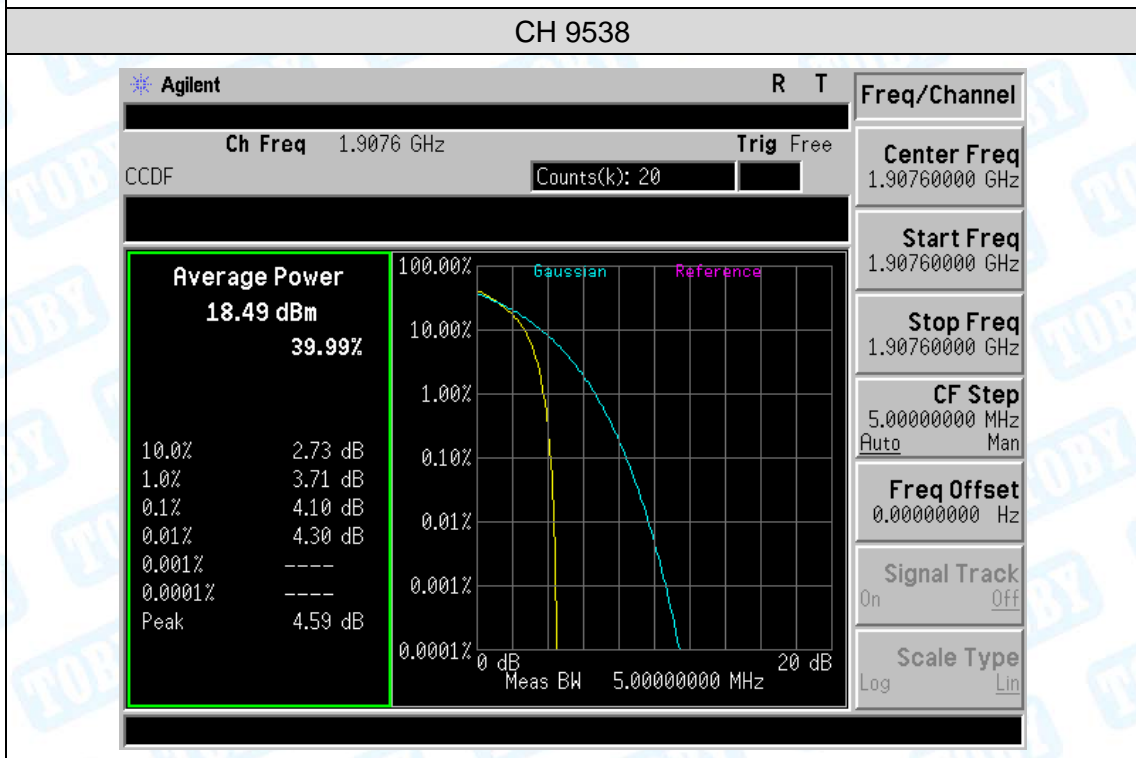
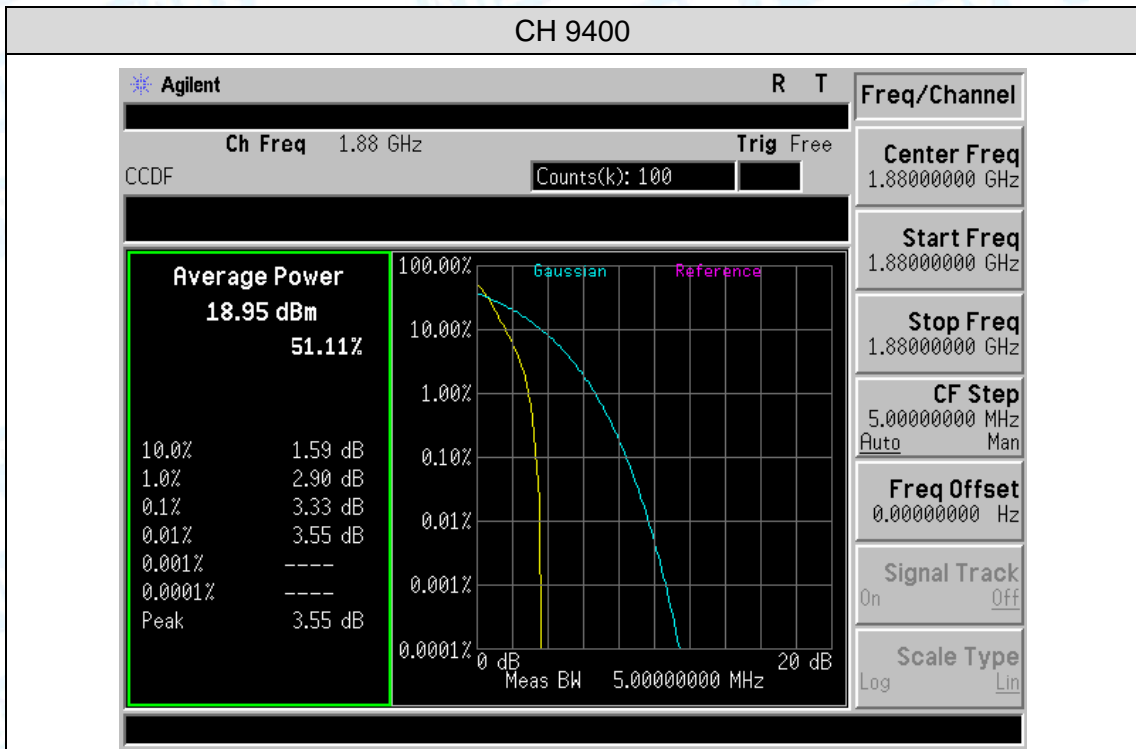
UMTS Band II				
Mode	Channel	Frequency (MHz)	Conducted Power (dBm)	Conducted Power (W)
HSDPA Subtest 1	9262	1852.4	20.93	0.124
	9400	1880.0	21.44	0.139
	9538	1907.6	21.77	0.150
HSDPA Subtest 2	9262	1852.4	21.34	0.136
	9400	1880.0	21.26	0.134
	9538	1907.6	21.27	0.134
HSDPA Subtest 3	9262	1852.4	20.59	0.115
	9400	1880.0	20.54	0.113
	9538	1907.6	20.36	0.109
HSDPA Subtest 4	9262	1852.4	20.14	0.103
	9400	1880.0	20.06	0.101
	9538	1907.6	20.35	0.108
HSUPA Subtest 1	9262	1852.4	21.04	0.127
	9400	1880.0	21.40	0.138
	9538	1907.6	21.72	0.149
HSUPA Subtest 2	9262	1852.4	21.32	0.136
	9400	1880.0	21.26	0.134
	9538	1907.6	21.25	0.133
HSUPA Subtest 3	9262	1852.4	21.09	0.129
	9400	1880.0	21.02	0.126
	9538	1907.6	21.25	0.133
HSUPA Subtest 4	9262	1852.4	20.96	0.125
	9400	1880.0	20.84	0.121
	9538	1907.6	20.63	0.116
HSUPA Subtest 5	9262	1852.4	20.05	0.101
	9400	1880.0	20.15	0.104
	9538	1907.6	20.35	0.108

## Attachment C--Peak-Average Ratio

UMTS Band II			
Mode	Channel	Frequency (MHz)	Peak-Average Ratio (PAR)
UMTS Band II	9262	1852.4	3.29
	9400	1880.0	3.33
	9538	1907.6	4.10
			Limit ≤ 13dB







## Attachment D-- Radiated Output Power

Measurement Data (worst case)

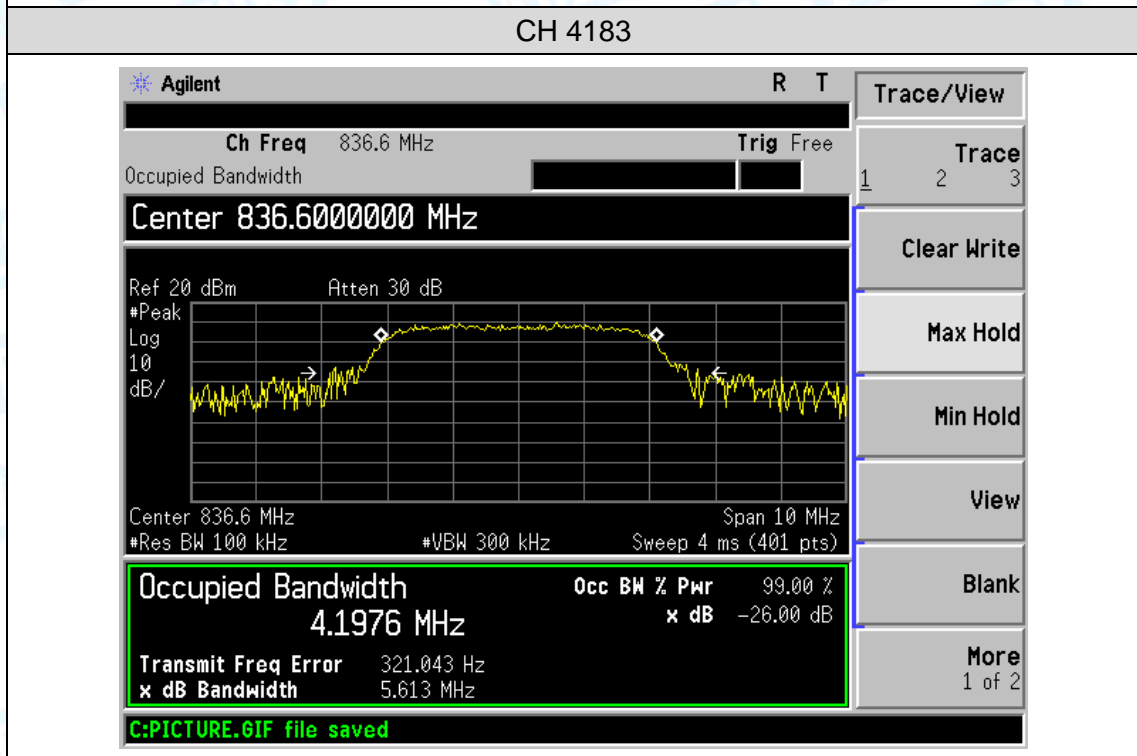
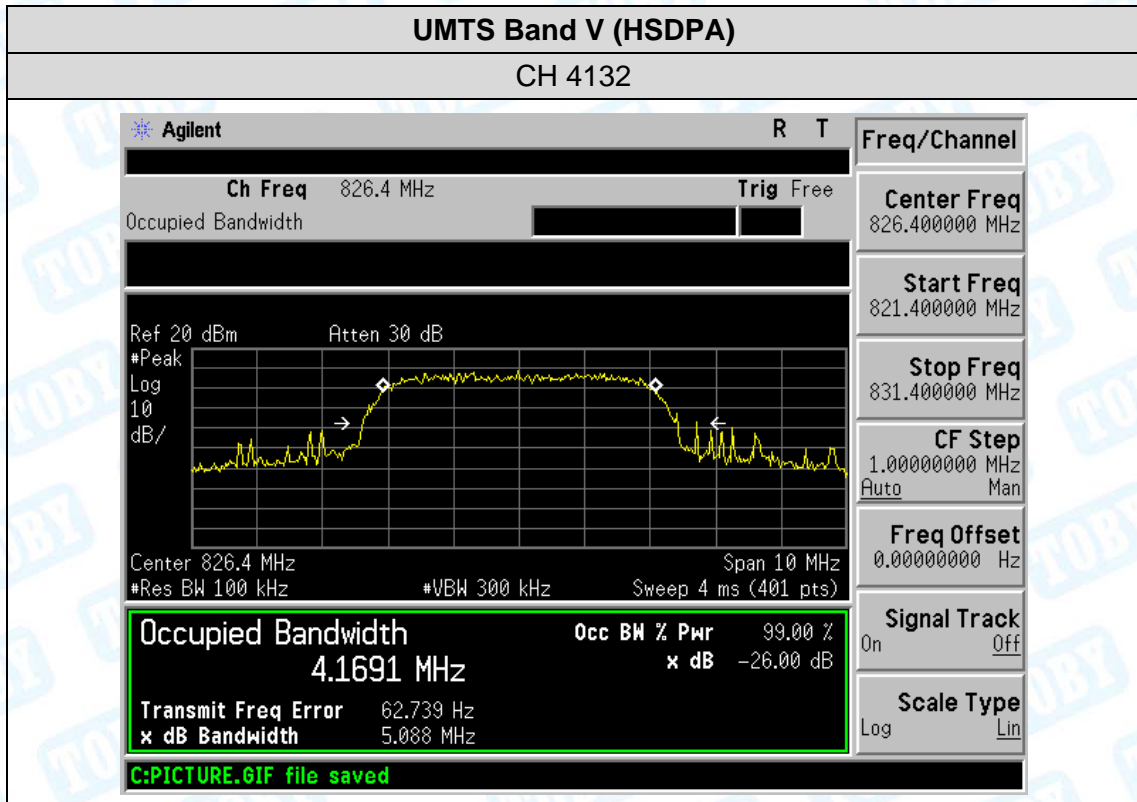
UMTS Band V								
Mode	Channel	Frequency (MHz)	Antenna (H&V)	SG Level (dBm)	Antenna Factor (dBi)	Cable Loss (dB)	ERP Power (dBm)	ERP Power (W)
Band V HSDPA	4132	826.4	H	18.49	3.46	1.26	20.69	0.1172
			V	17.15	3.46	1.26	19.35	0.0861
	4183	836.6	H	18.46	3.82	1.26	21.02	0.1265
			V	17.09	3.82	1.26	19.65	0.0923
	4233	846.6	H	17.98	4.16	1.26	20.88	0.1225
			V	16.14	4.16	1.26	19.04	0.0802
<b>Limit</b>							<b>38.5</b>	<b>7</b>

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)
Band II HSDPA	9262	1852.4	H	19.10	5.01	2.59	21.52	0.1419
			V	16.83	5.01	2.59	19.25	0.0841
	9400	1880.0	H	19.81	4.82	2.59	22.04	0.1600
			V	17.13	4.82	2.59	19.36	0.0863
	9538	1907.6	H	19.99	4.45	2.59	21.85	0.1531
			V	17.66	4.45	2.59	19.52	0.0895
<b>Limit</b>							<b>33</b>	<b>2</b>

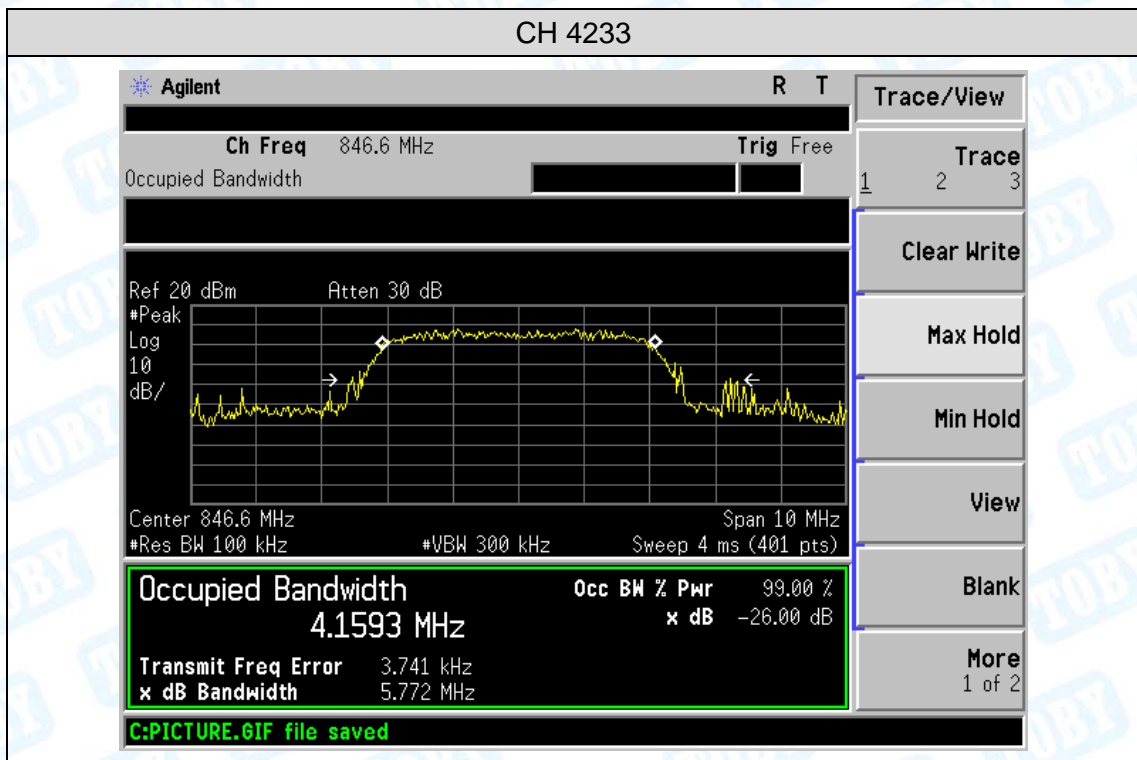


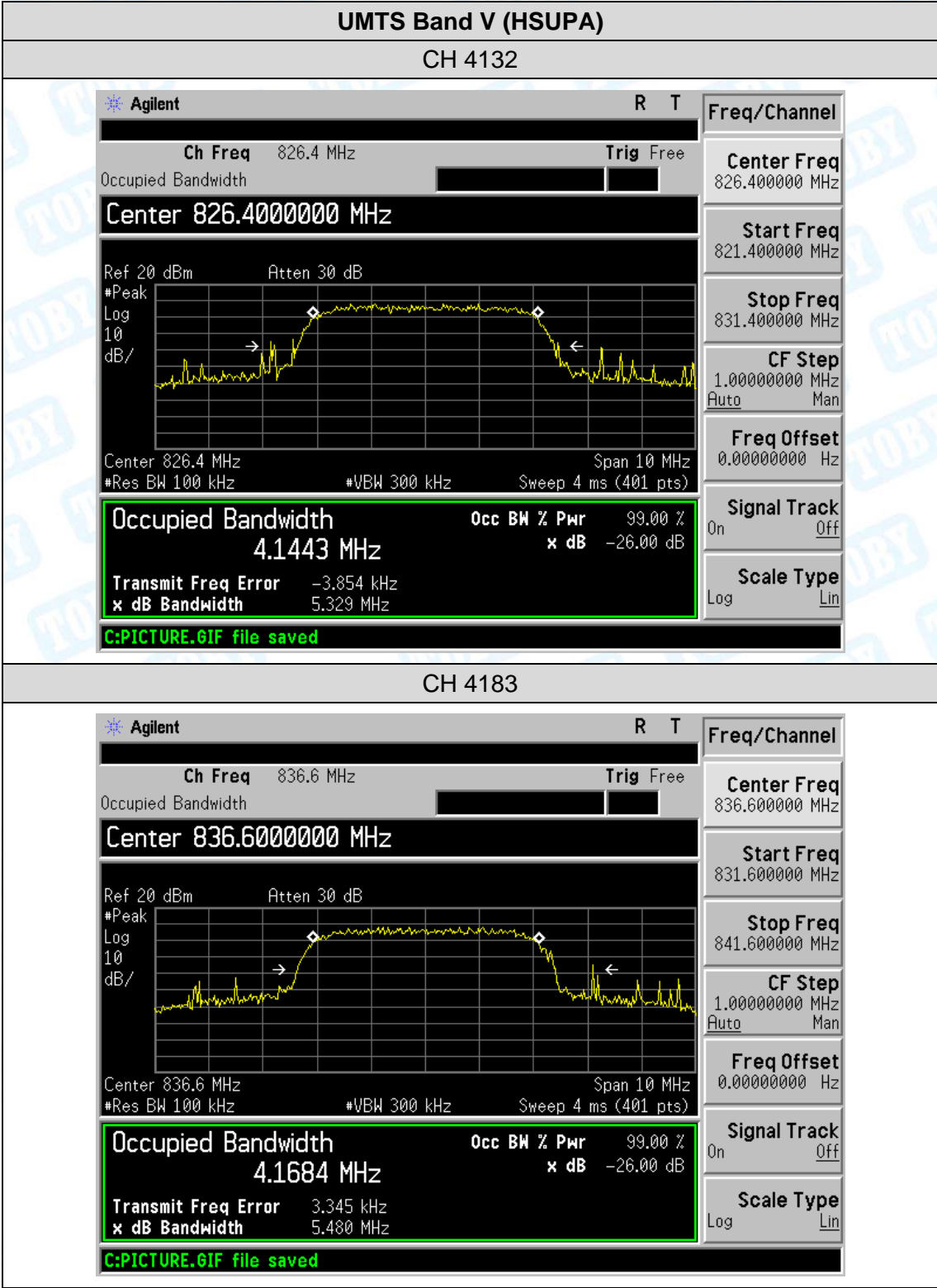
## Attachment E--Occupied Bandwidth

UMTS Band V				
Mode	Channel	Frequency (MHz)	99% OBW (MHz)	-26dB Bandwidth (MHz)
Band V HSDPA	4132	826.4	4.1691	5.088
	4183	836.6	4.1976	5.613
	4233	846.6	4.1593	5.772
Band V HSUPA	4132	826.4	4.1443	5.329
	4183	836.6	4.1684	5.480
	4233	846.6	4.1512	6.197
UMTS Band II				
Mode	Channel	Frequency (MHz)	99% OBW (MHz)	-26dB Bandwidth (MHz)
Band II HSDPA	9262	1852.4	4.1398	4.748
	9400	1880.0	4.1346	4.724
	9538	1907.6	4.1466	4.766
Band II HSUPA	9262	1852.4	4.1362	4.774
	9400	1880.0	4.1291	4.708
	9538	1907.6	4.1380	4.710

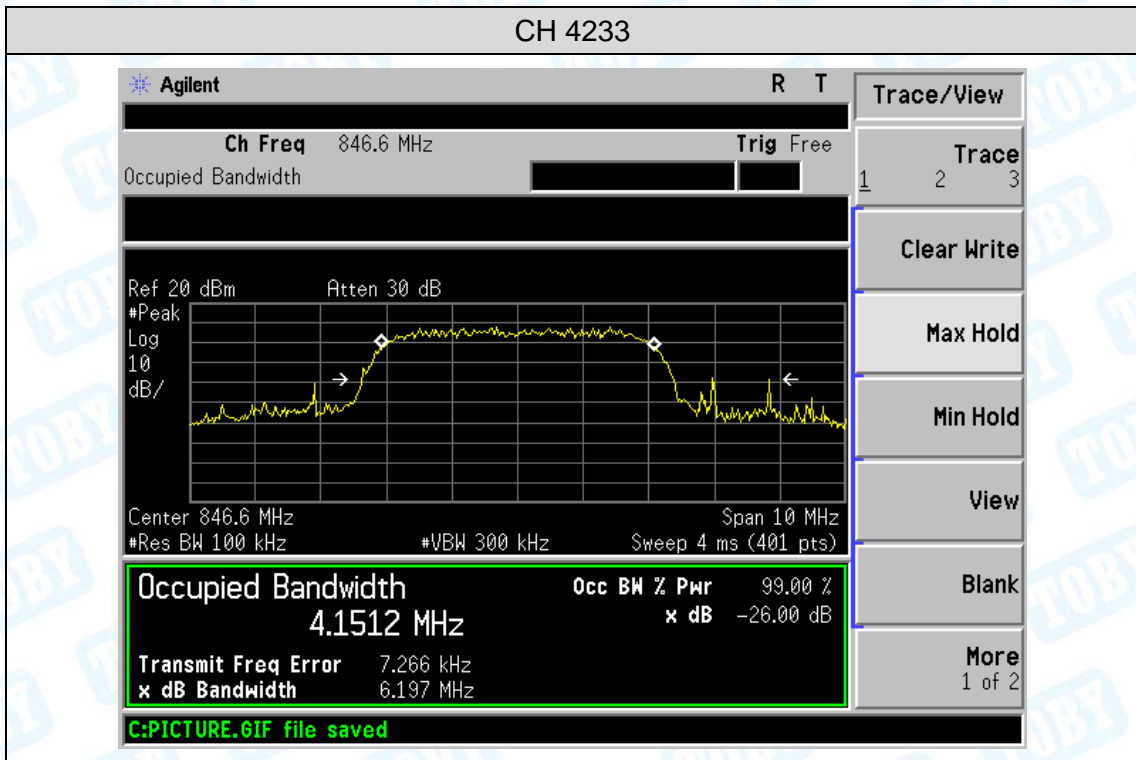


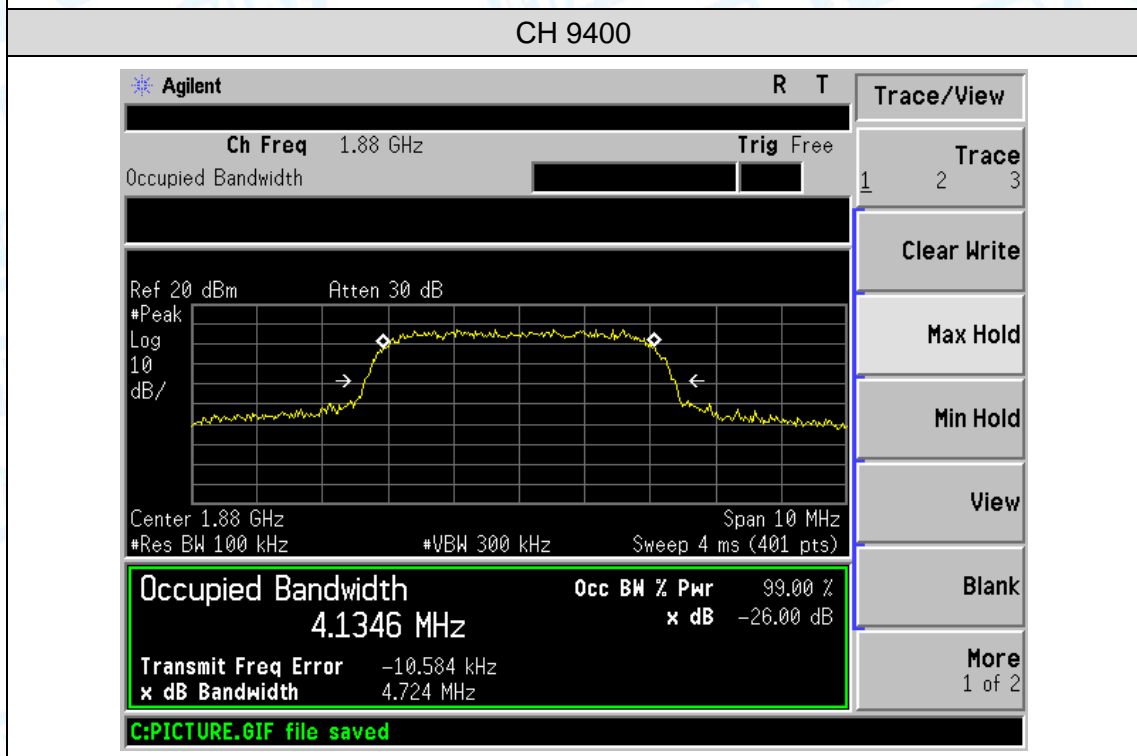
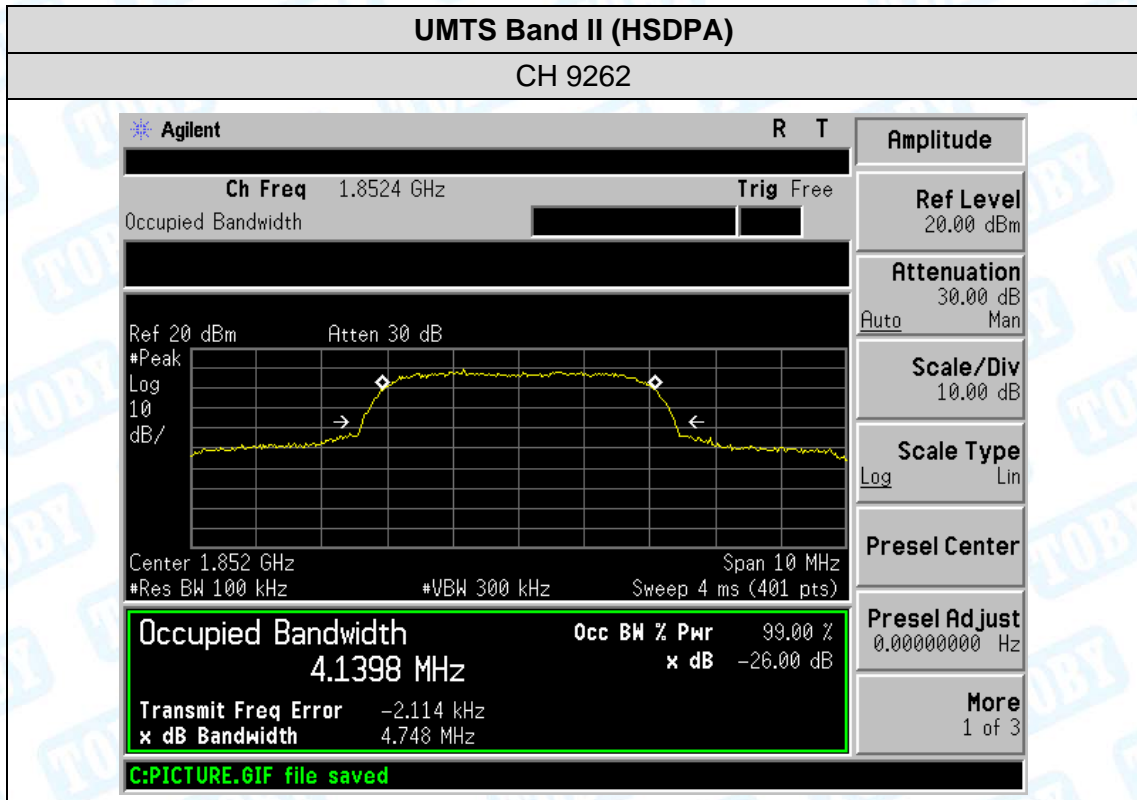




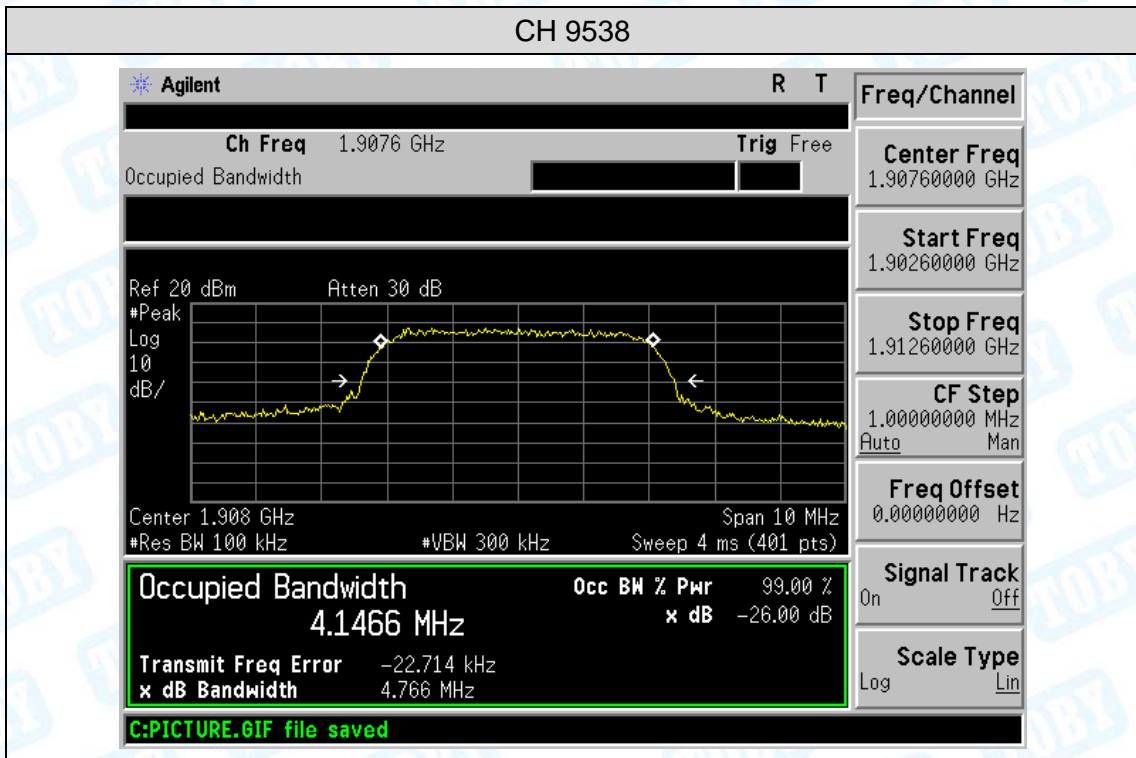


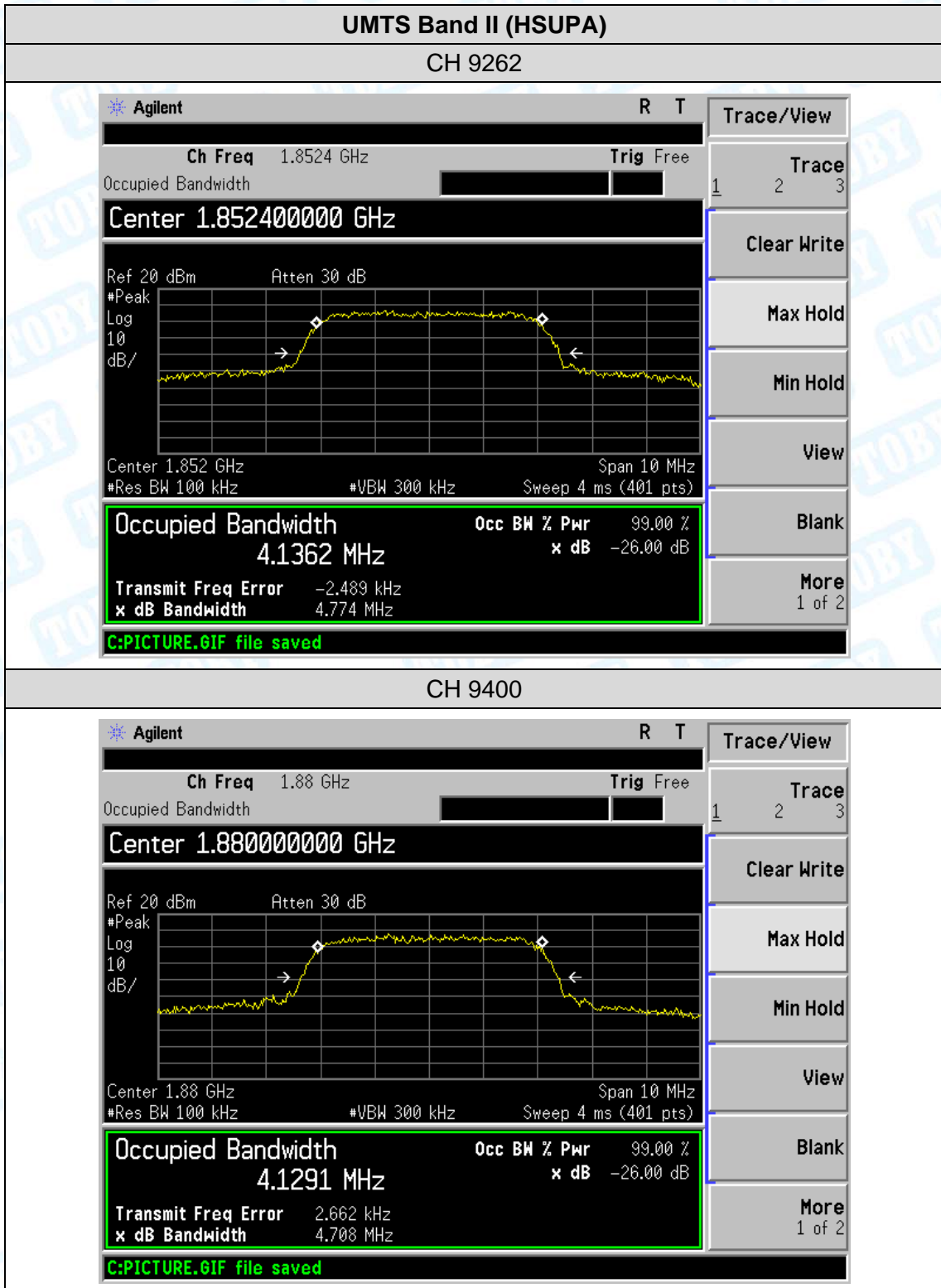




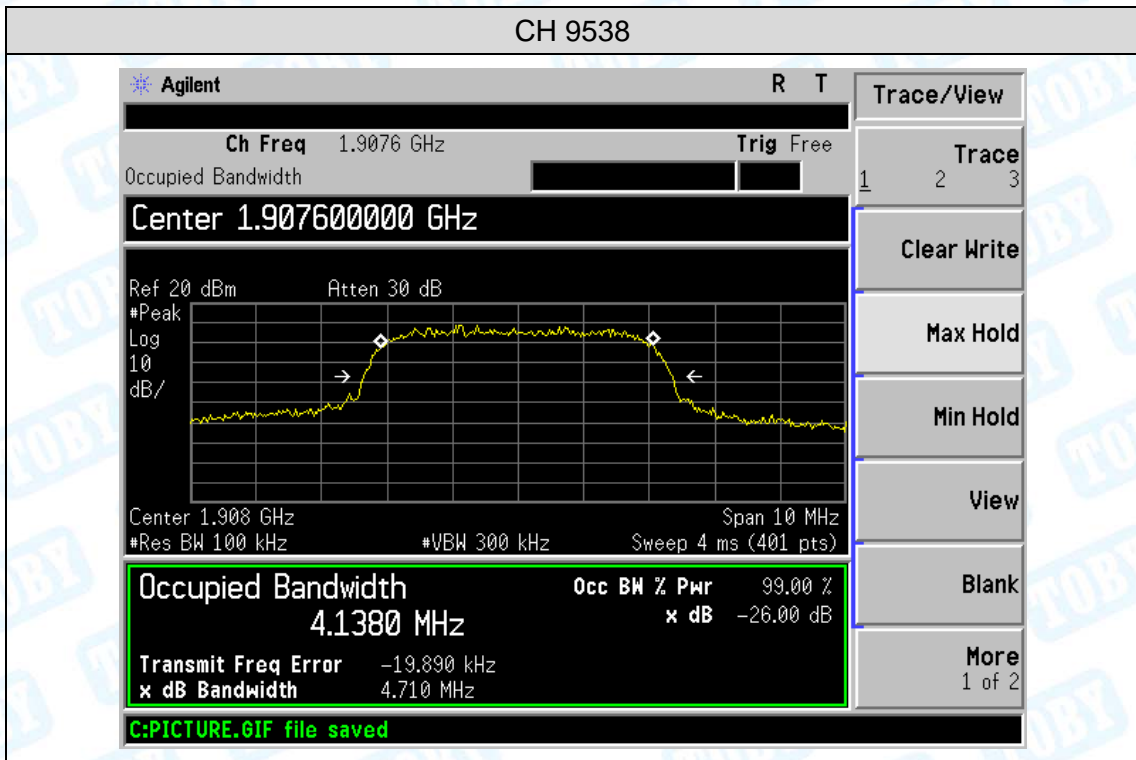




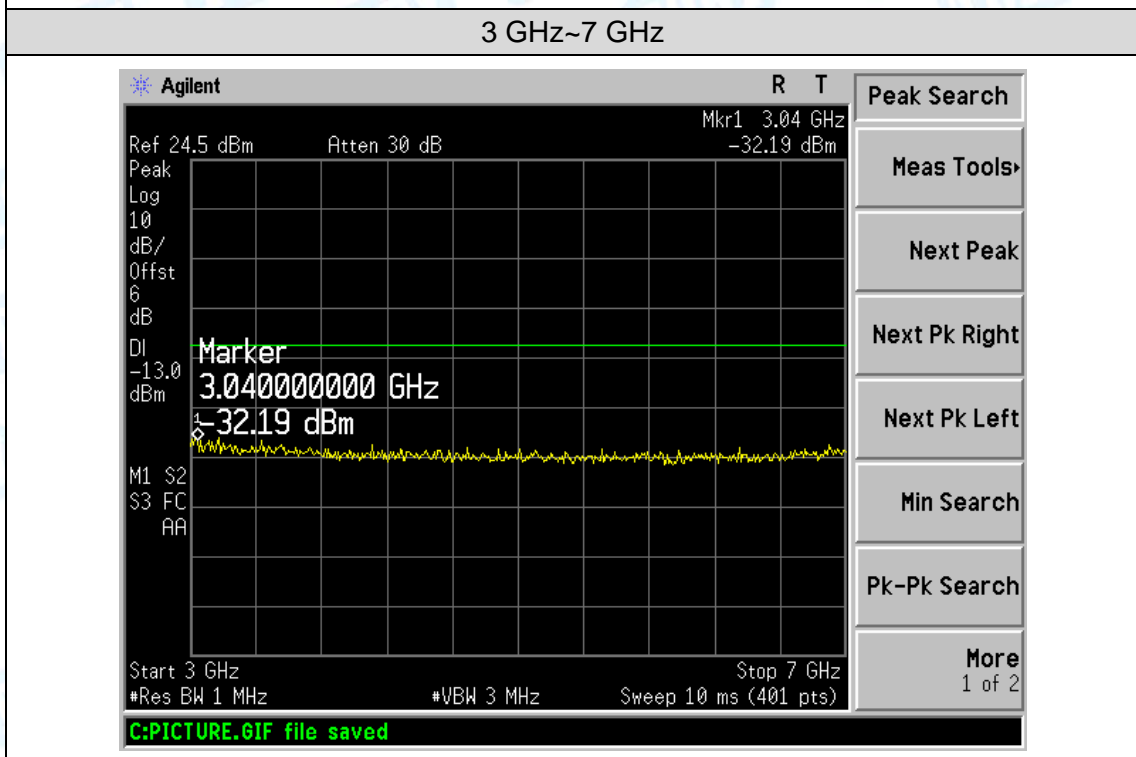
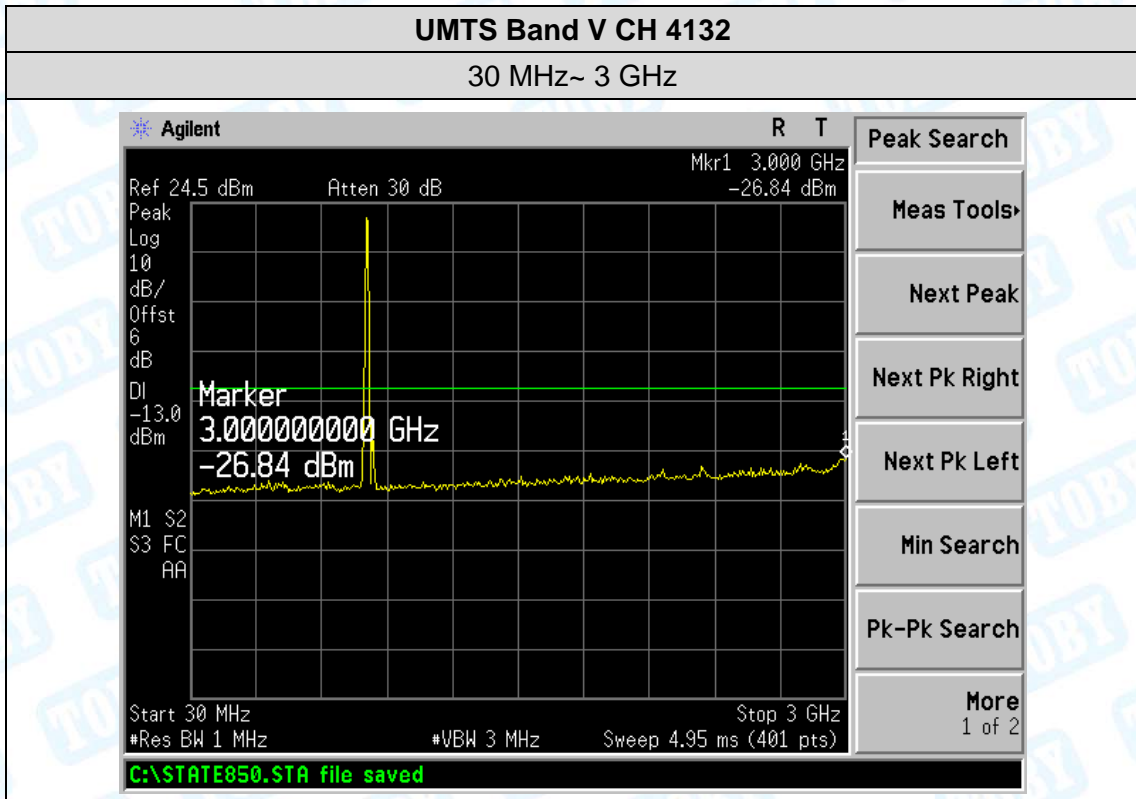




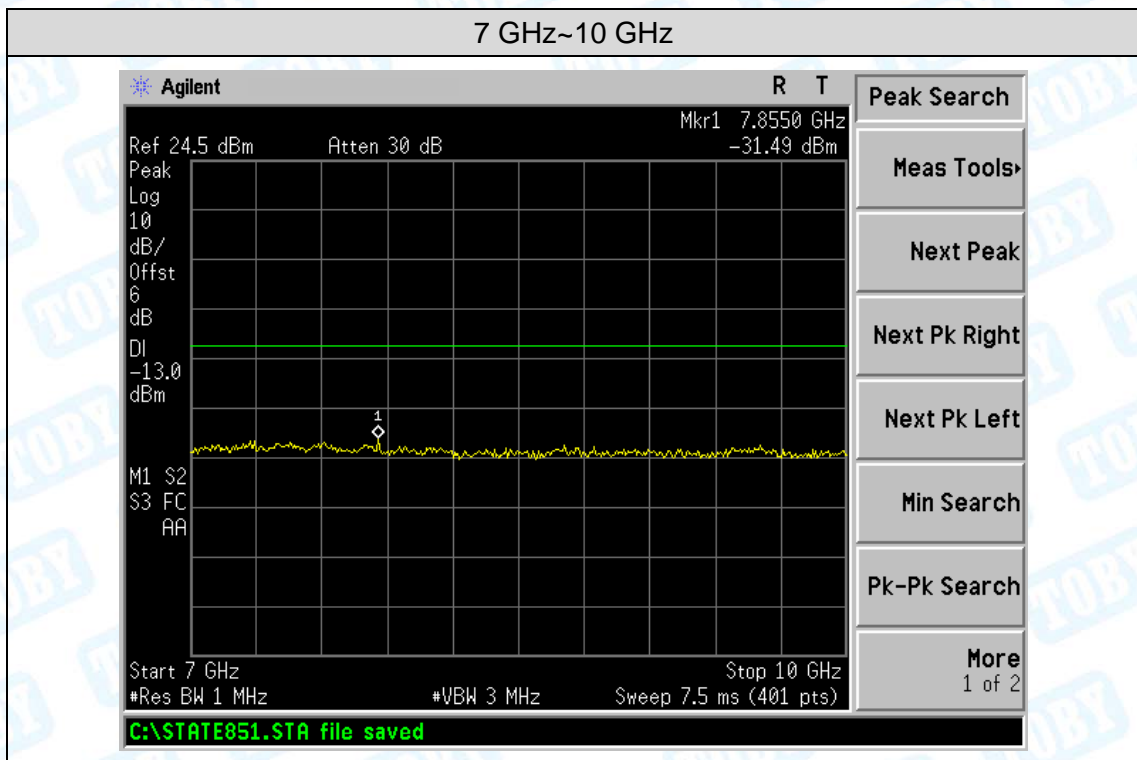


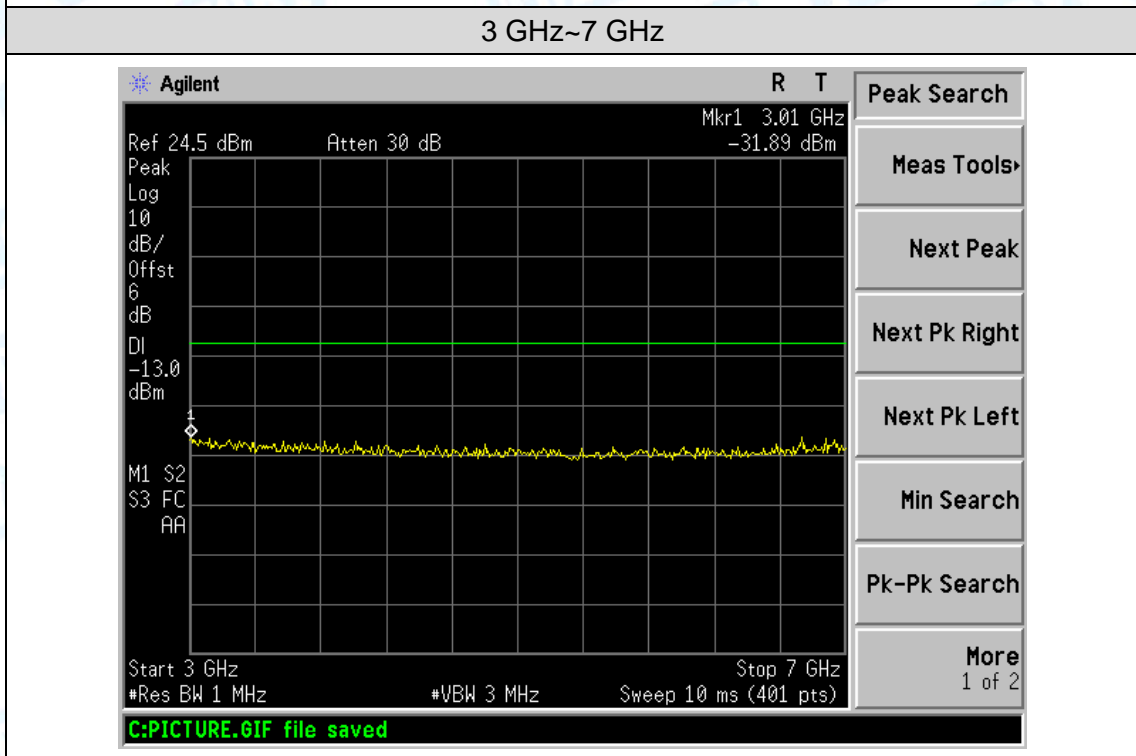
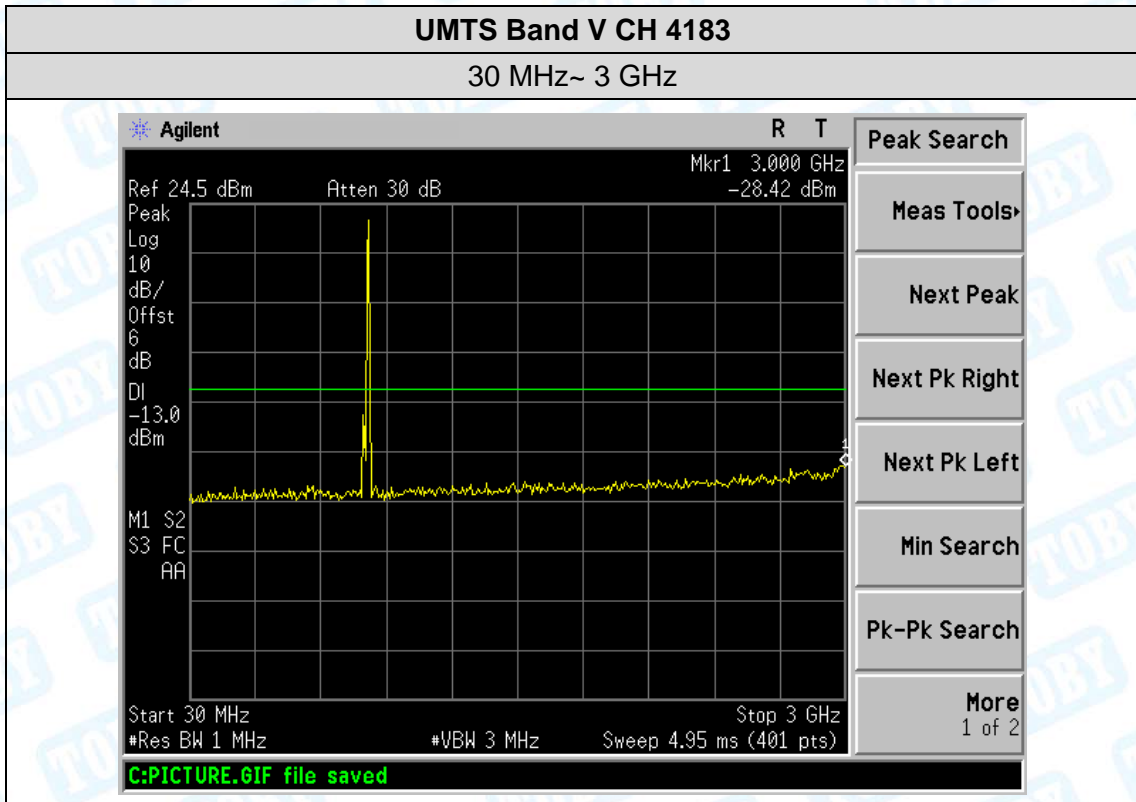


## Attachment F--Conducted Out of Band Emissions

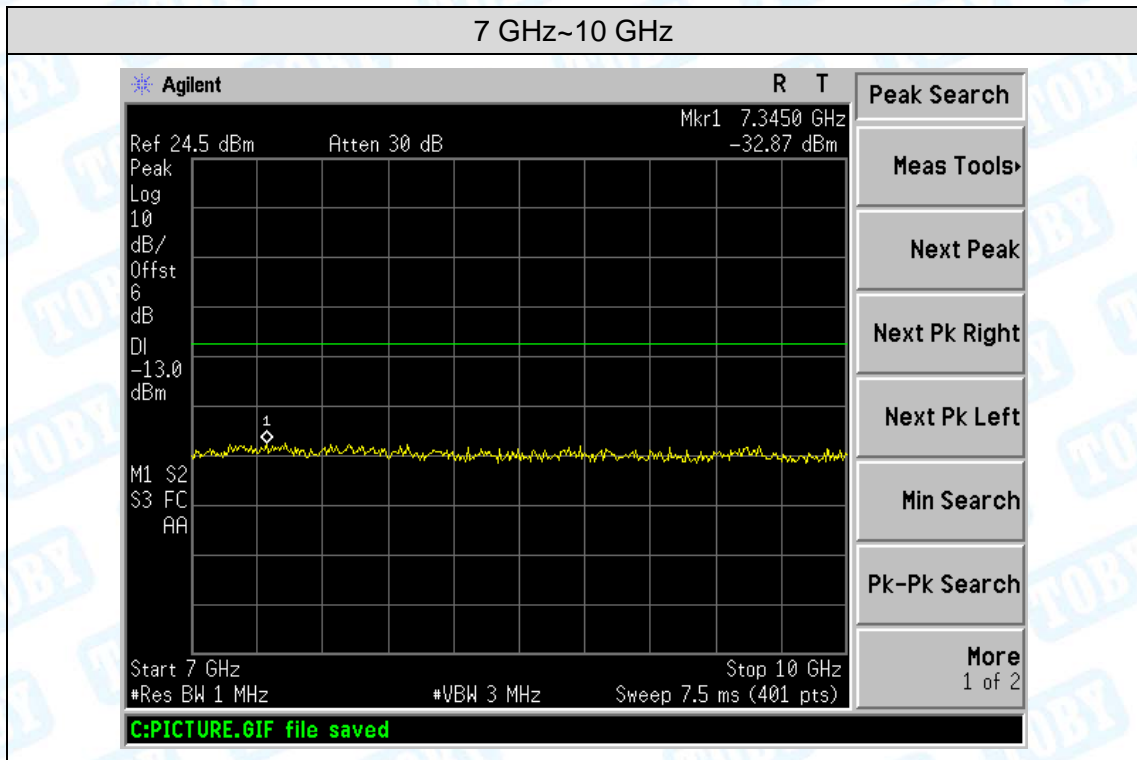


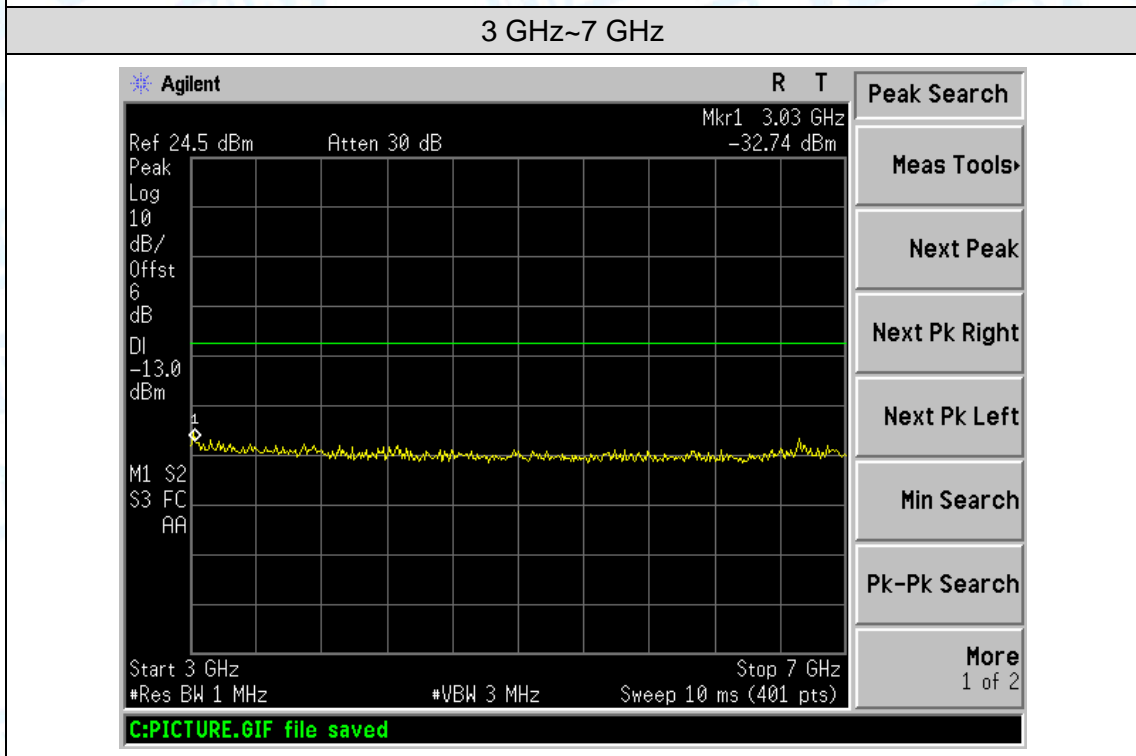
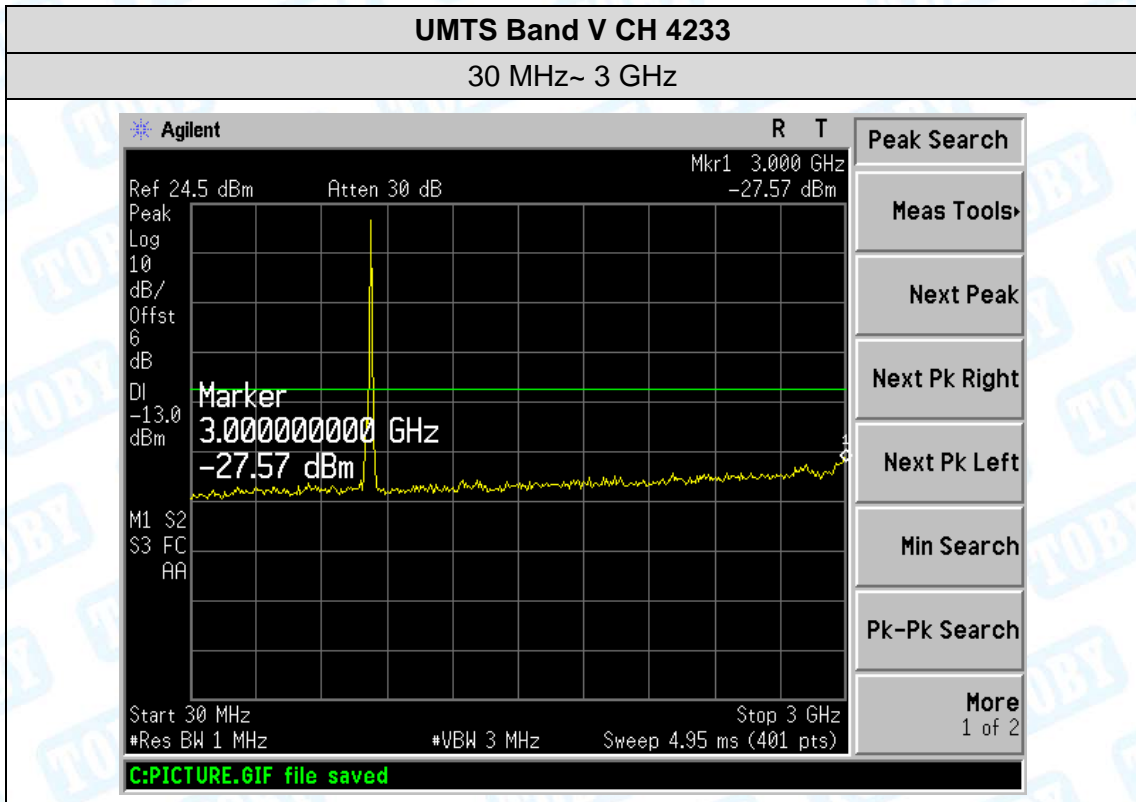




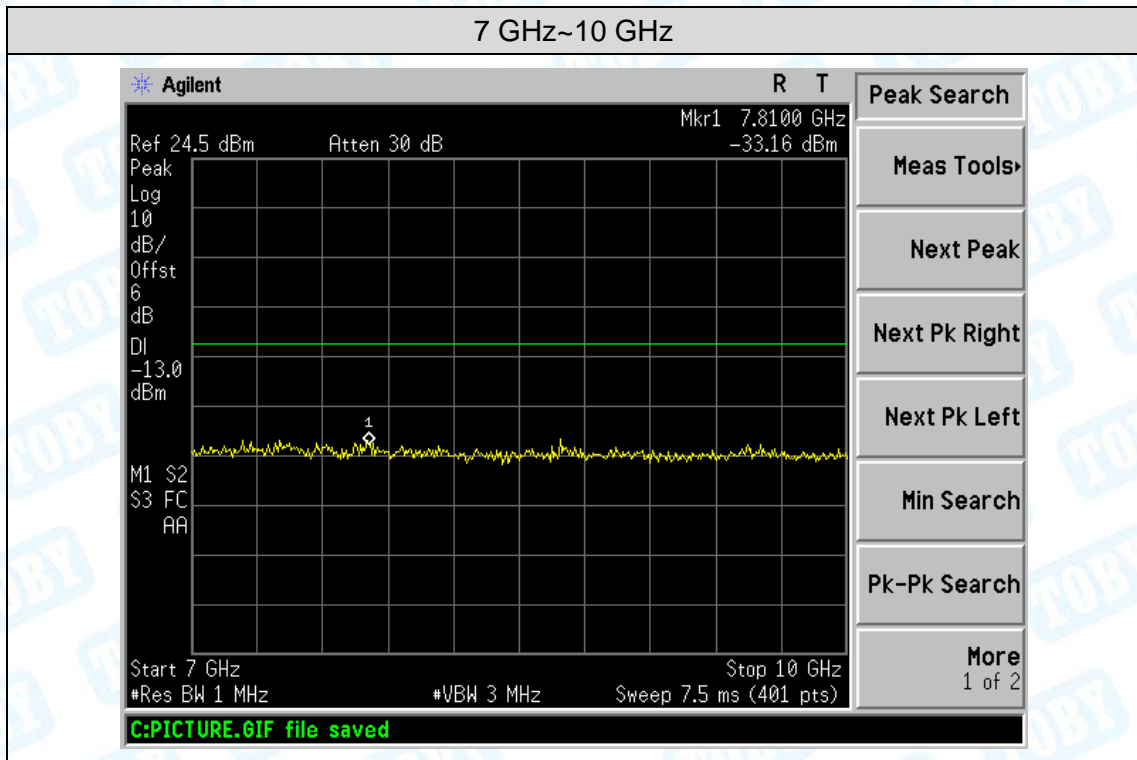


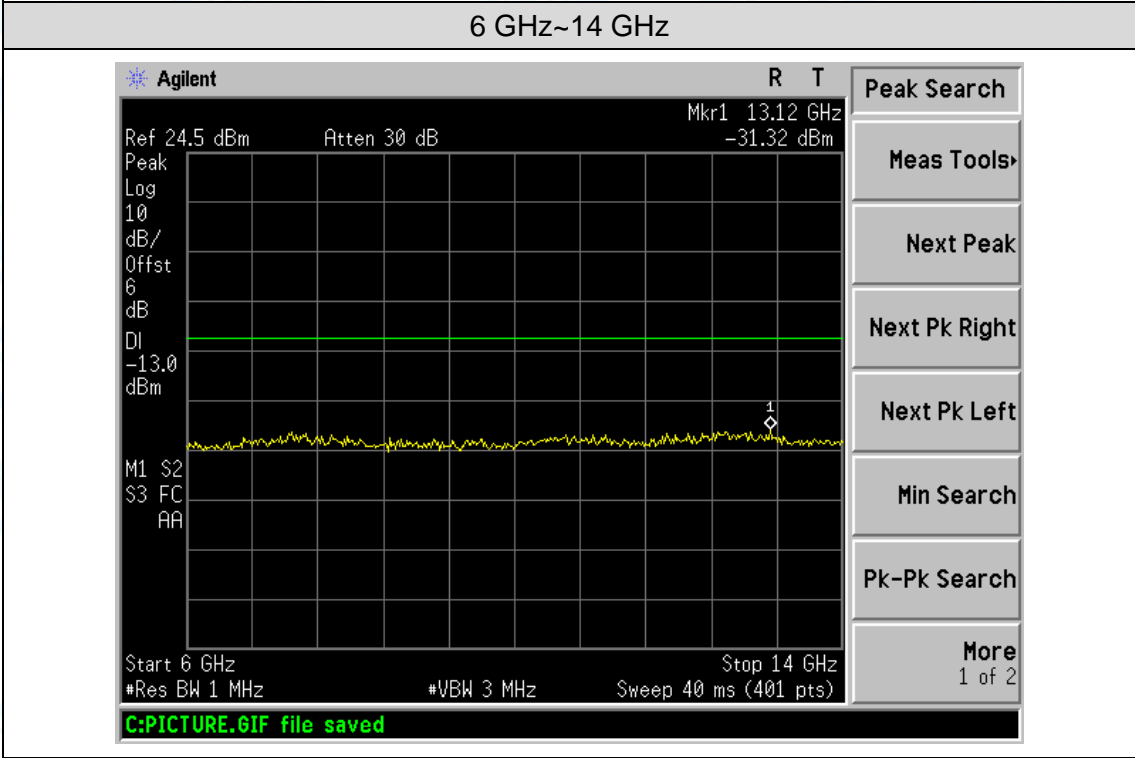
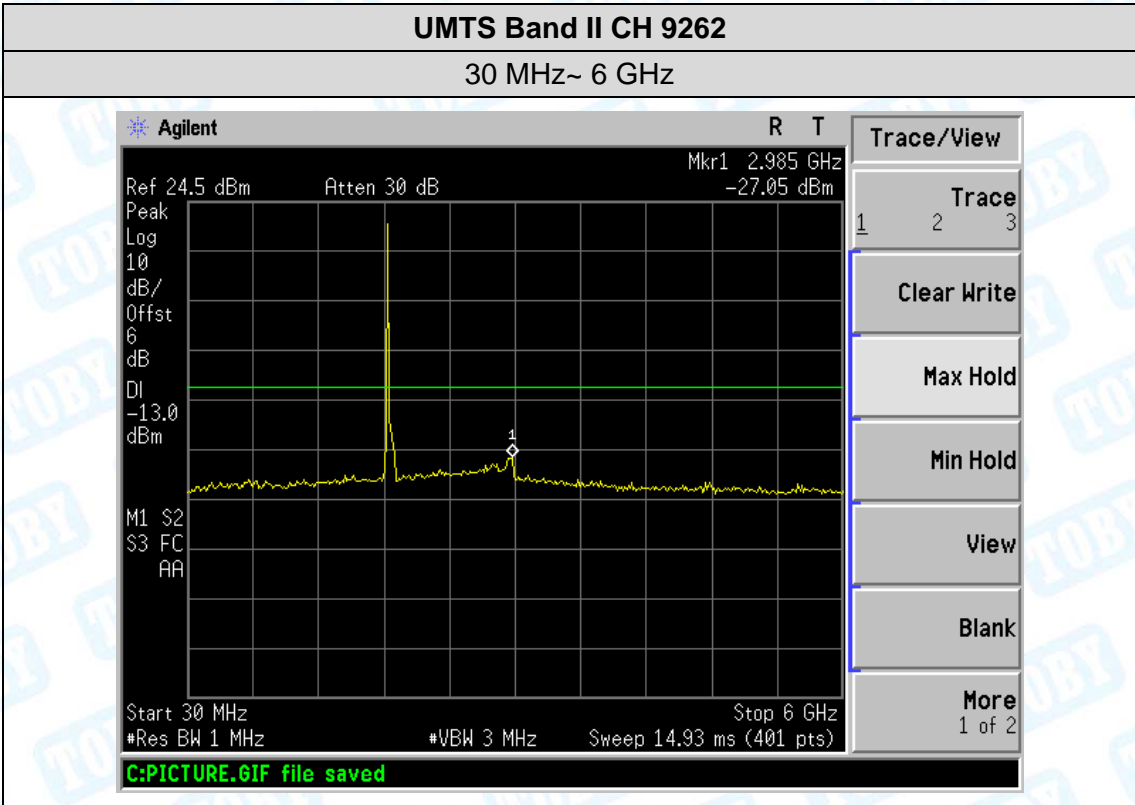




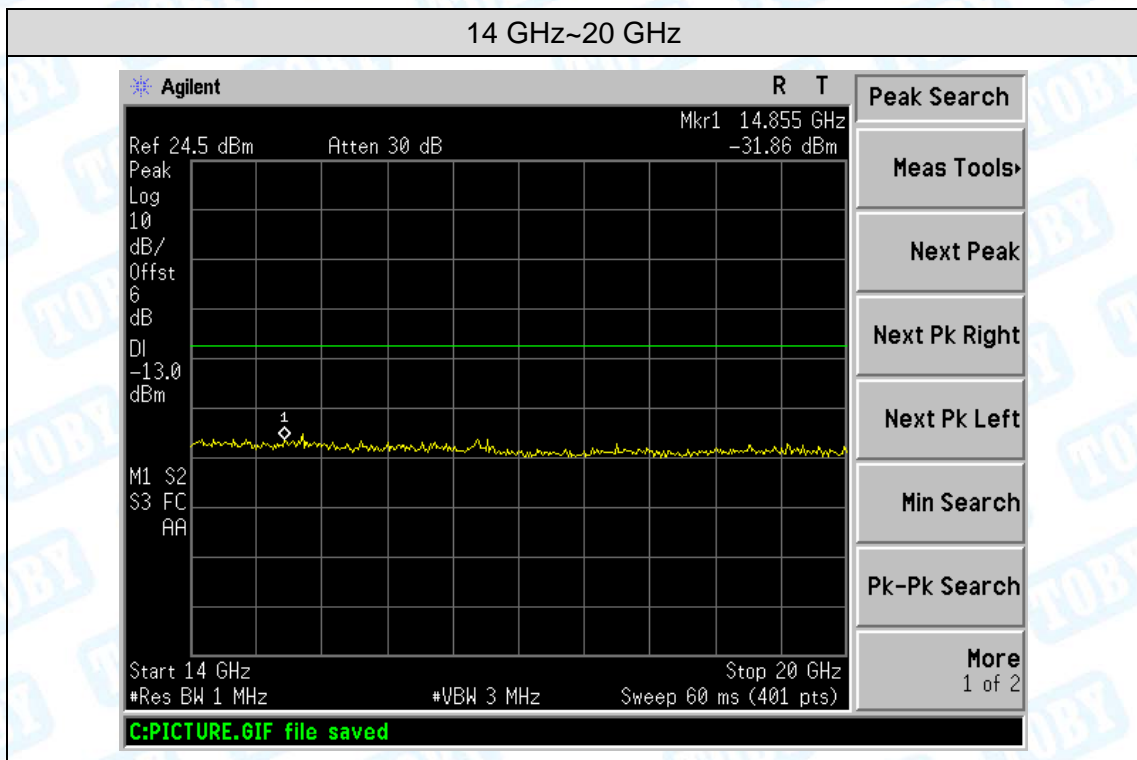


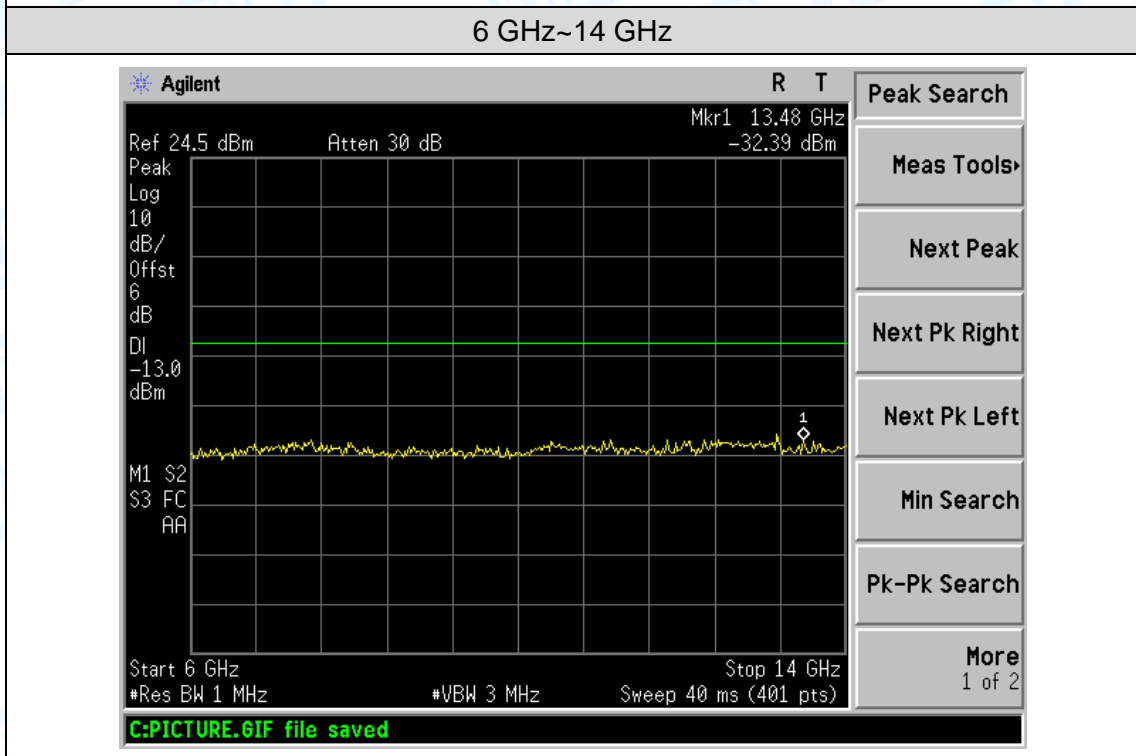
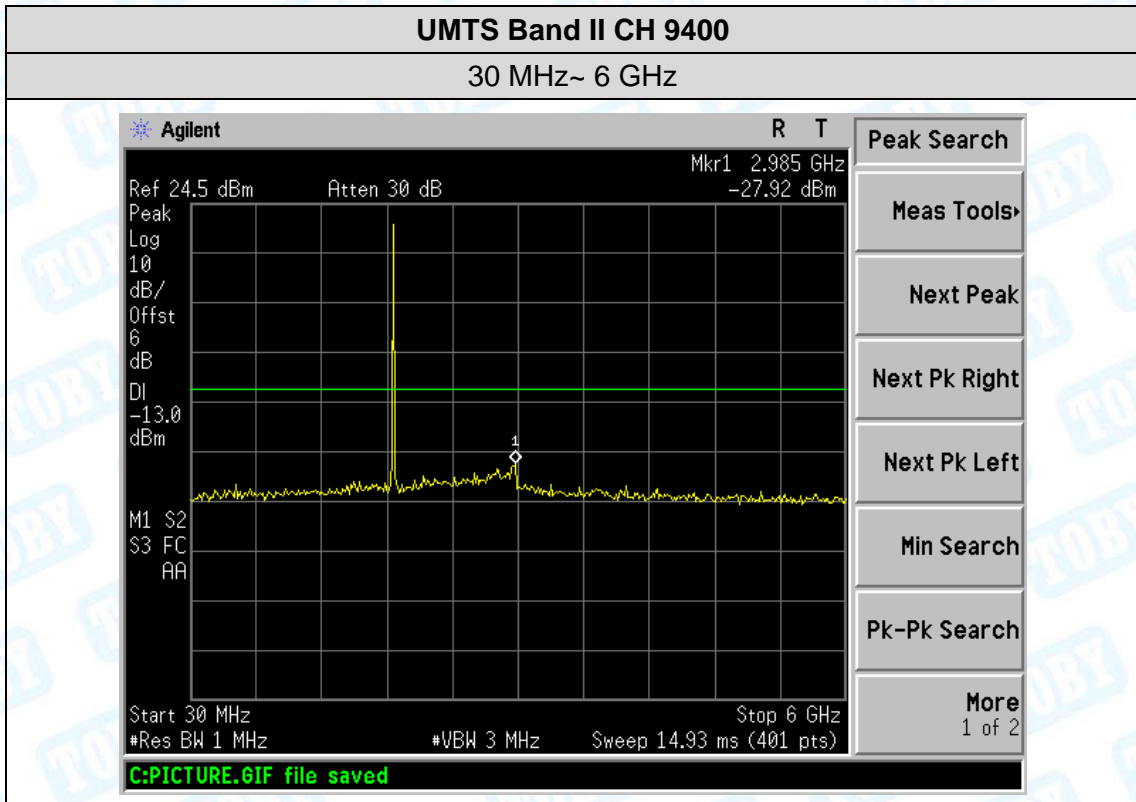




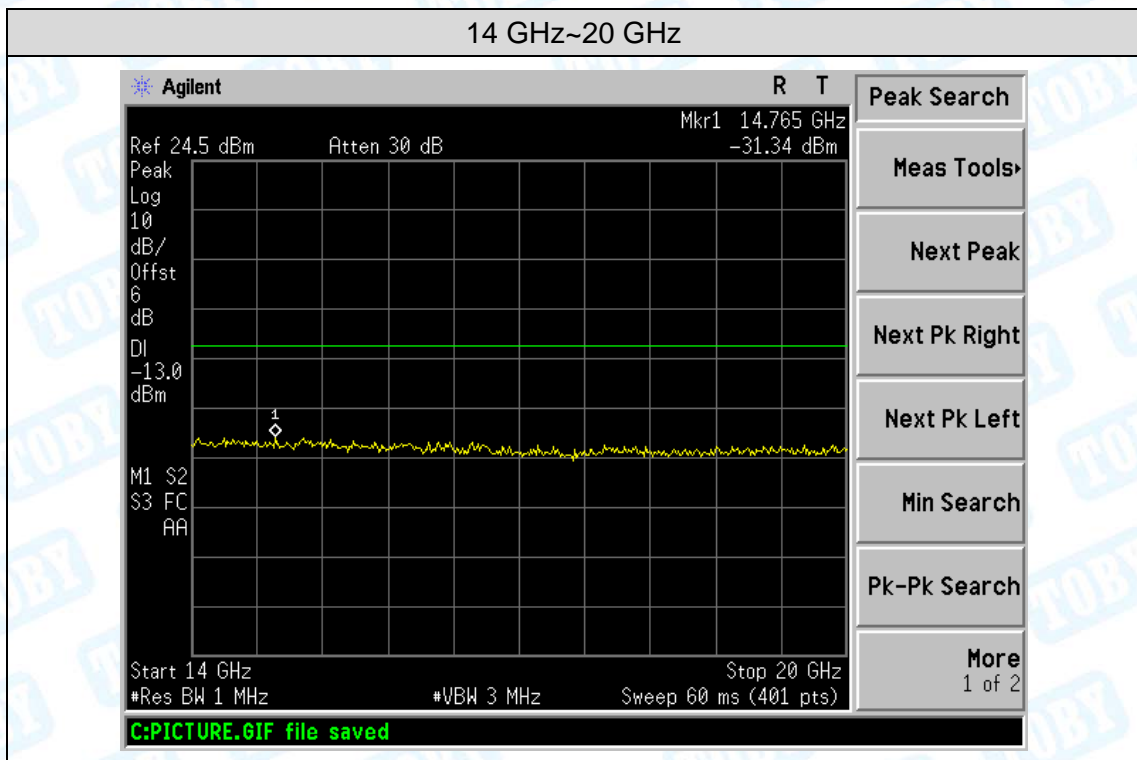


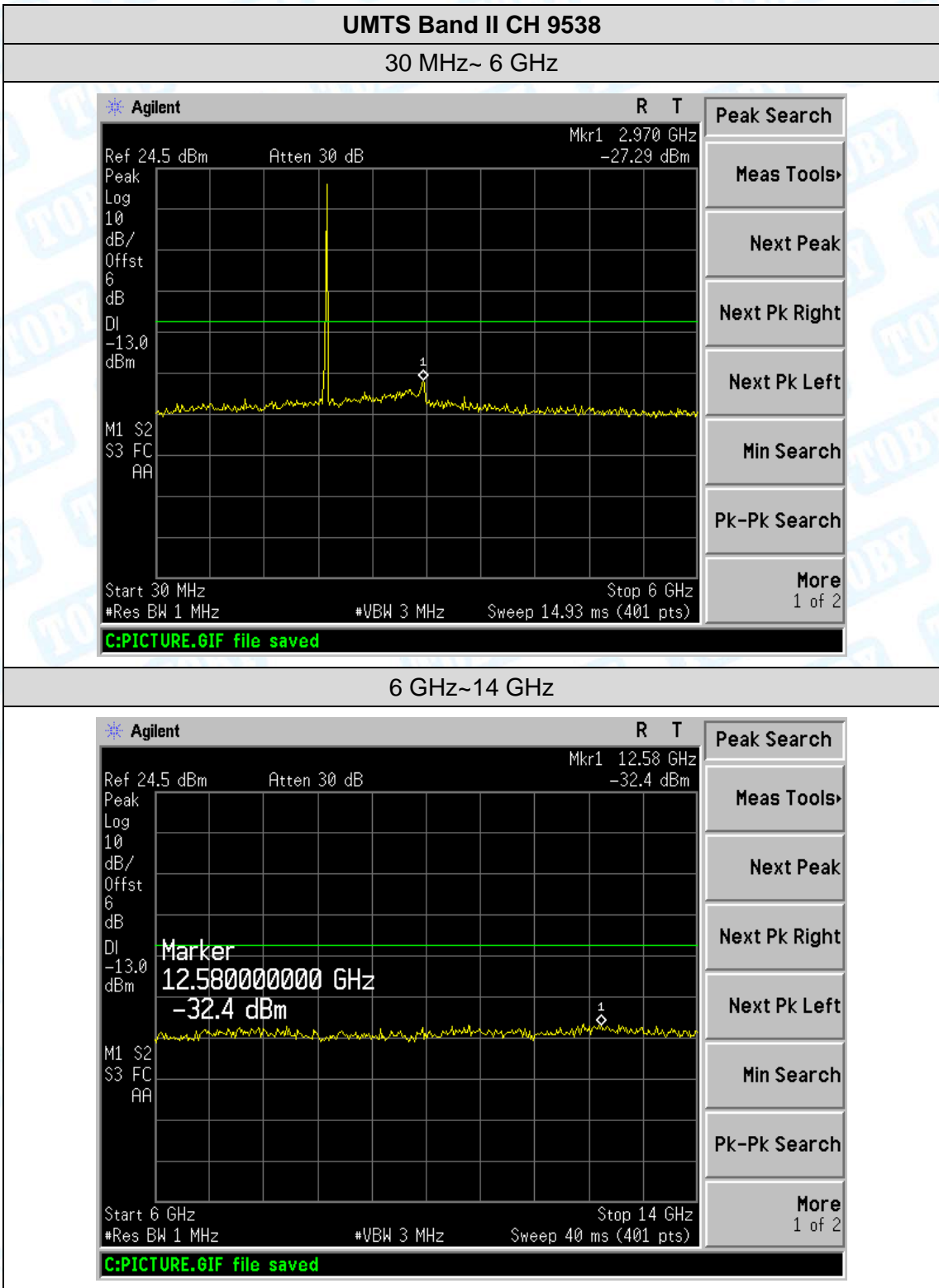




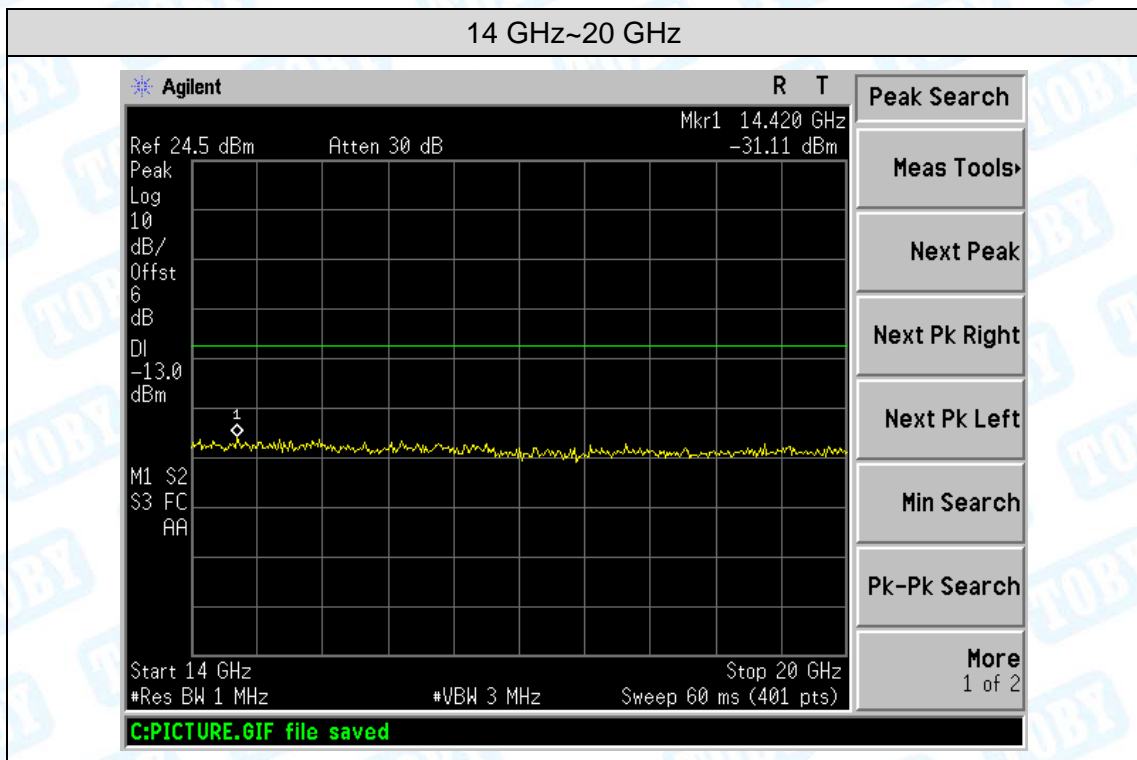






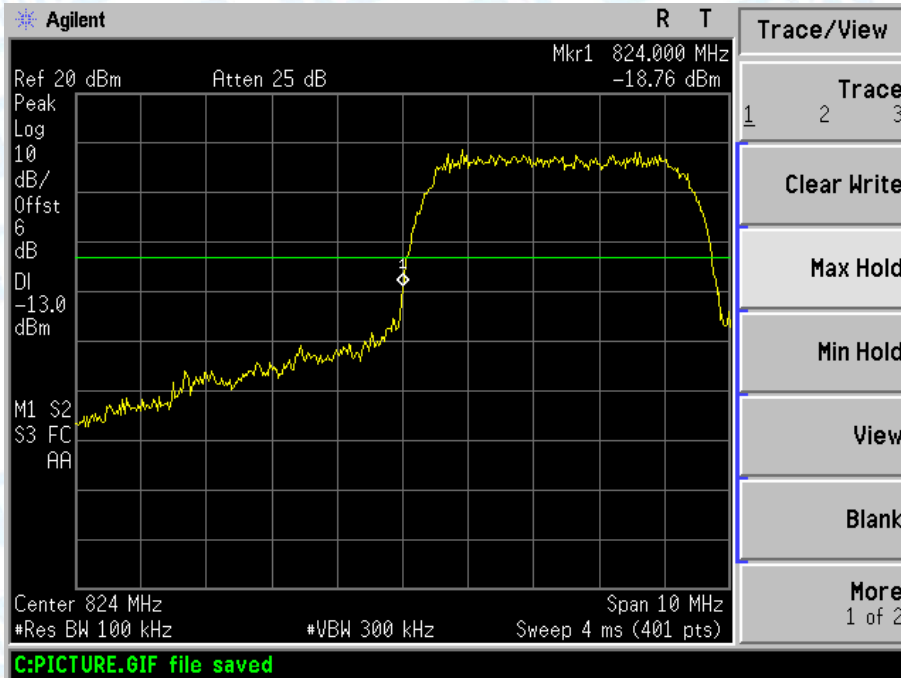




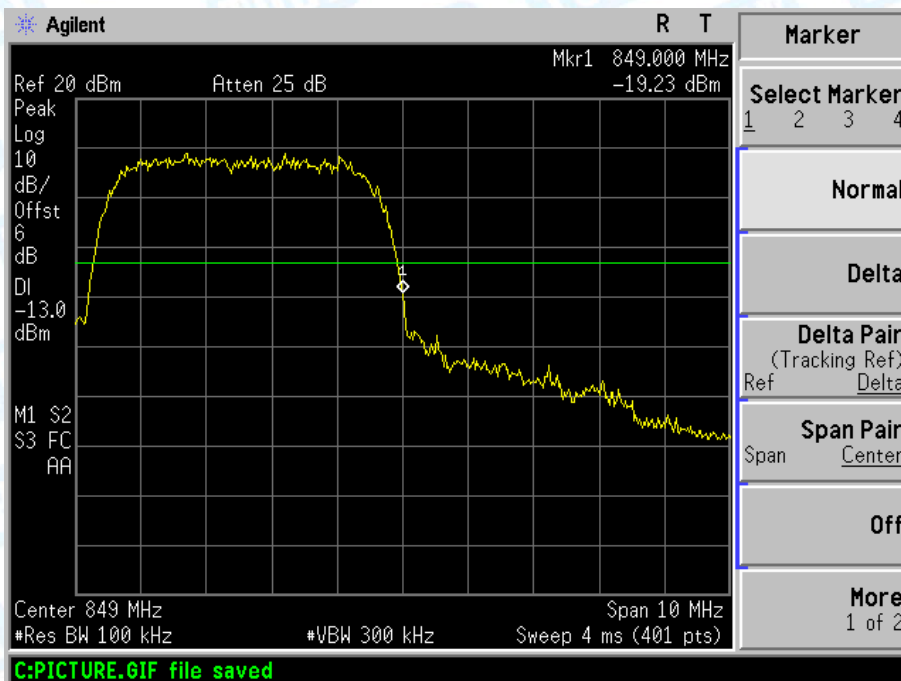


# Attachment G-- Band Edge Test

Test Mode:	UMTS Band V 12.2k HSDPA
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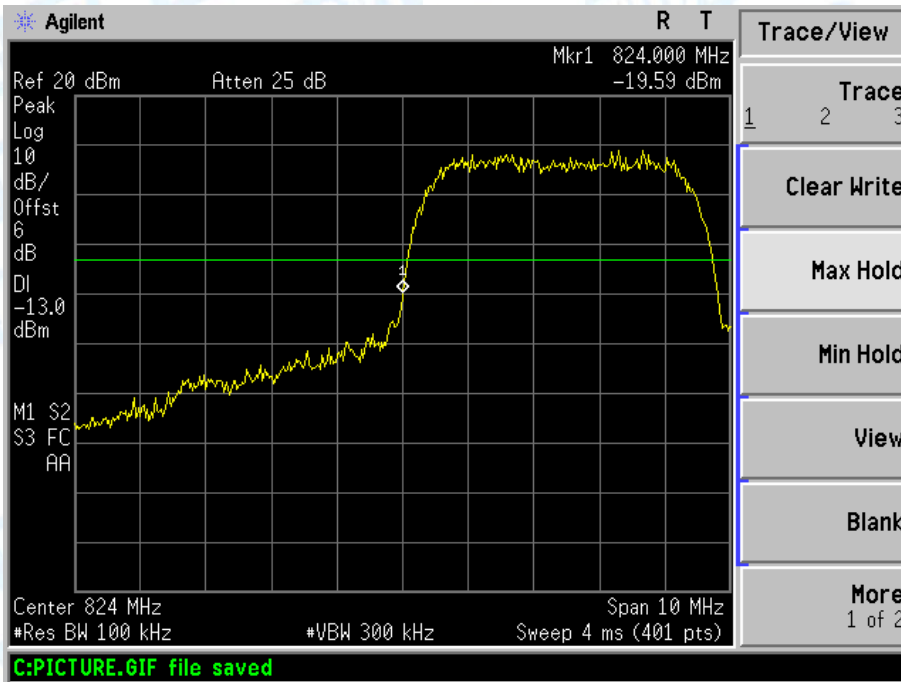
Lowest channel



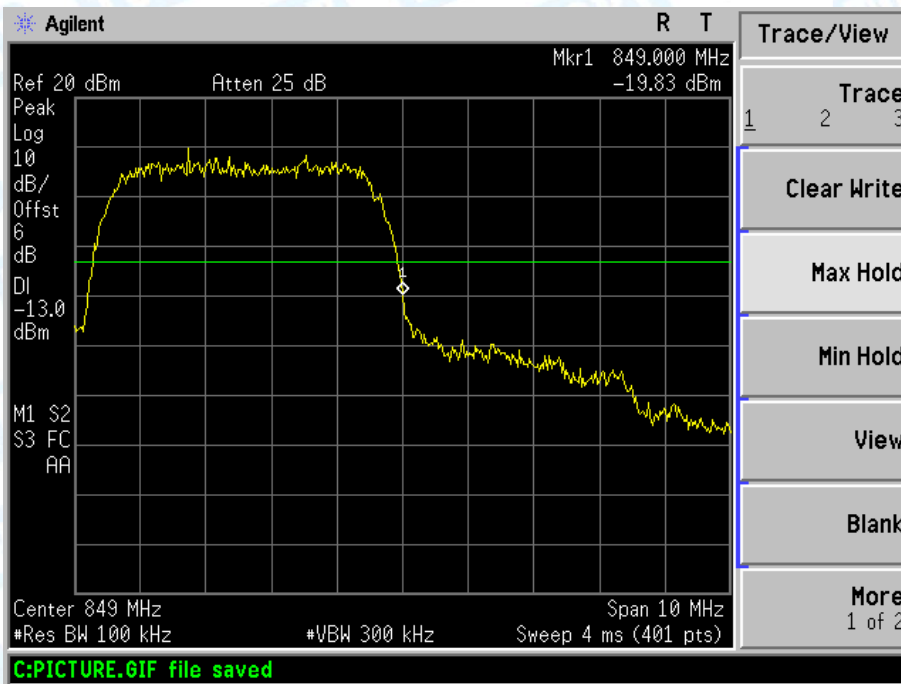
Highest channel



Test Mode: UMTS Band V 12.2k HSUPA

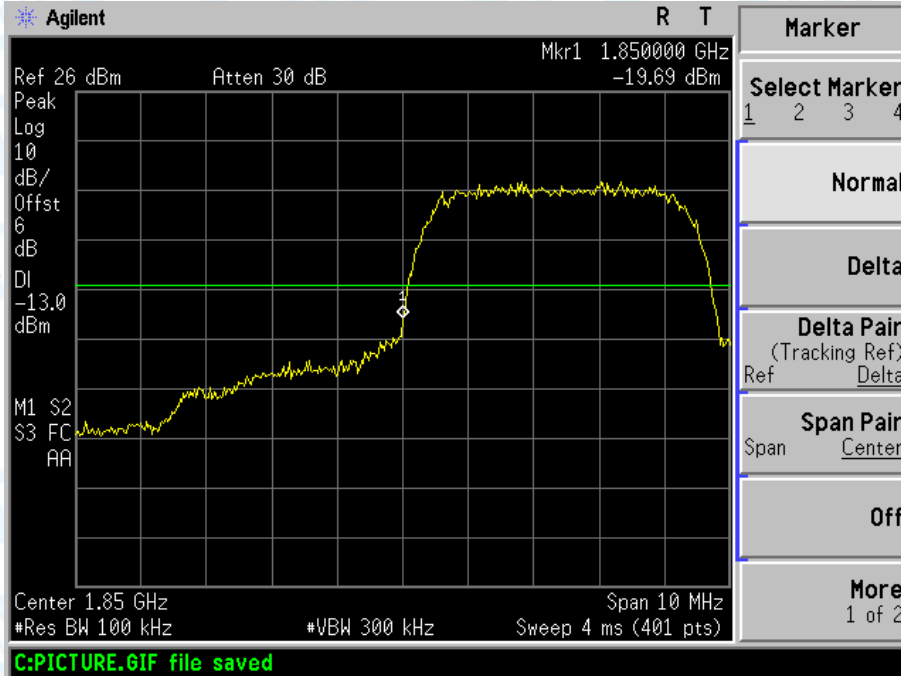


Lowest channel

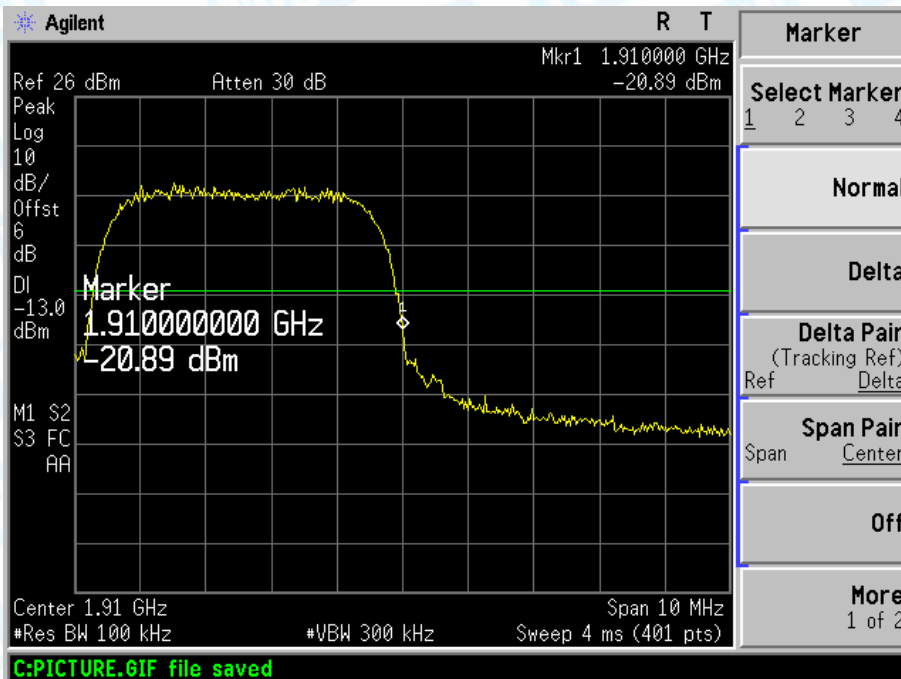


Highest channel

Test Mode: UMTS Band II 12.2k HSDPA



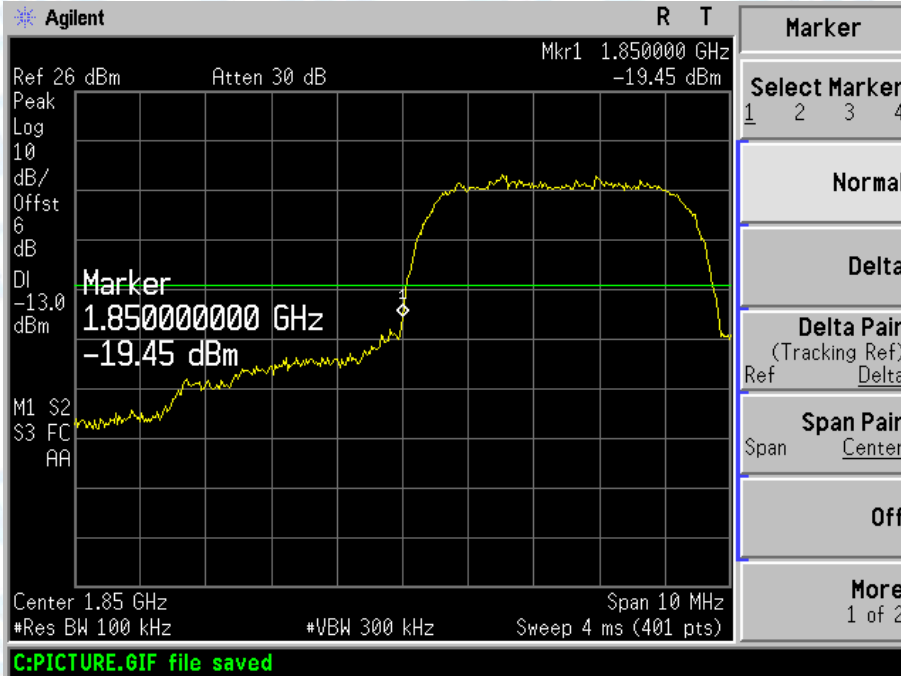
Lowest channel



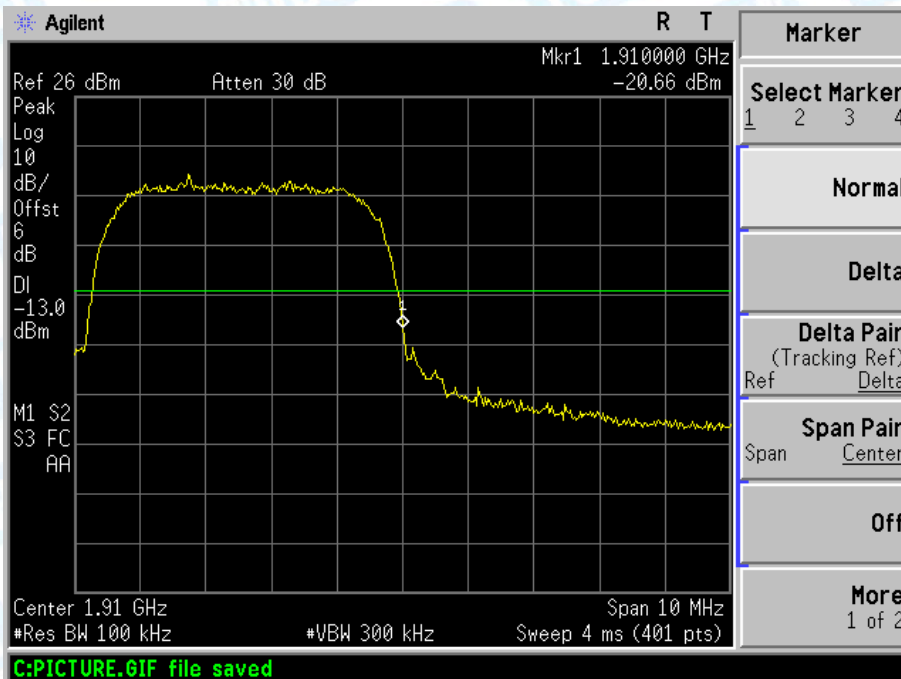
Highest channel



Test Mode: UMTS Band II 12.2k HSUPA



Lowest channel



Highest channel

## Attachment H--Radiated Out Band of Emissions

Measurement Data (worst case)

Test mode: UMTS Band V HSDPA							
Channel: Middle		Date of Test: 2020-06-18					
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	-35.81	7.49	3.97	-24.35	-13.00	Pass
2509.80	H	-38.75	7.03	5.05	-26.67		
3346.40	H	-46.80	12.48	5.98	-28.34		
4183.00	H	---	---	---	---		
5019.60	H	---	---	---	---		
5856.20	H	---	---	---	---		
1673.20	Vertical	-35.23	8.02	3.97	-23.24	-13.00	Pass
2509.80	V	-41.89	10.47	5.05	-26.37		
3346.40	V	-51.48	16.92	5.98	-28.58		
4183.00	V	---	---	---	---		
5019.60	V	---	---	---	---		
5856.20	V	---	---	---	---		
Test mode: UMTS Band V HSUPA							
Channel: Middle		Date of Test: 2020-06-18					
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	-35.62	7.49	3.97	-24.16	-13.00	Pass
2509.80	H	-38.06	7.03	5.05	-25.98		
3346.40	H	-47.18	12.48	5.98	-28.72		
4183.00	H	---	---	---	---		
5019.60	H	---	---	---	---		
5856.20	H	---	---	---	---		
1673.20	Vertical	-35.65	8.02	3.97	-23.66	-13.00	Pass
2509.80	V	-41.00	10.47	5.05	-25.48		
3346.40	V	-50.84	16.92	5.98	-27.94		
4183.00	V	---	---	---	---		
5019.60	V	---	---	---	---		
5856.20	V	---	---	---	---		
Remark: 1, The testing has been conformed to $10 \times 836.6 \text{MHz} = 8,366 \text{MHz}$ . 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 II HSDPA							
Channel: Middle			Date of Test: 2020-06-18				
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	-44.49	14.70	6.12	-23.67	-13.00	Pass
5640.30	H	-47.88	13.67	7.86	-26.35		
7520.40	H	-51.49	14.27	9.54	-27.68		
9400.00	H	---	---	---	---		
11280.00	H	---	---	---	---		
13160.00	H	---	---	---	---	-13.00	Pass
3760.40	Vertical	-45.67	15.81	6.12	-23.74		
5640.30	V	-46.97	13.80	7.86	-25.31		
7520.40	V	-51.28	13.40	9.54	-28.34		
9400.00	V	---	---	---	---		
11280.00	V	---	---	---	---	-13.00	Pass
13160.00	V	---	---	---	---		
Test mode: UMTS Band II HSUPA							
Channel: Middle			Date of Test: 2020-06-18				
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	-45.14	14.70	6.12	-24.32	-13.00	Pass
5640.30	H	-48.25	13.67	7.86	-26.72		
7520.40	H	-52.15	14.27	9.54	-28.34		
9400.00	H	---	---	---	---		
11280.00	H	---	---	---	---		
13160.00	H	---	---	---	---	-13.00	Pass
3760.40	Vertical	-45.55	15.81	6.12	-23.62		
5640.30	V	-47.33	13.80	7.86	-25.67		
7520.40	V	-51.43	13.40	9.54	-28.49		
9400.00	V	---	---	---	---		
11280.00	V	---	---	---	---	-13.00	Pass
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							

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