



**FCC CFR47 PART 22H and 24E**

**CERTIFICATION TEST REPORT**

**FOR**

**BT3.0, 802.11 B/G/N 1X1 HT20, GSM850/1900, WCDMA850/1900MHZ, BAR PHONE  
WITH HOTSPOTS. AND VOIP SUPPORTED**

**MODEL NUMBER: GT-B5330L**

**FCC ID: A3LGTB5330L  
REPORT NUMBER: 12I14431-3**

**ISSUE DATE: JUNE 20, 2012**

*Prepared for*

**SAMSUNG ELECTRONICS CO., LTD.  
416, MAETAN 3-DONG, YEONGTONG-GU  
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA**

*Prepared by*

**COMPLIANCE CERTIFICATION SERVICES (UL CCS)  
47173 BENICIA STREET  
FREMONT, CA 94538, U.S.A.  
TEL: (510) 771-1000  
FAX: (510) 661-0888**



**NVLAP LAB CODE 200065-0**

---

Revision History

Rev.	Issue Date	Revisions	Revised By
---	06/20/12	Initial Issue	T. Chan

---

## TABLE OF CONTENTS

<b>1.</b>	<b>ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2.</b>	<b>TEST METHODOLOGY .....</b>	<b>5</b>
<b>3.</b>	<b>FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4.</b>	<b>CALIBRATION AND UNCERTAINTY .....</b>	<b>5</b>
4.1.	<i>MEASURING INSTRUMENT CALIBRATION .....</i>	<i>5</i>
4.2.	<i>SAMPLE CALCULATION .....</i>	<i>5</i>
4.3.	<i>MEASUREMENT UNCERTAINTY .....</i>	<i>5</i>
<b>5.</b>	<b>EQUIPMENT UNDER TEST .....</b>	<b>6</b>
5.1.	<i>DESCRIPTION OF EUT .....</i>	<i>6</i>
5.2.	<i>MAXIMUM OUTPUT POWER .....</i>	<i>6</i>
5.3.	<i>SOFTWARE AND FIRMWARE .....</i>	<i>7</i>
5.4.	<i>WORST-CASE CONFIGURATION AND MODE .....</i>	<i>7</i>
5.5.	<i>DESCRIPTION OF TEST SETUP .....</i>	<i>7</i>
<b>6.</b>	<b>TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>10</b>
<b>7.</b>	<b>RF POWER OUTPUT VERIFICATION .....</b>	<b>11</b>
7.1.	<i>RF POWER OUTPUT FOR GSM MODE .....</i>	<i>11</i>
7.2.	<i>RF POWER OUTPUT FOR UMTS REL99 .....</i>	<i>13</i>
<b>8.</b>	<b>LIMITS AND RESULTS .....</b>	<b>18</b>
8.1.	<i>CONDUCTED TEST RESULTS .....</i>	<i>18</i>
8.1.1.	<i>OCCUPIED BANDWIDTH .....</i>	<i>18</i>
8.1.2.	<i>BAND EDGE .....</i>	<i>36</i>
8.1.3.	<i>OUT OF BAND EMISSIONS .....</i>	<i>45</i>
8.2.	<i>RADIATED TEST RESULTS .....</i>	<i>60</i>
8.2.1.	<i>RADIATED POWER (ERP &amp; EIRP) .....</i>	<i>60</i>
8.2.2.	<i>FIELD STRENGTH OF SPURIOUS RADIATION .....</i>	<i>70</i>
8.3.	<i>FREQUENCY STABILITY .....</i>	<i>79</i>
<b>9.</b>	<b>SETUP PHOTOS .....</b>	<b>82</b>

**1. ATTESTATION OF TEST RESULTS**

**COMPANY NAME:** SAMSUNG ELECTRONICS CO., LTD.  
416, MAETAN 3-DONG, YEONGTONG-GU  
SUWON-CITY, GYEONGGI-DO 443-742, SOUTH KOREA

**EUT DESCRIPTION:** BT3.0+HS, 802.11 B/G/N 1X1 HT20, GSM850/1900 &  
WCDMA850/1900MHZ, BAR PHONE WITH HOTSPOTS, VOIP  
SUPPORTED

**MODEL:** GT-B5330L

**SERIAL NUMBER:** FJ-161-B

**DATE TESTED:** JUNE 8-20, 2012

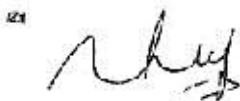
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 22 SUBPART H AND 24 SUBPART E	Pass

Compliance Certification Services (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved &amp; Released For UL CCS By:

Tested By:




THU CHAN  
ENGINEERING MANAGER  
UL CCS

CHIN PANG  
EMC ENGINEER  
UL CCS

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-C, FCC CFR 47 Part 2, FCC CFR 47 Part 22, and FCC CFR Part 24.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a BT3.0+HS, 802.11 b/g/n 1x1 HT20, GSM850/ 1900 Bar phone with hotspots, and EDGE Rx only. Model No: GT-S6102E.

The radio module is manufactured by Samsung Electronics Co., Ltd.

### 5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted and radiated ERP / EIRP output powers as follows:

Part 22 Cellular Band					
Frequency range (MHz)	Modulation	Conducted		ERP	
		dBm	mW	dBm	mW
824.2 – 848.8	GSM	32.60	1819.7	28.05	638.3
824.2 – 848.8	GPRS	32.60	1819.7	27.60	575.4
824.2 – 848.8	EGPRS	RX Only			

Part 22 Cellular Band					
Frequency range (MHz)	Modulation	Conducted		ERP	
		dBm	mW	dBm	mW
826.4 - 846.6	UMTS, Rel 99	25.66	368.1	21.70	147.9
826.4 - 846.6	UMTS, HSDPA	26.55	451.9	21.80	151.4

Part 24 PCS Band					
Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1850.2-1909.8	GSM	29.60	912.0	29.62	916.2
1850.2-1909.8	GPRS	29.60	912.0	30.04	1009.3
1850.2-1909.8	EGPRS	RX Only			

Part 24 PCS Band					
Frequency range (MHz)	Modulation	Conducted		EIRP	
		dBm	mW	dBm	mW
1852.4-1907.6	UMTS, Rel 99	25.67	369.0	28.79	756.8
1852.4-1907.6	UMTS, HSDPA	26.52	448.7	28.47	703.1

### 5.3. SOFTWARE AND FIRMWARE

The EUT is linked with Agilent 8960 Communication Test Set.

### 5.4. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power.

Since the EUT is a portable device, in addition to the peak power measurements on the "RF Power Output Verification" section, the EUT also investigated on X, Y and Z orientations with and without AC Adapter and the worst-orientation was determined to be at X position for Cell band and Y position for PCS bands without AC Adapter.

### 5.5. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Samsung	ETAOU10BBB	SC4BA17LS/7-E	DoC
Headset	Samsung	NA	FJ-066-A	NA

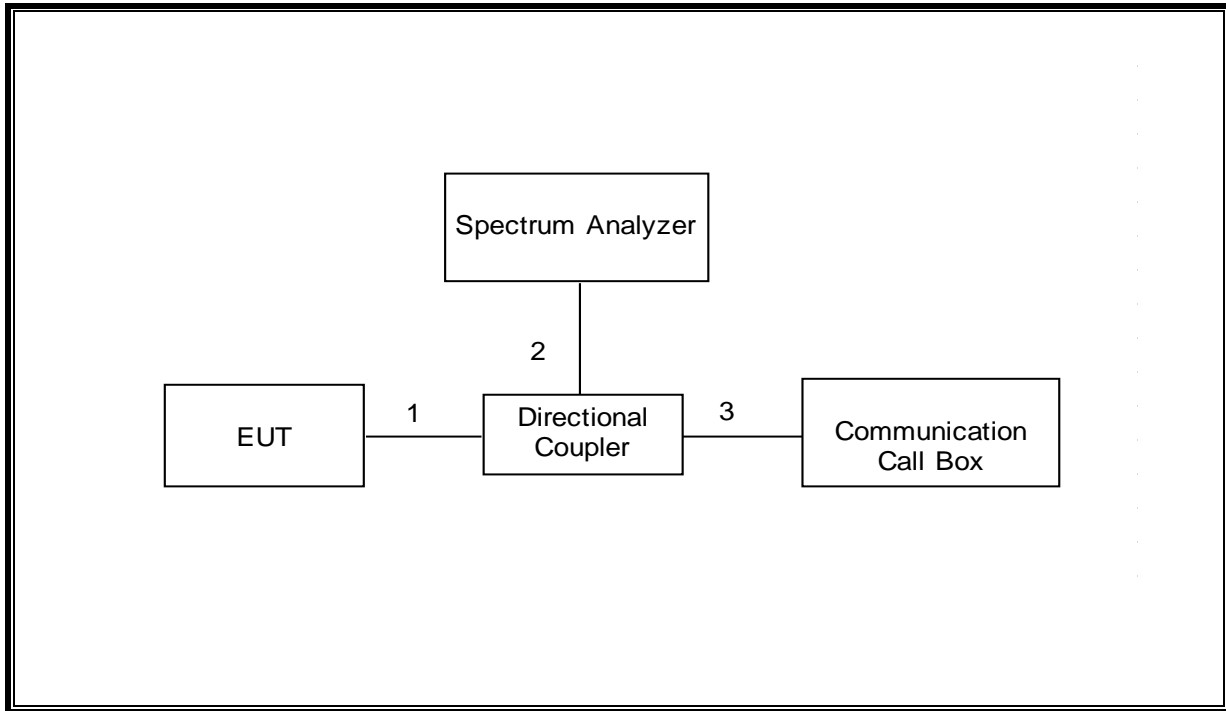
#### I/O CABLES (CONDUCTED SETUP)

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	RF In	1	Directional Coupler	Un-shielded	1m	NA
2	RF In/Out	1	Spectrum Analyzer	Un-shielded	None	NA
3	RF In/Out	1	Communication Test Set	Un-shielded	0.5m	NA

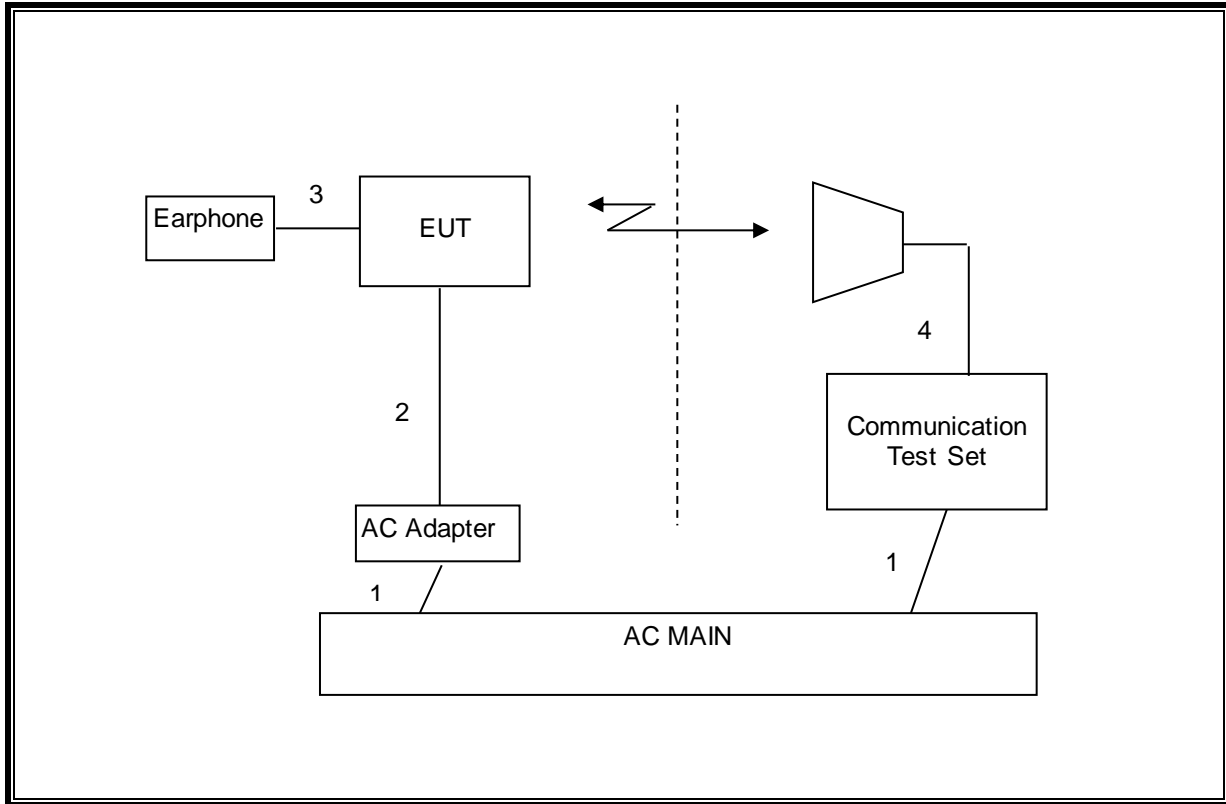
#### I/O CABLES (RADIATED SETUP)

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US115V	Un-shielded	2m	NA
2	DC	1	DC	Un-shielded	2m	NA
3	Jack	1	Earphone	Un-shielded	2m	NA
4	RF In/Out	1	Horn	Un-shielded	2m	NA

**SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)**



**SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	07/12/12
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	07/16/12
Antenna, Horn, 18 GHz	EMCO	3115	C00783	06/29/12
Antenna, Horn, 18 GHz	EMCO	3115	C00943	CNR
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01159	04/09/13
Spectrum Analyzer, 26.5 GHz	Agilent / HP	E4440A	C01176	08/04/12
Communications Test Set	Agilent / HP	E5515C	C01086	09/27/12
DC Power Supply	Lambda	LA-300	None	CNR
Signal Generator, 20 GHz	Agilent / HP	83732B	C00774	07/14/12
Temperature / Humidity Chamber	WATLOW Controls	SK-3102	None	CNR
Dual Channel Thermometer	Tektronix	DTM920	CCS-0048	05/21/13
Antenna, Tuned Dipole 400~1000	ETS	3121C DB4	C00993	07/16/12
Highpass Filter, 2.7 GHz	Micro-Tronics	HPM13194	N02686	CNR
Highpass Filter, 1.5 GHz	Micro-Tronics	HPM13193	N02688	CNR
Directional Coupler	RF-Lambda	RFDC5M06G15	None	CNR

## 7. RF POWER OUTPUT VERIFICATION

### 7.1. RF POWER OUTPUT FOR GSM MODE

#### TEST PROCEDURE

##### GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900  
 Press Connection control to choose the different menus  
 Press RESET > choose all to reset all settings  
 Connection Press Signal Off to turn off the signal and change settings  
 Network Support > GSM+GPRS or GSM+EGPRS  
 Main Service > Packet Data  
 Service selection > Test Mode A – Auto Slot Config. off  
 MS Signal Press Slot Config bottom on the right twice to select and change the number of time slots and power setting  
     > Slot configuration > Uplink/Gamma  
     > 33 dBm for GPRS 850/900  
     > 30 dBm for GPRS1800/1900  
 BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel  
 Frequency Offset > + 0 Hz  
 Mode > BCCH and TCH  
 BCCH Level > -85 dBm (May need to adjust if link is not stable)  
 BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]  
 Channel Type > Off  
 P0> 4 dB  
 Slot Config > Unchanged (if already set under MS Signal)  
 TCH > choose desired test channel  
 Hopping > Off  
 Main Timeslot > 3 (Default)  
 Network Coding Scheme > CS4 (GPRS) and MCS9 (EGPRS)  
 Bit Stream > 2E9-1PSR Bit Pattern  
 AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input  
 Connection Press Signal On to turn on the signal and change settings

#### RESULTS

**GSM for Cell and PCS Band**

Mode	Ch.	f (MHz)	1 time slot	2 time slots	3 time slots	4 time slots
			Peak	Peak	Peak	Peak
GSM	128	824.2	32.60	32.60	32.60	32.60
	190	836.6	32.60	32.60	32.60	32.60
	251	848.8	32.60	29.60	29.60	32.60
GSM	512	1850.2	29.60	29.40	29.40	29.40
	661	1880	29.40	29.50	29.50	29.50
	810	1909.8	29.50	27.00	29.50	29.50

**GPRS for Cell and PCS Band**

Mode	Ch.	f (MHz)	1 time slot	2 time slots	3 time slots	4 time slots
			Peak	Peak	Peak	Peak
GPRS	128	824.2	32.60	30.10	28.1	27
	190	836.6	32.60	30.10	28.1	27
	251	848.8	32.60	30.10	28.1	27
GPRS	512	1850.2	29.60	27.00	25.1	24.1
	661	1880	29.40	27.00	25	24
	810	1909.8	29.50	27.00	25	23.9

**7.2. RF POWER OUTPUT FOR UMTS REL99****TEST PROCEDURE**

The following summary of these settings are illustrated below:

	Mode	Rel99
	Subtest	-
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	HSDPA FRC	Not Applicable
	HSUPA Test	Not Applicable
	Power Control Algorithm	Algorithm2
	$\beta_c$	Not Applicable
	$\beta_d$	Not Applicable
	$\beta_{ec}$	Not Applicable
	$\beta_c/\beta_d$	8/15
	$\beta_{hs}$	Not Applicable
	$\beta_{ed}$	Not Applicable

**RESULTS**

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
				Peak
UMTS 850	4132	4357	826.4	25.33
	4180	4405	836.4	25.66
	4230	4455	846.6	25.39

Band	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
				Peak
UMTS 1900	9662	9262	1852.4	25.67
	9800	9400	1880.0	25.39
	9938	9538	1907.6	25.64

**7.3. RF POWER OUTPUT FOR UMTS Rel 6 HSDPA****TEST PROCEDURE**

The following summary of these settings are illustrated below:

	Mode	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA	Rel6 HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	HSUPA Test	Not Applicable			
	Power Control Algorithm	Algorithm 2			
	$\beta_c$	2/15	12/15	15/15	15/15
	$\beta_d$	15/15	15/15	8/15	4/15
	$\beta_{ec}$	-	-	-	-
	$\beta_c/\beta_d$	2/15	12/15	15/8	15/4
	$\beta_{hs}$	4/15	24/15	30/15	30/15
	$\beta_{ed}$	Not Applicable			
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs} = \beta_{hs}/\beta_c$	30/15			

**RESULT**

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
					Peak
UMTS850 (Band V)	1	4132	4357	826.4	25.24
		4180	4405	836.0	25.32
		4230	4455	846.0	24.95
	2	4132	4357	826.4	26.32
		4180	4405	836.0	26.35
		4230	4455	846.0	26.03
	3*	4132	4357	826.4	26.55
		4180	4405	836.0	26.50
		4230	4455	846.0	26.40
	4	4132	4357	826.4	26.40
		4180	4405	836.0	26.44
		4230	4455	846.0	26.24

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
					Peak
UMTS1900 (Band II)	1	9262	9662	1852.4	25.71
		9400	9800	1880.0	25.39
		9538	9938	1907.6	25.52
	2	9262	9662	1852.4	26.45
		9400	9800	1880.0	26.42
		9538	9938	1907.6	26.24
	3*	9262	9662	1852.4	26.50
		9400	9800	1880.0	26.43
		9538	9938	1907.6	26.52
	4	9262	9662	1852.4	26.43
		9400	9800	1880.0	26.42
		9538	9938	1907.6	26.20

## 7.1. RF POWER OUTPUT UMTS Rel 6 HSPA (HSDPA & HSUPA)

### TEST PROCEDURE

The following summary of these settings are illustrated below:

Mode	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	Rel6 HSUPA	
Subtest	1	2	3	4	5	
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	$\beta_c$	11/15	6/15	15/15	2/15	15/15
	$\beta_d$	15/15	15/15	9/15	15/15	0
	$\beta_{ec}$	209/225	12/15	30/15	2/15	5/15
	$\beta_c/\beta_d$	11/15	6/15	15/9	2/15	-
	$\beta_{hs}$	22/15	12/15	30/15	4/15	5/15
$\beta_{ed}$	1309/225	94/75	47/15	56/75	47/15	
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = $\beta_{hs}/\beta_c$	30/15				
HSUPA Specific Settings	D E-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_TFCIs	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO 4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO 23 E-TFCI 75 E-TFCI PO 26 E-TFCI 81 E-TFCI PO 27	

### RESULTS

Band	Subtest	UL Ch	DL Ch	Frequency	Conducted output power (dBm)
					Peak
UMTS850 (Band V)	1	4132	4357	826.4	25.20
		4180	4405	836.0	25.16
		4230	4455	846.0	25.00
	2	4132	4357	826.4	25.02
		4180	4405	836.0	25.16
		4230	4455	846.0	25.00
	3	4132	4357	826.4	25.34
		4180	4405	836.0	25.40
		4230	4455	846.0	25.39
	4	4132	4357	826.4	25.06
		4180	4405	836.0	24.86
		4230	4455	846.0	24.87
	5	4132	4357	826.4	25.36
		4180	4405	836.0	25.32
		4230	4455	846.0	25.15
UMTS1900 (Band II)	1	9262	9662	1852.4	25.54
		9400	9800	1880.0	25.30
		9538	9938	1907.6	25.32
	2	9262	9662	1852.4	25.48
		9400	9800	1880.0	25.32
		9538	9938	1907.6	25.20
	3	9262	9662	1852.4	25.73
		9400	9800	1880.0	25.59
		9538	9938	1907.6	25.41
	4	9262	9662	1852.4	25.04
		9400	9800	1880.0	25.07
		9538	9938	1907.6	25.03
	5	9262	9662	1852.4	25.60
		9400	9800	1880.0	25.41
		9538	9938	1907.6	25.60

## 8. LIMITS AND RESULTS

### 8.1. CONDUCTED TEST RESULTS

#### 8.1.1. OCCUPIED BANDWIDTH

##### RULE PART(S)

FCC: §2.1049

##### LIMITS

For reporting purposes only

##### TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the low, middle and high channel in each band. The -26dB bandwidth was also measured and recorded.

##### MODES TESTED

- GSM
- GPRS
- UMTS

**RESULTS**

Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB BW (kHz)
GSM	GSM	128	824.2	247.3999	263.620
		190	836.6	250.6269	270.991
		251	848.8	246.7674	284.154
	GPRS	128	824.2	249.7657	316.784
		190	836.6	247.2084	293.195
		251	848.8	251.8833	276.186

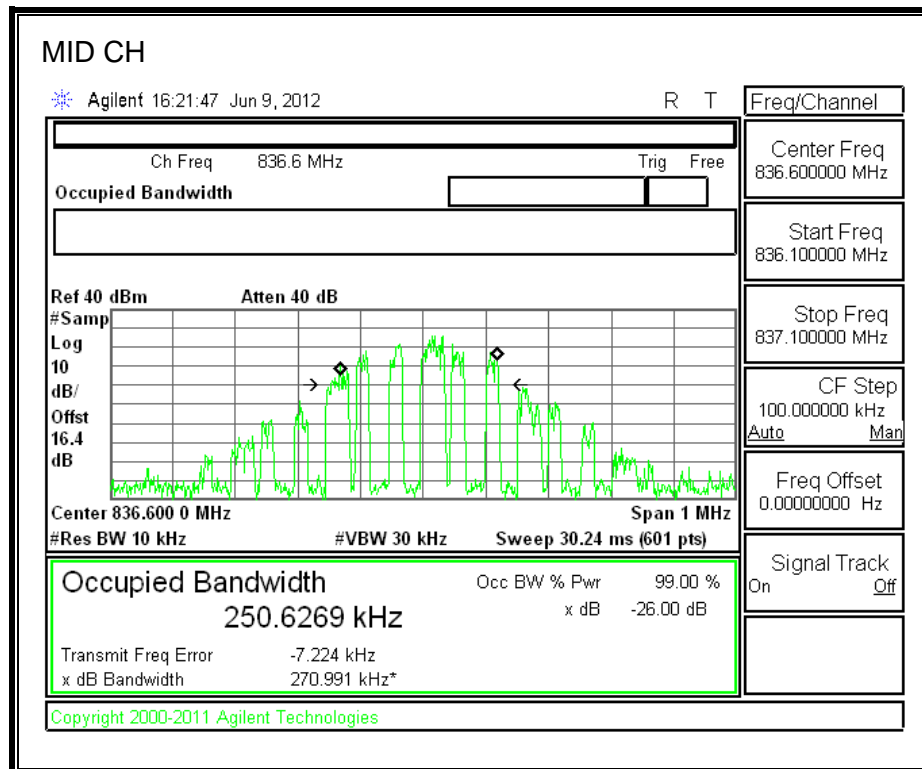
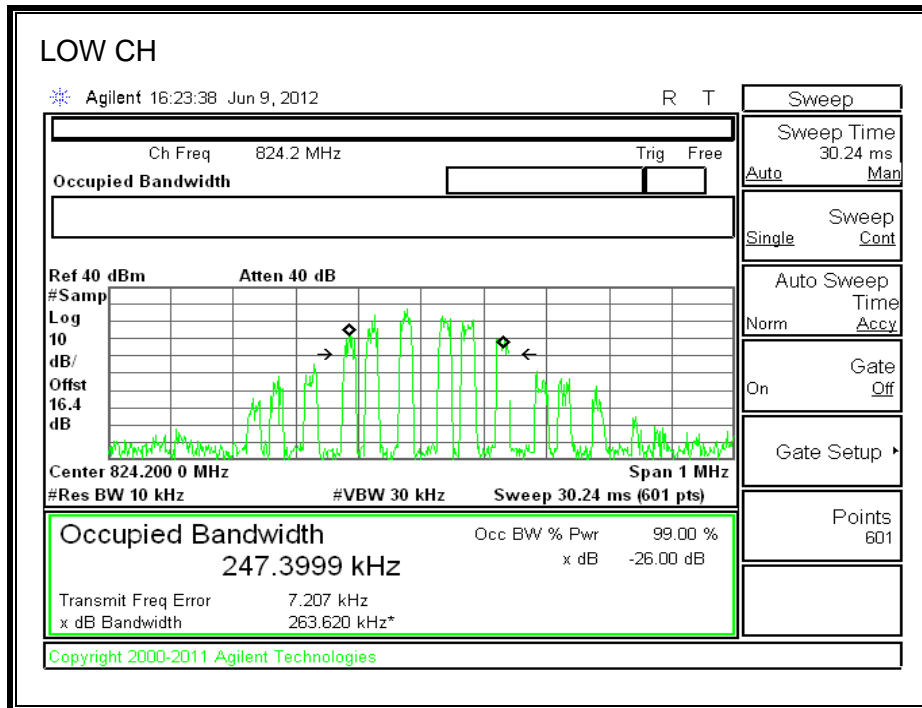
Band	Mode	Channel	f (MHz)	99% BW (MHz)	-26dB BW (kHz)
WCDMA	REL 99	4357	826.4	4.1944	4.715
		4405	836.0	4.2495	4.649
		4455	846.0	4.2229	4.746
	HSDPA	4357	826.4	4.1834	4.675
		4405	836.0	4.1958	4.684
		4455	846.0	4.1900	4.650

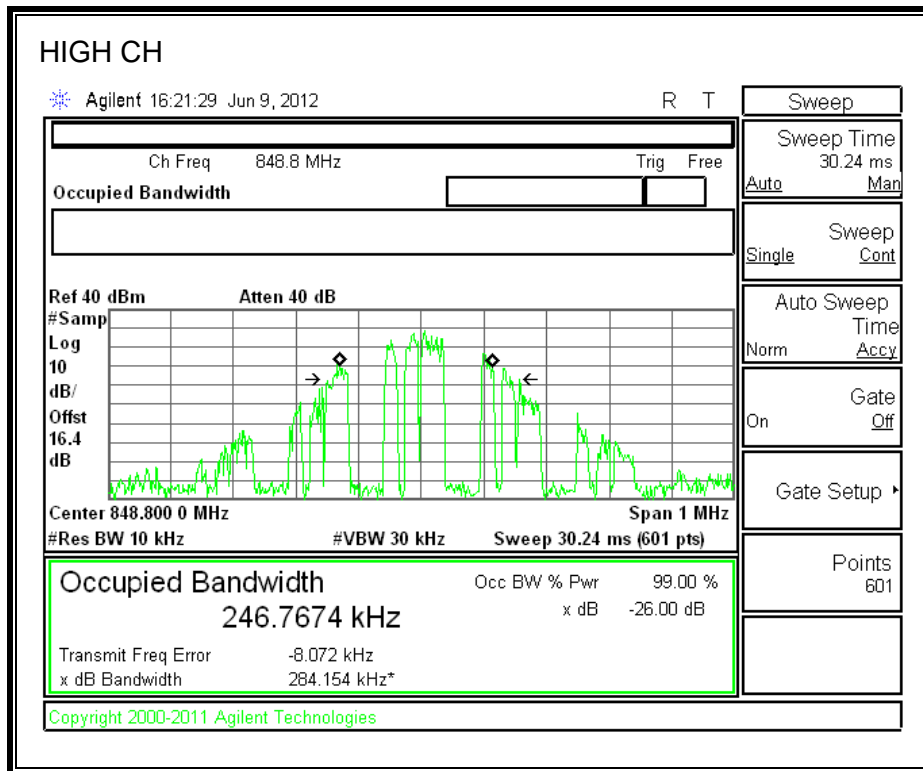
Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB BW (kHz)
GSM	GSM	512	1850.2	255.4884	316.103
		661	1880.0	250.4115	272.465
		810	1909.8	254.6649	283.807
	GPRS	512	1850.2	242.2363	261.564
		661	1880.0	247.5932	267.311
		810	1909.8	245.1733	312.302

Band	Mode	Channel	f (MHz)	99% BW (kHz)	-26dB BW (kHz)
WCDMA	REL 99	9662	1852.4	4.2221	4.720
		9800	1880.0	4.0983	4.621
		9938	1907.6	4.2143	4.627
	HSDPA	9662	1852.4	4.1924	4.677
		9800	1880.0	4.1008	4.598
		9938	1907.6	4.2192	4.656

**99% and 26dB BANDWIDTH**

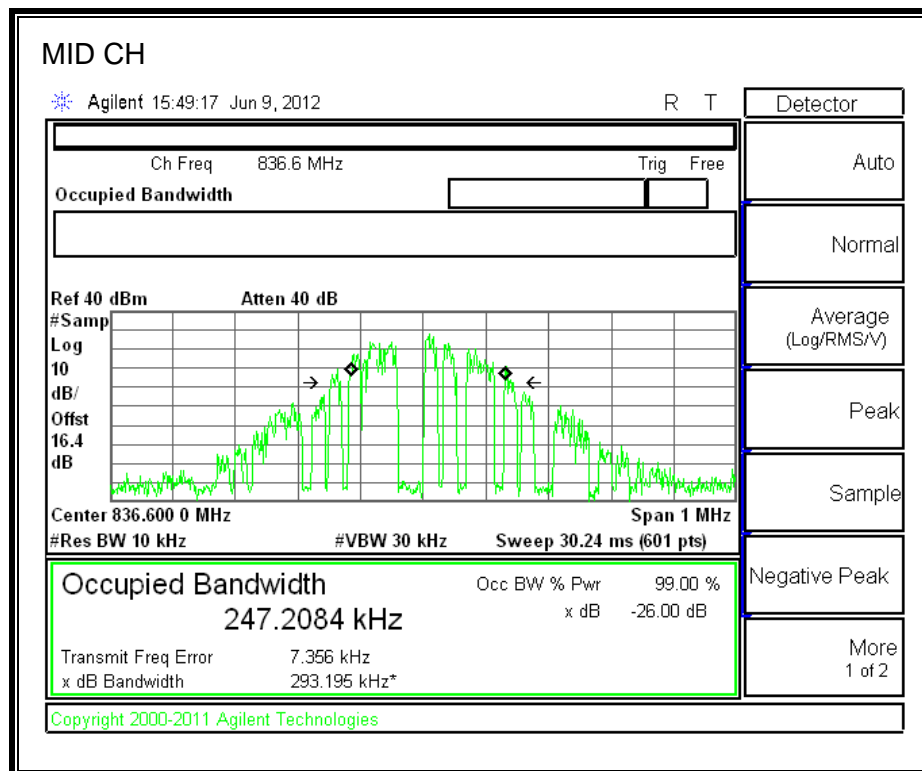
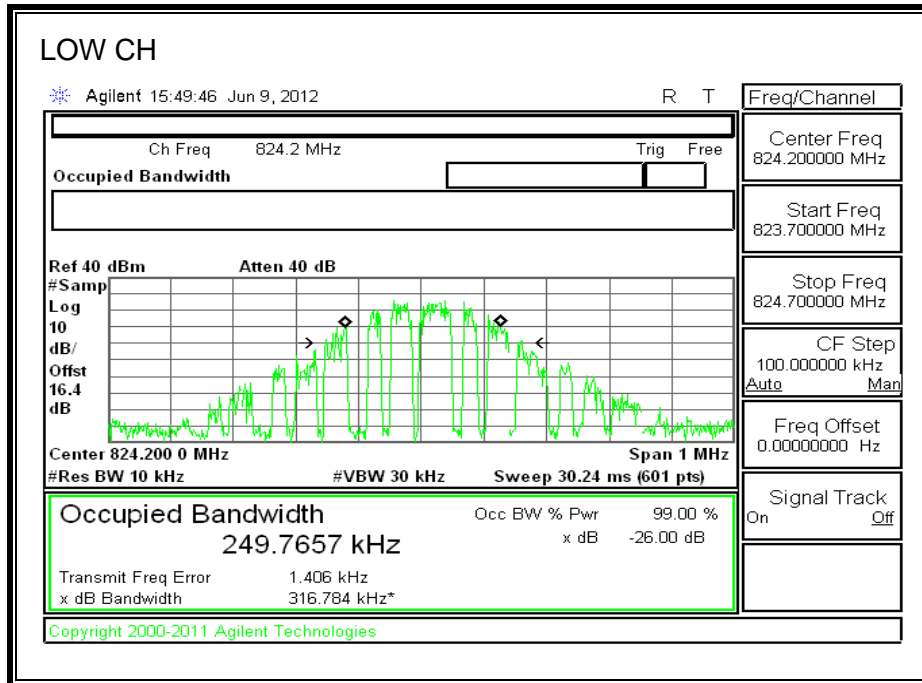
**GSM850 BAND**

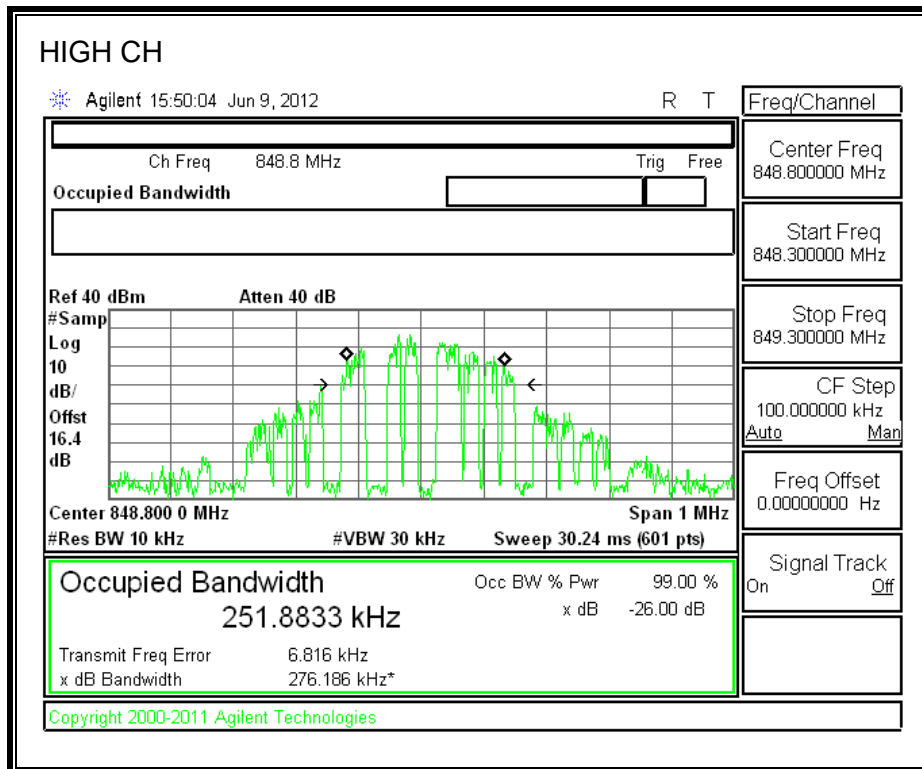




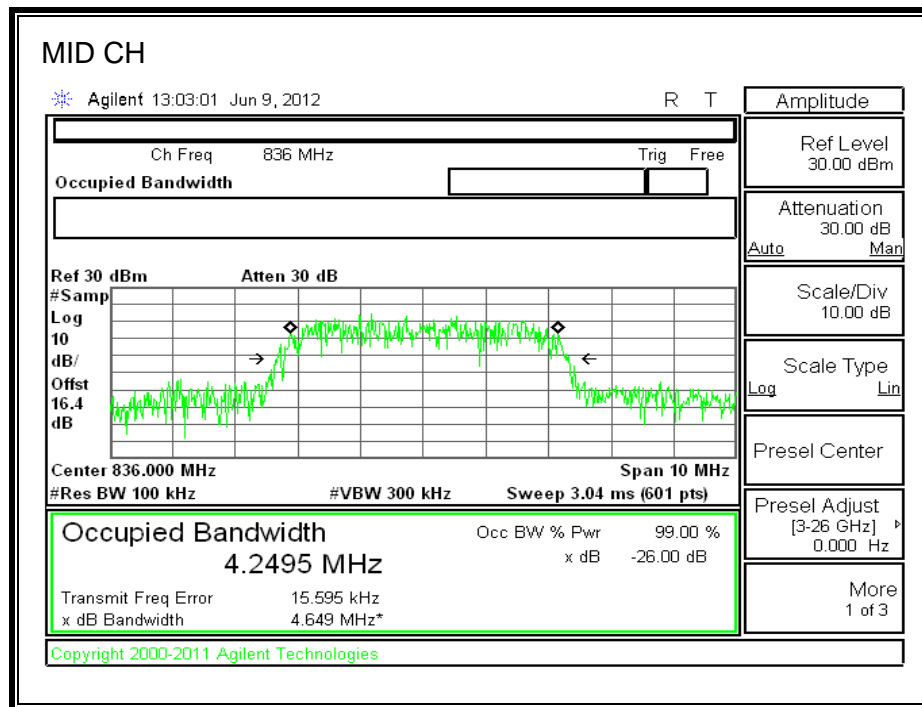
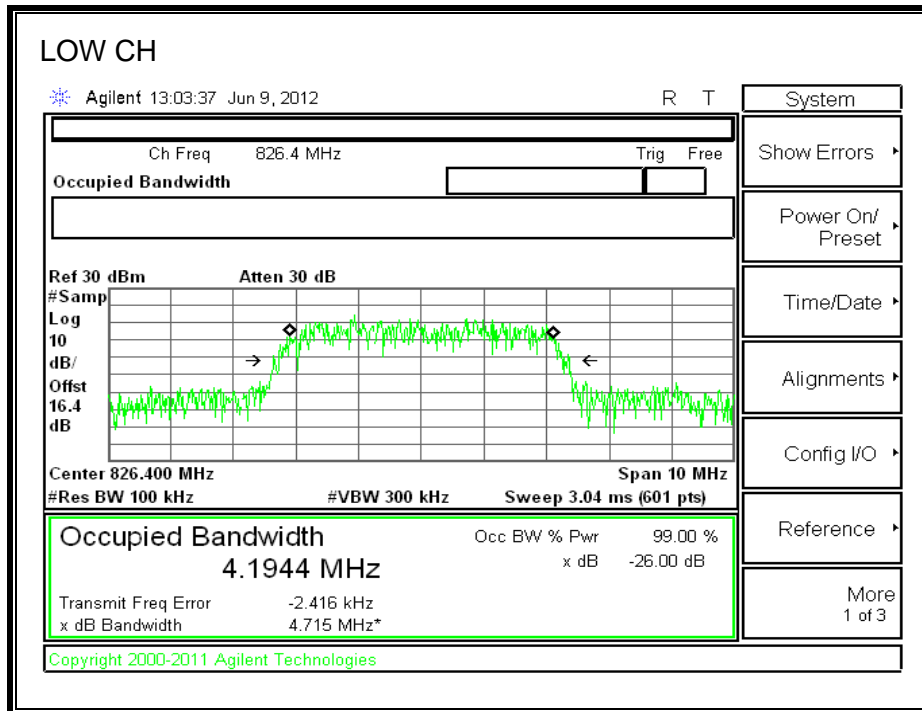
**99% and 26dB BANDWIDTH**

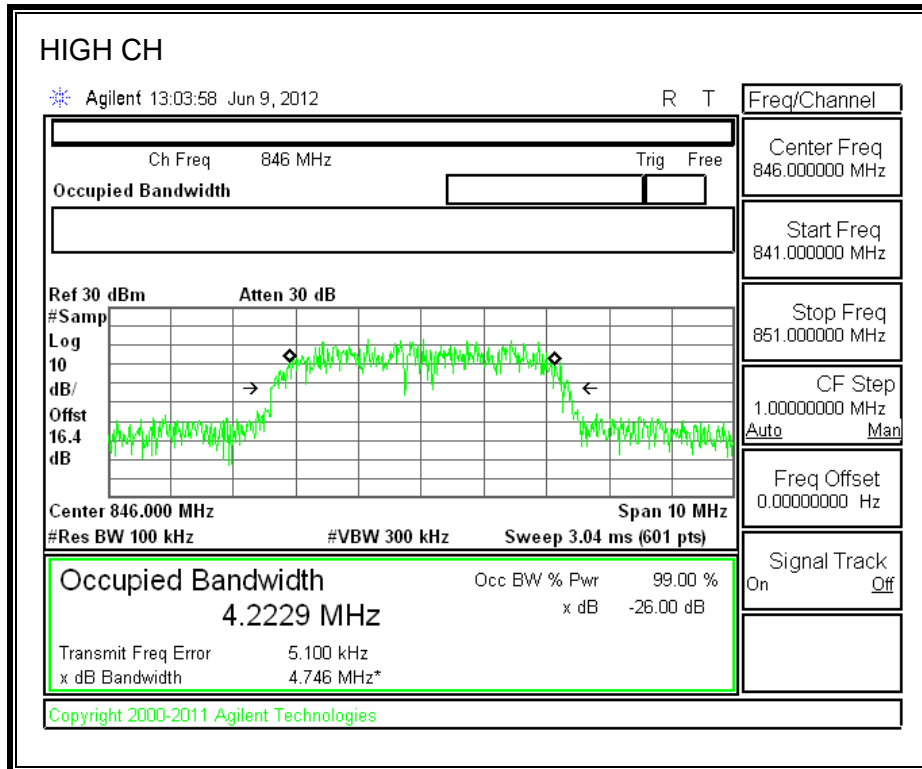
**GPRS850 BAND**



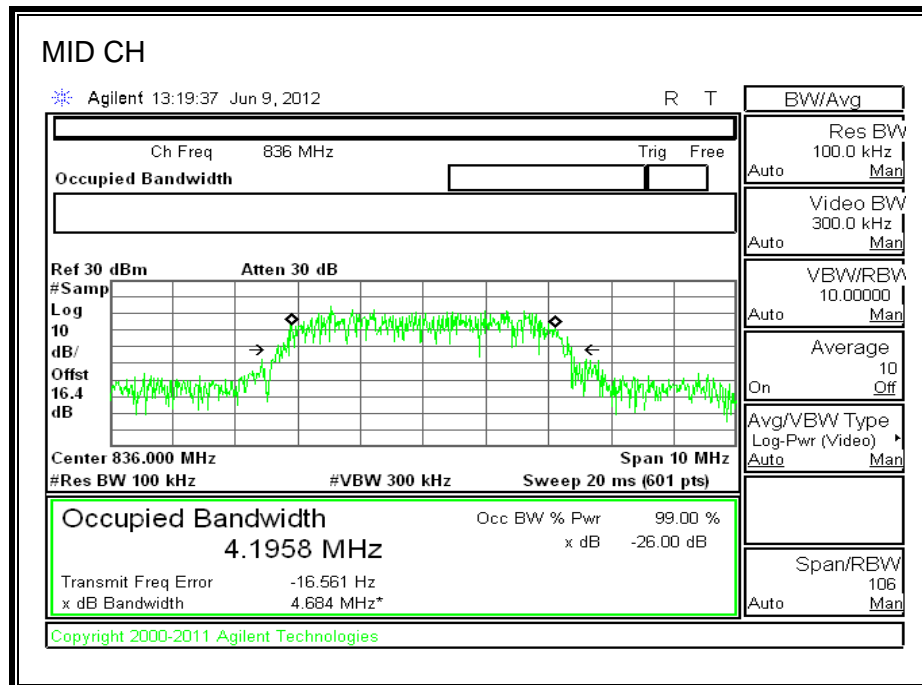
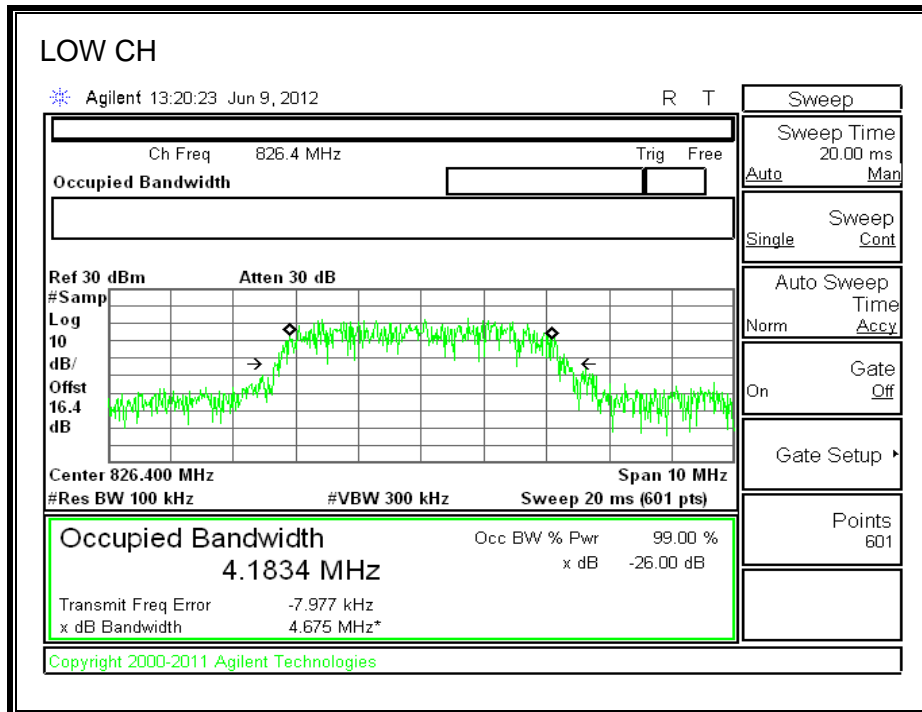


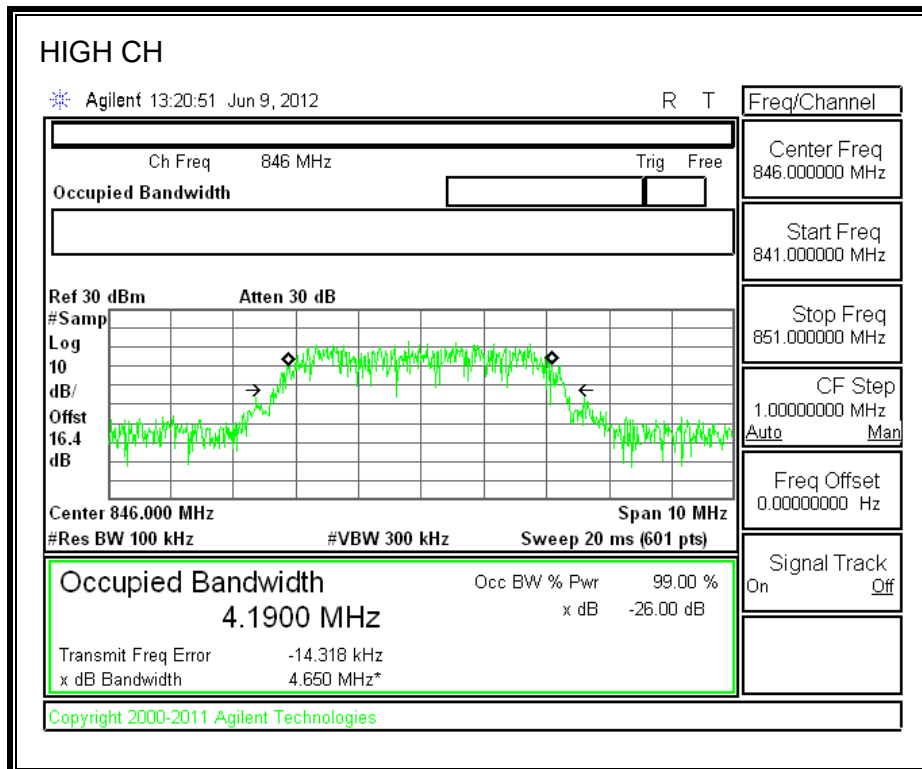
**WCDMA850, REL 99**



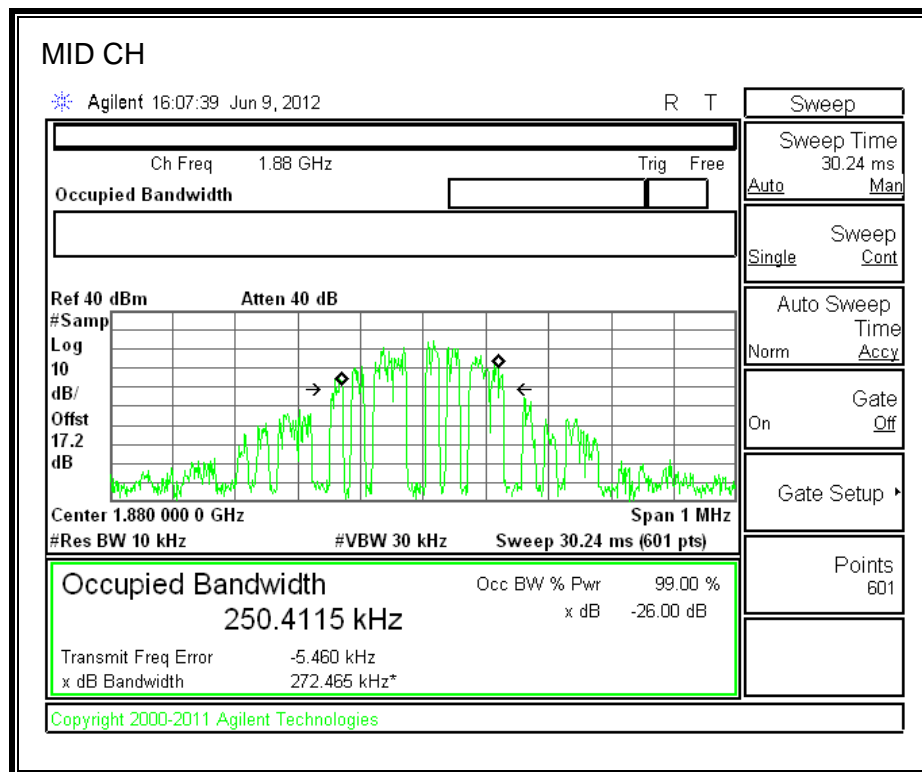
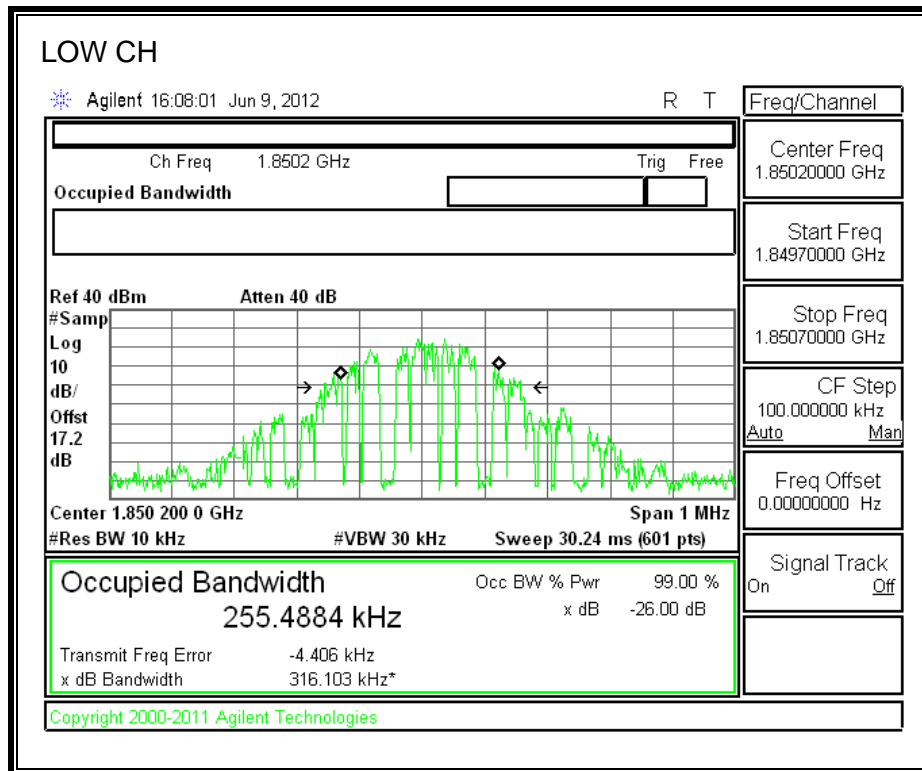


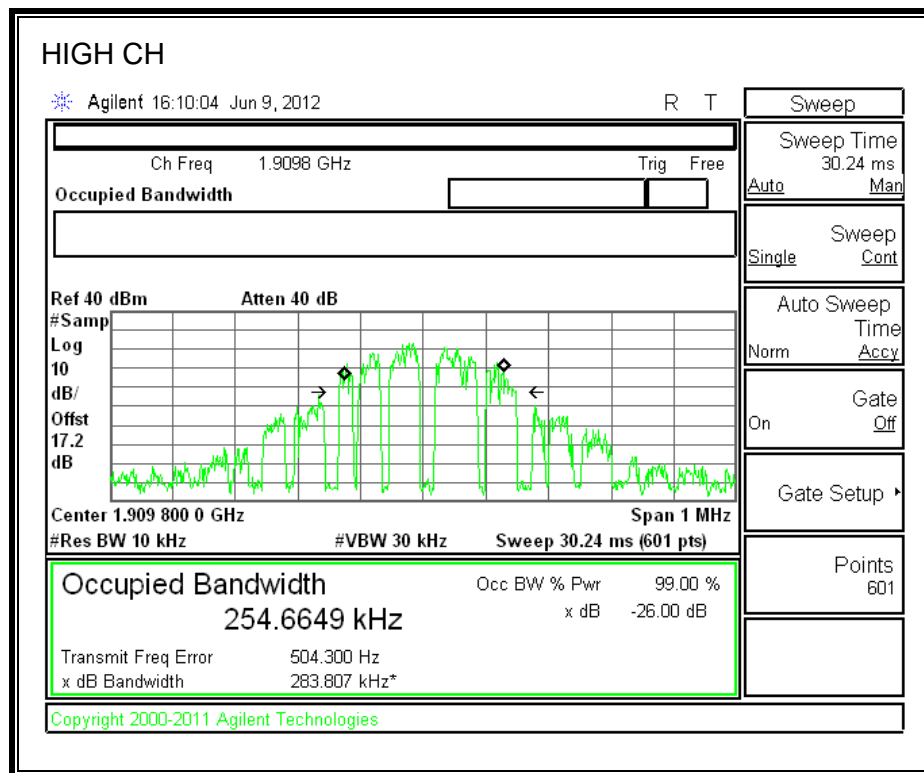
**WCDMA850, HSDPA**



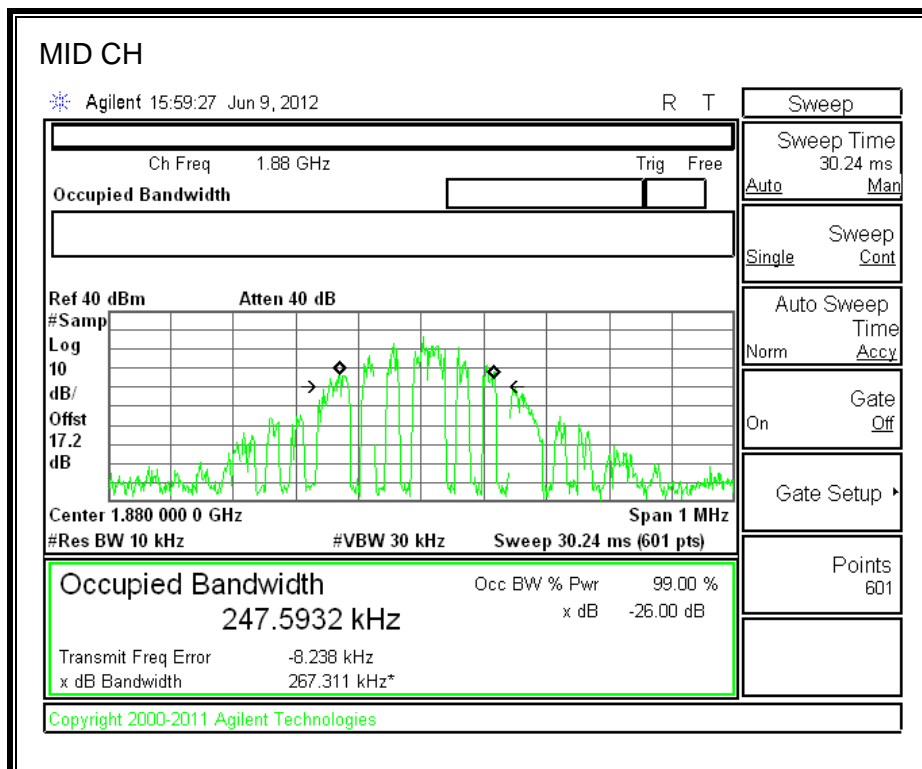
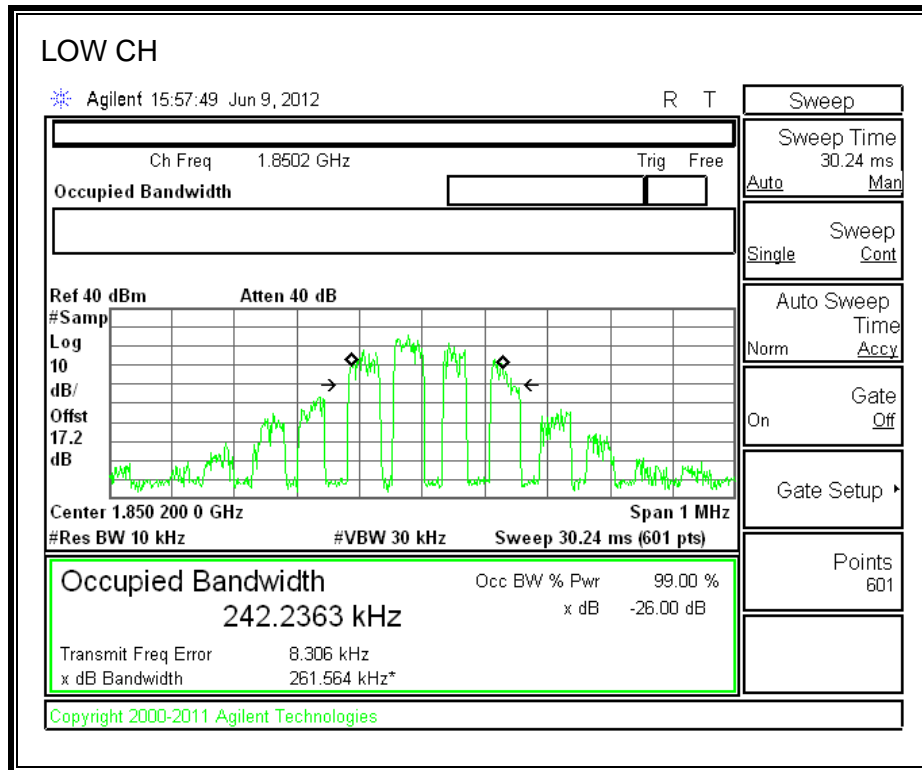


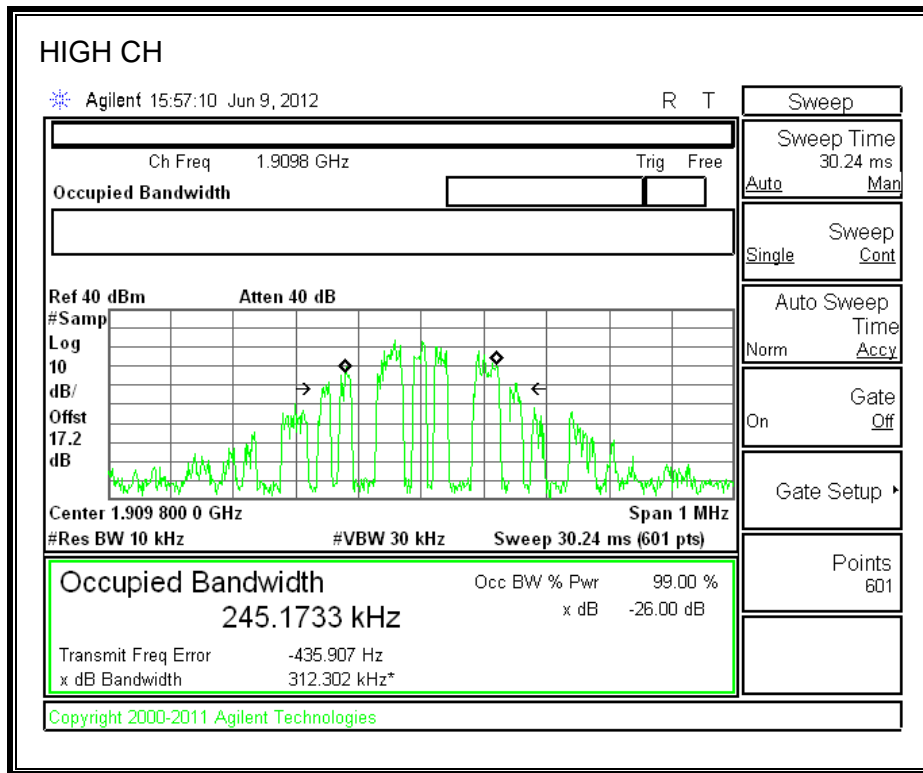
**GSM1900 BAND**



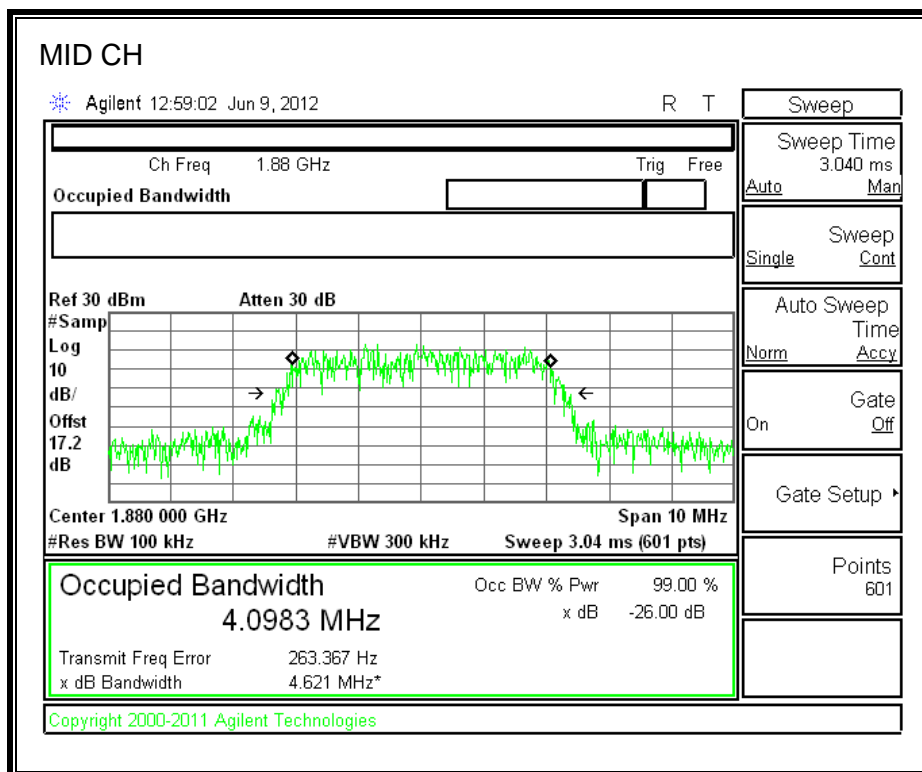
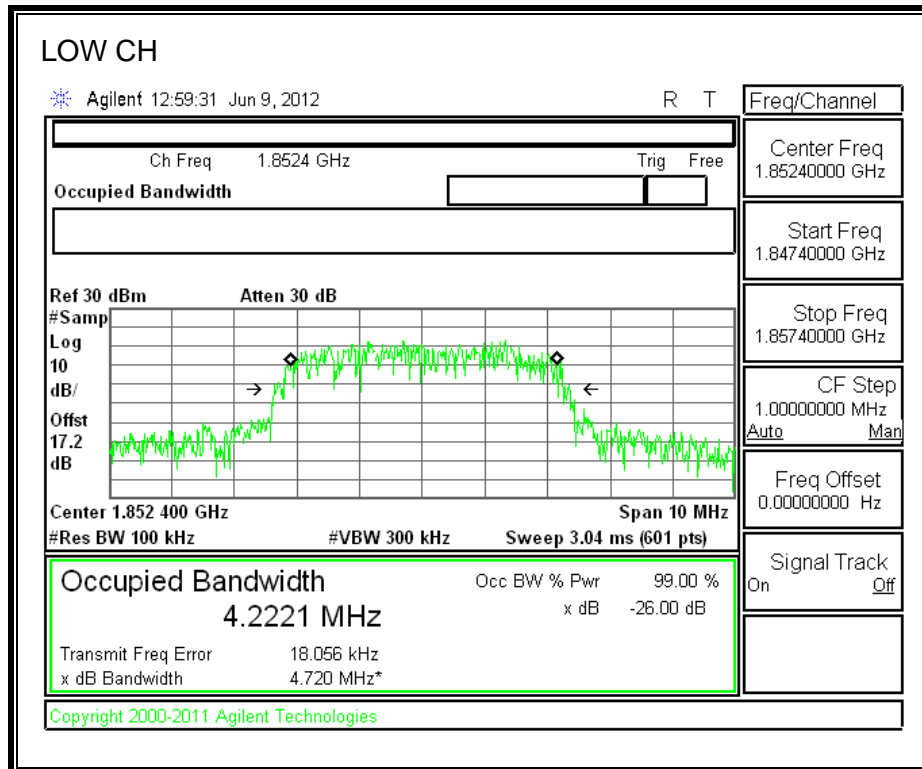


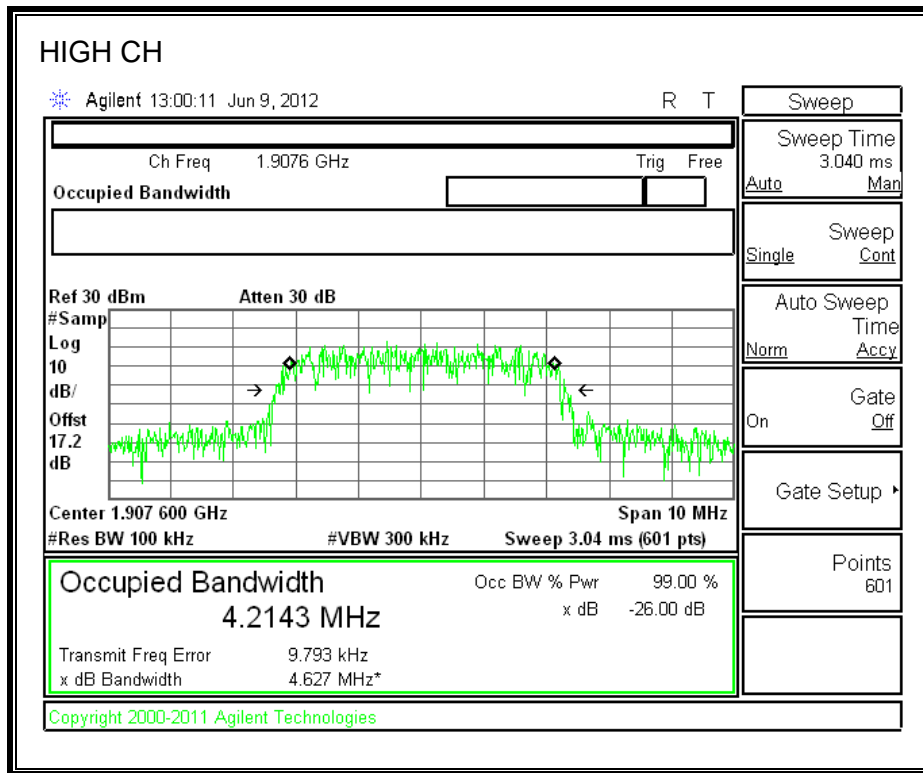
**GPRS1900 BAND**



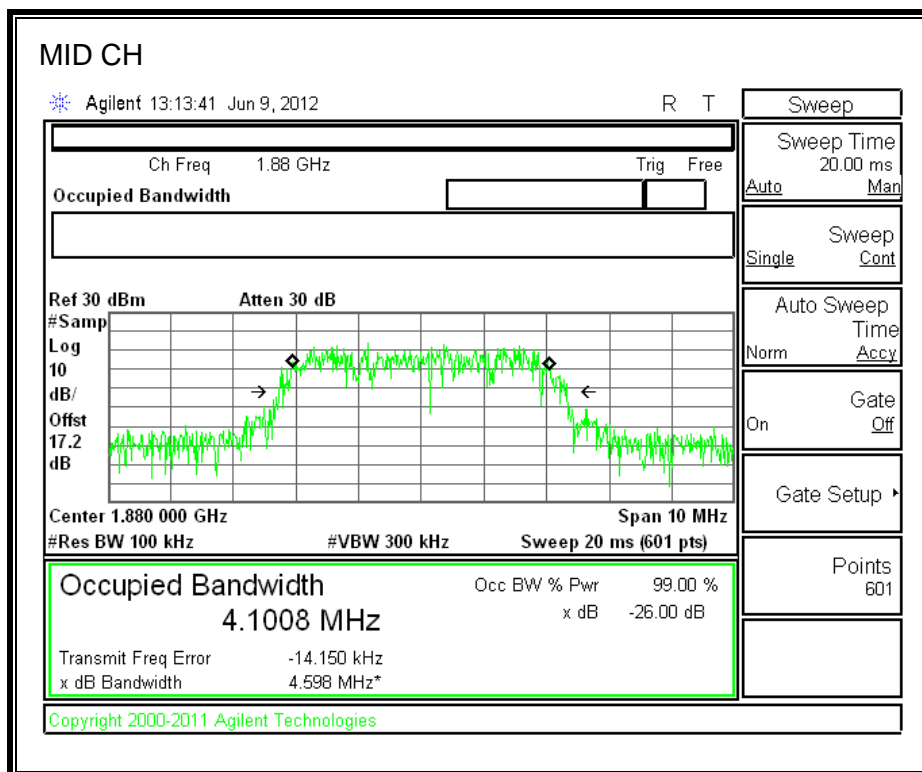
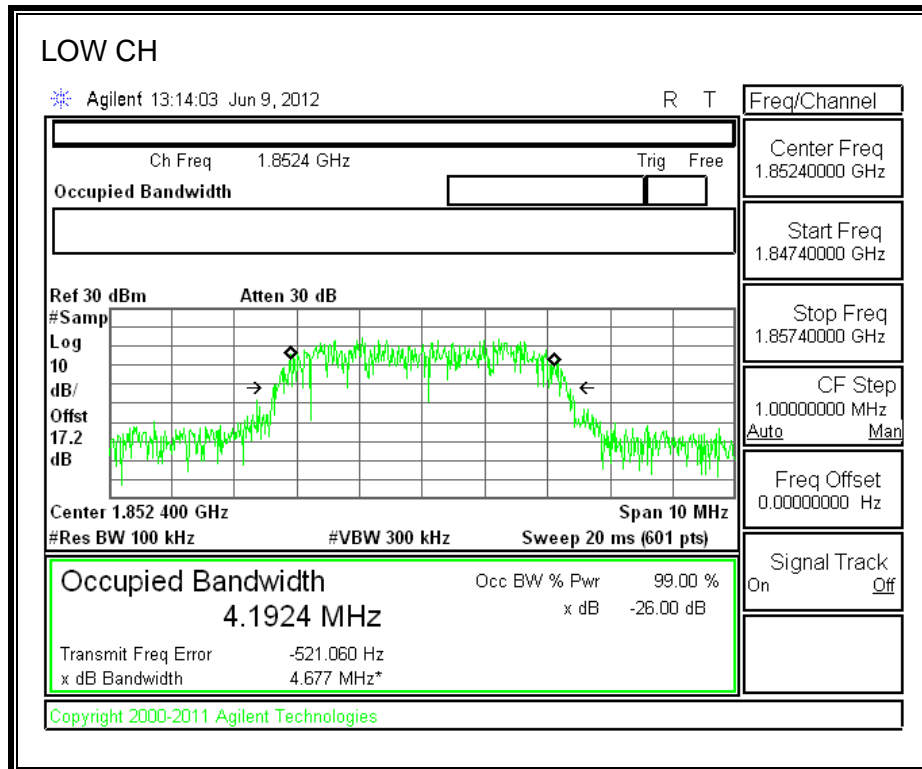


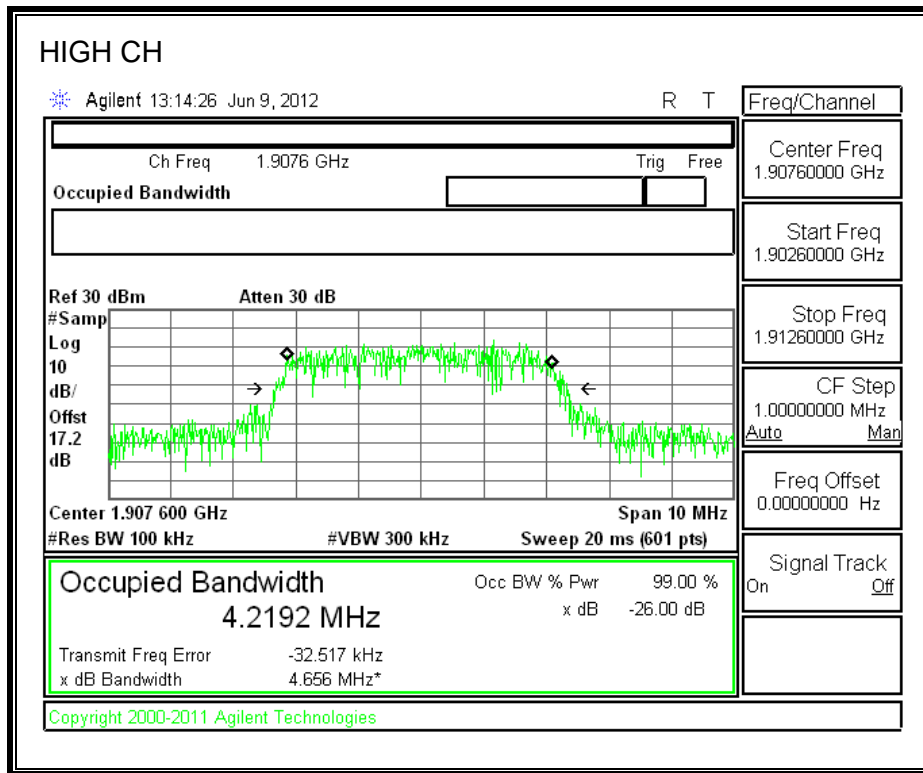
**WCDMA1900, REL 99**





**WCDMA1900, HSDPA**





## **8.1.2. BAND EDGE**

### **RULE PART(S)**

FCC: §22.359, 24.238

### **LIMITS**

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.

### **TEST PROCEDURE**

The transmitter output was connected to an Agilent 8960 Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each band edge measurement:

- Set the spectrum analyzer span to include the block edge frequency (824, 848, 1850, 1910MHz)
- Set a marker to point the corresponding band edge frequency in each test case.
- Set display line at -13 dBm
- Set resolution bandwidth to at least 1% of emission bandwidth.

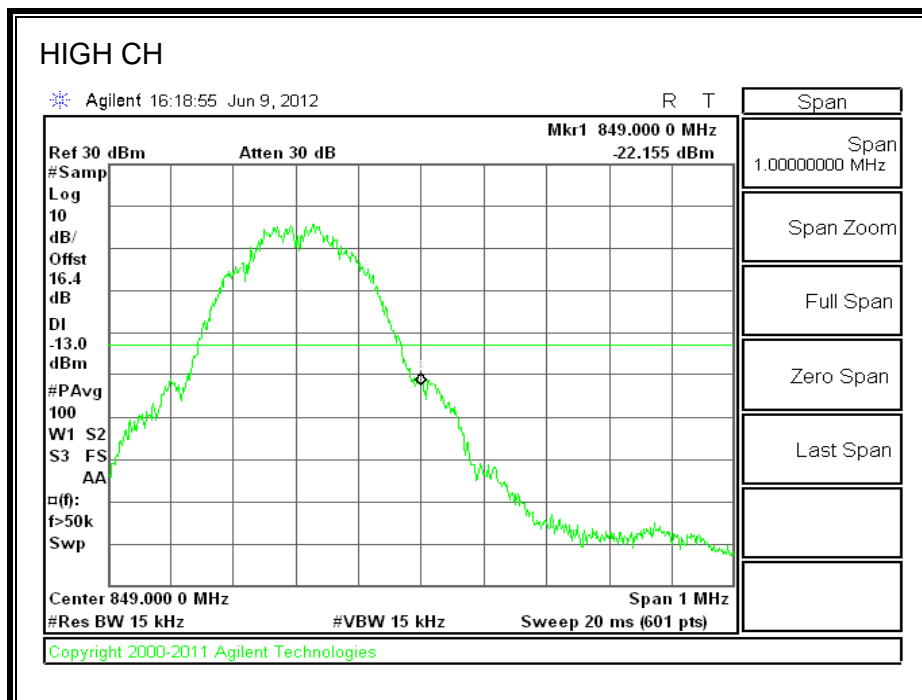
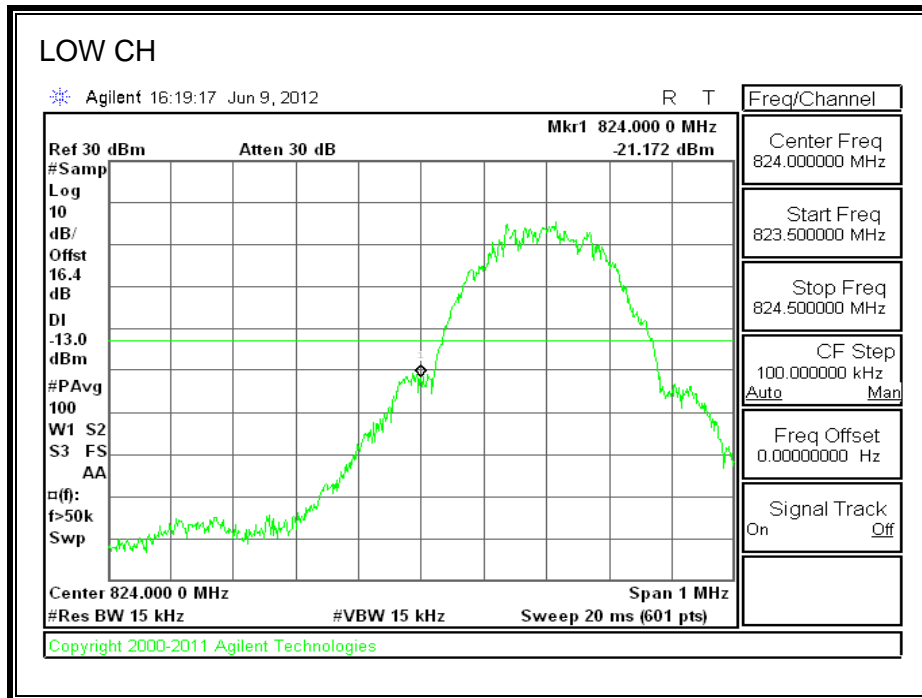
### **MODES TESTED**

- GSM
- GPRS
- UMTS

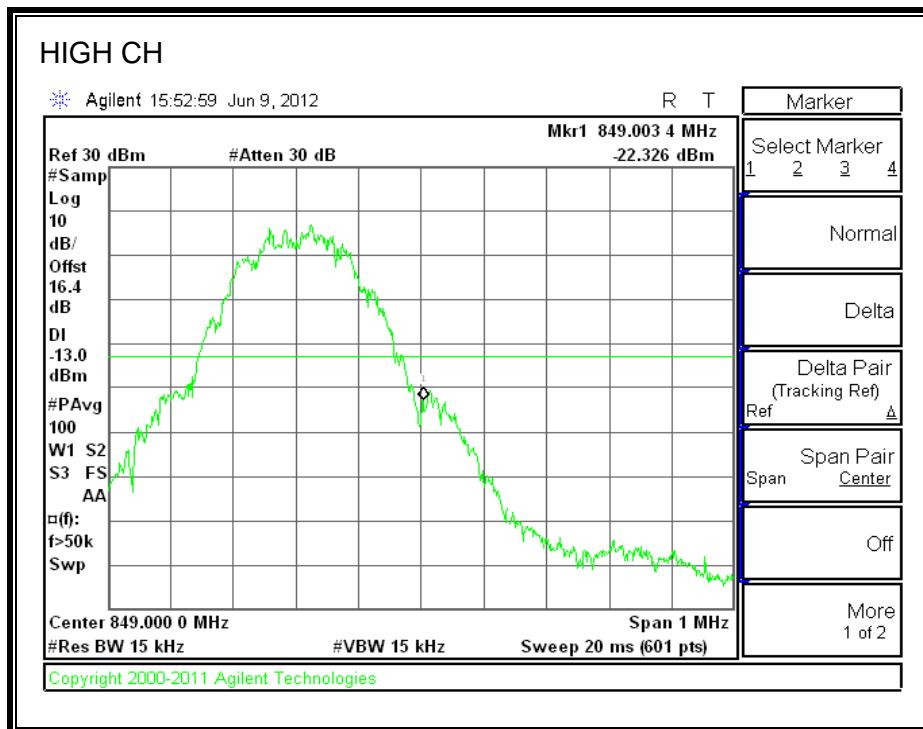
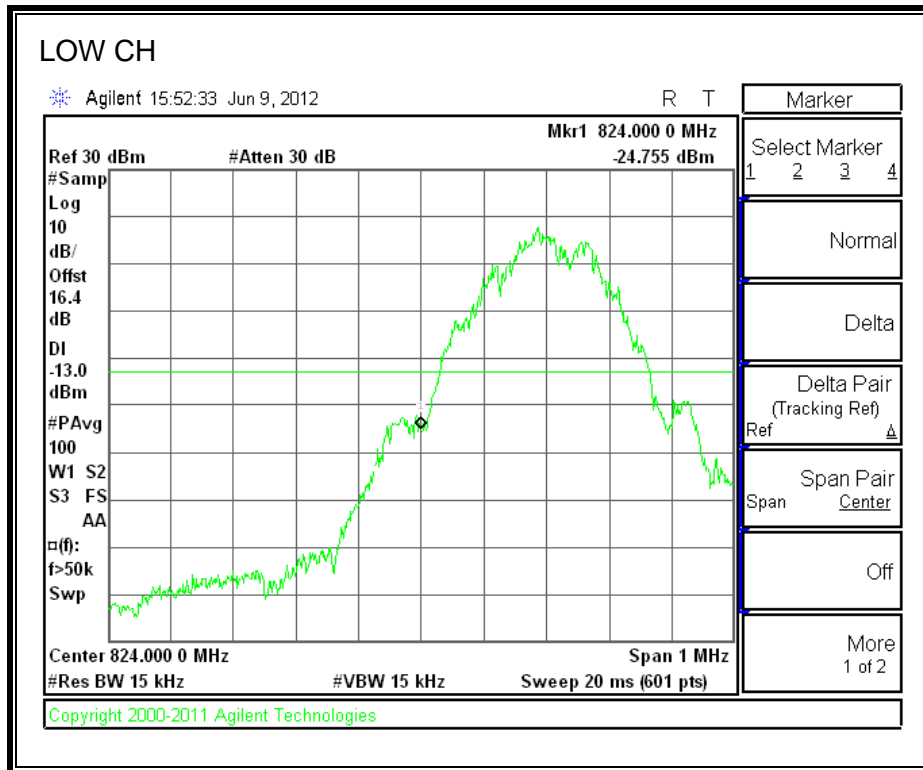
### **RESULTS**

**BANDEDGE**

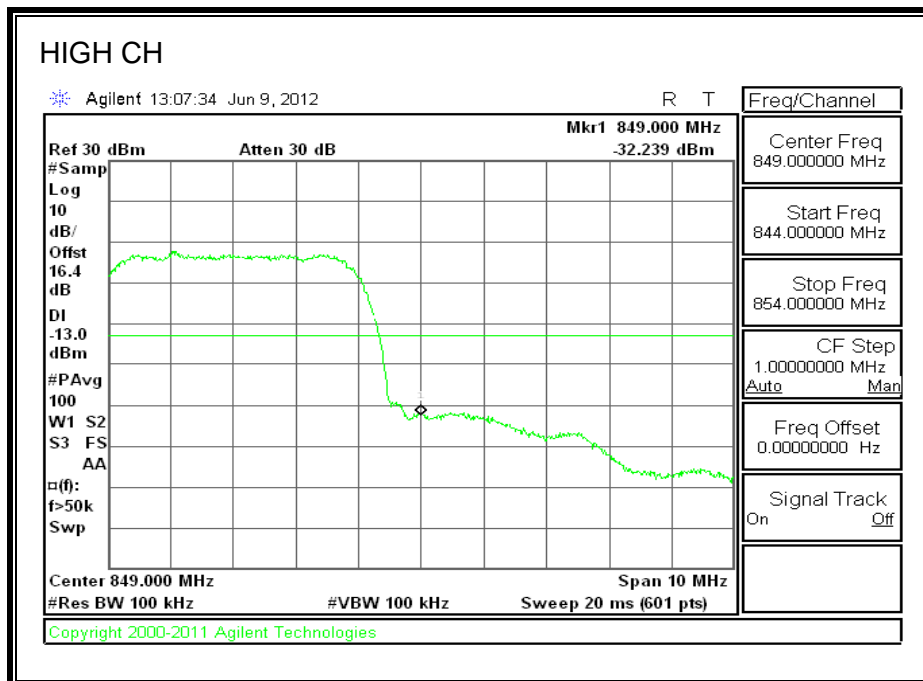
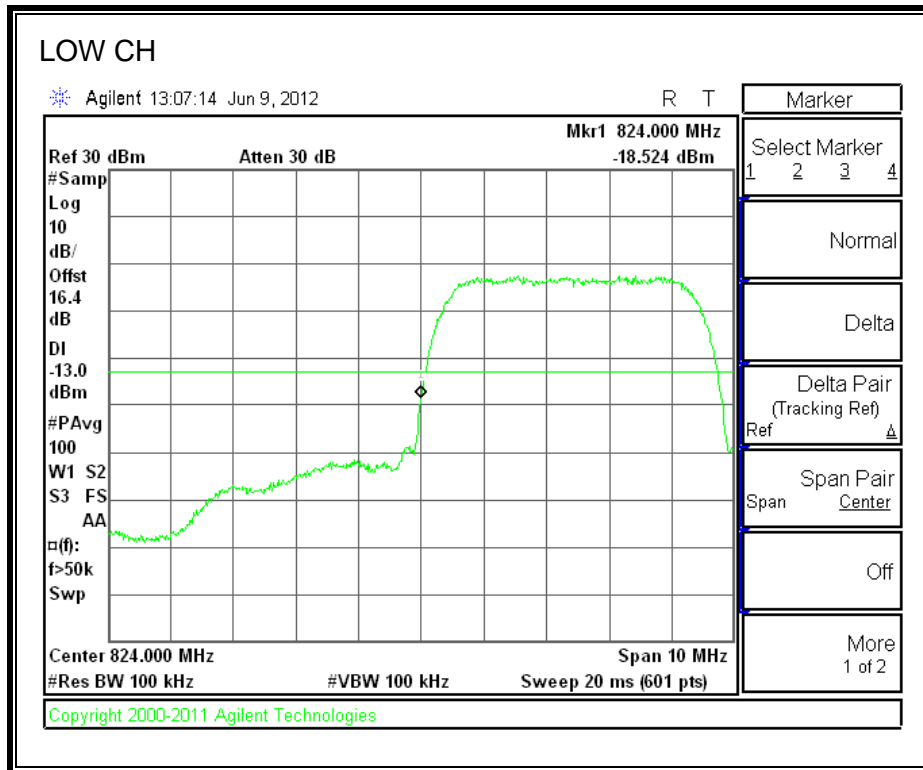
**GSMS850 BAND**



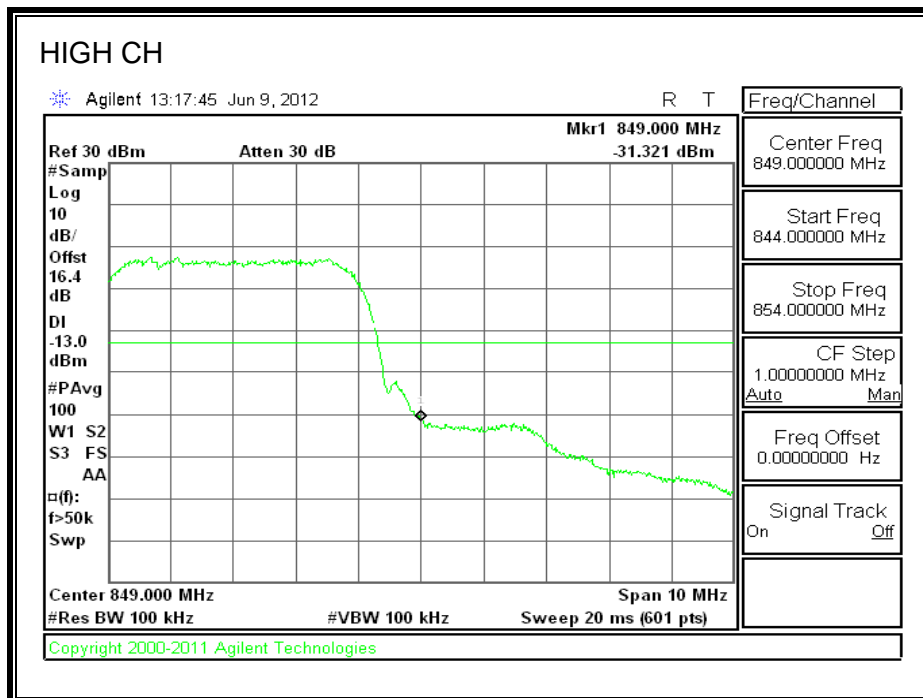
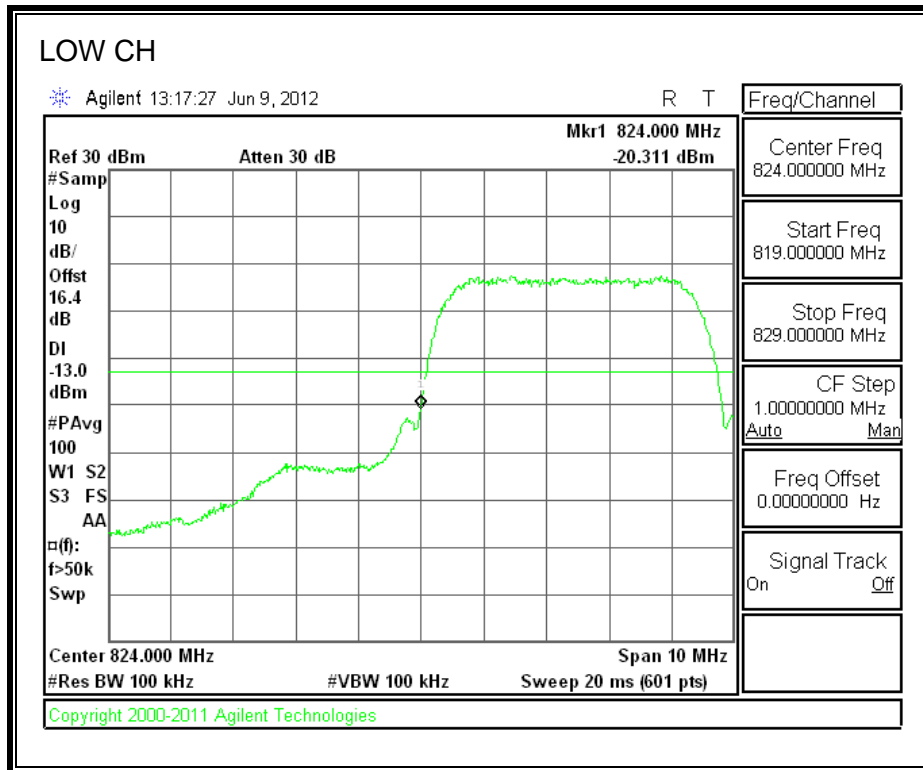
**GPRS850 BAND**



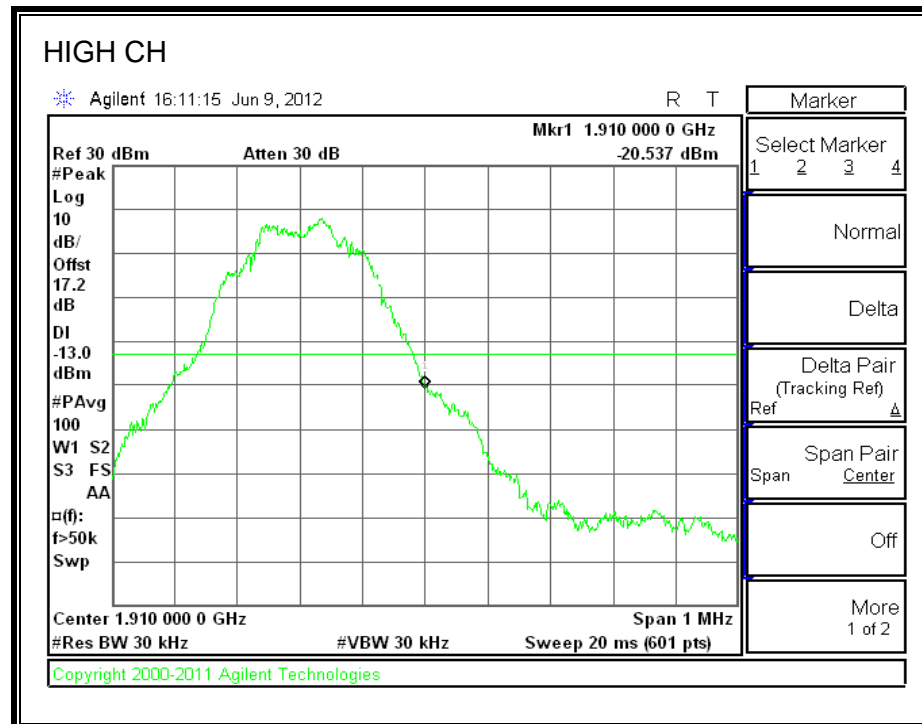
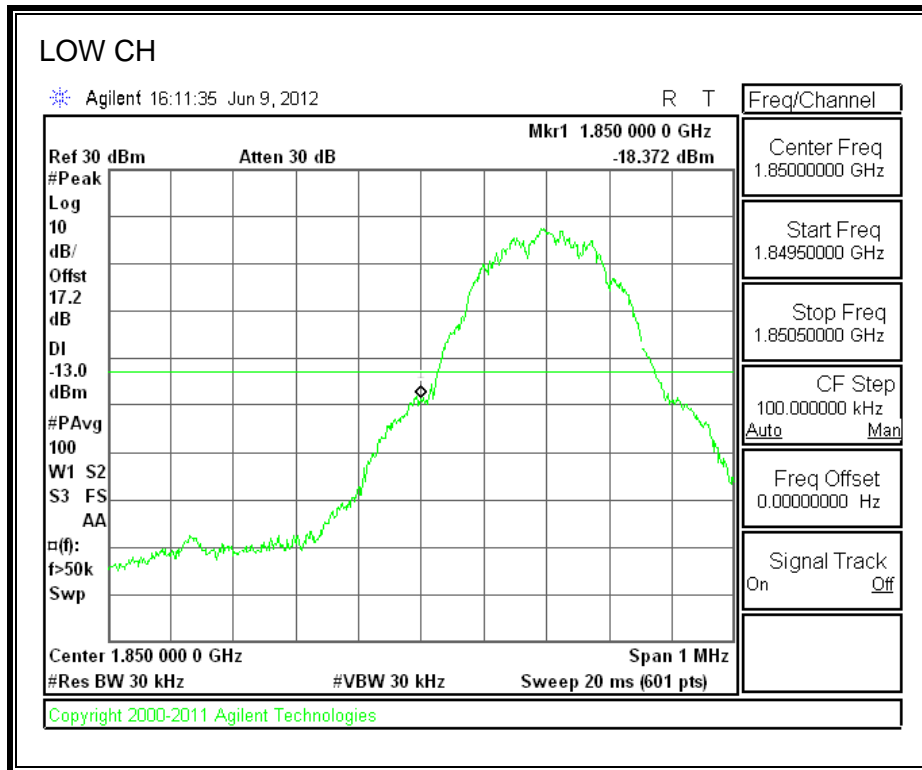
**WCDMA, REL 99 CELL**



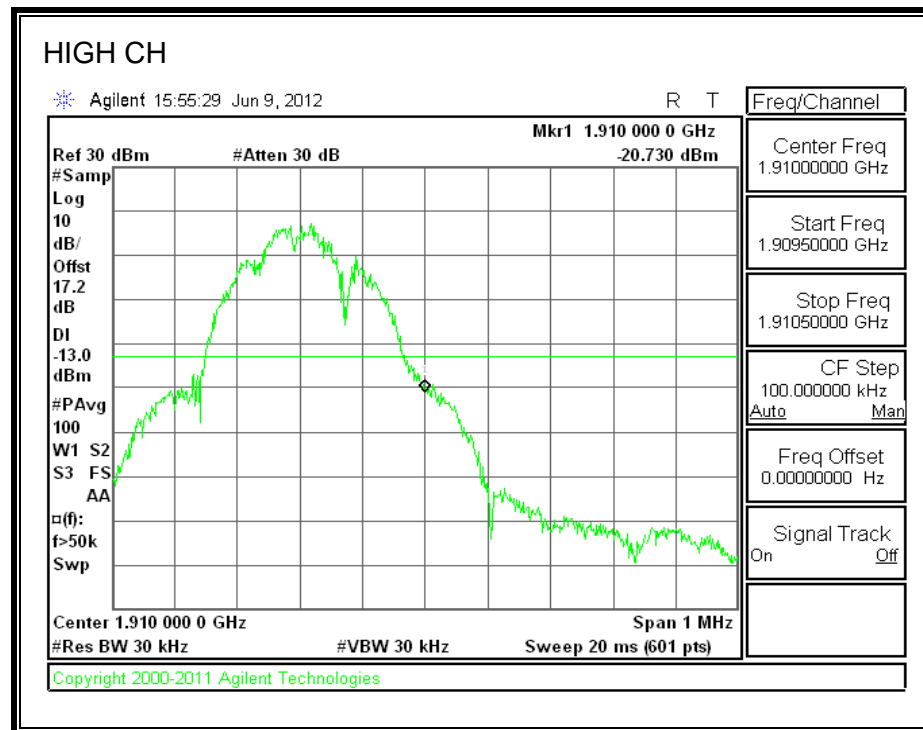
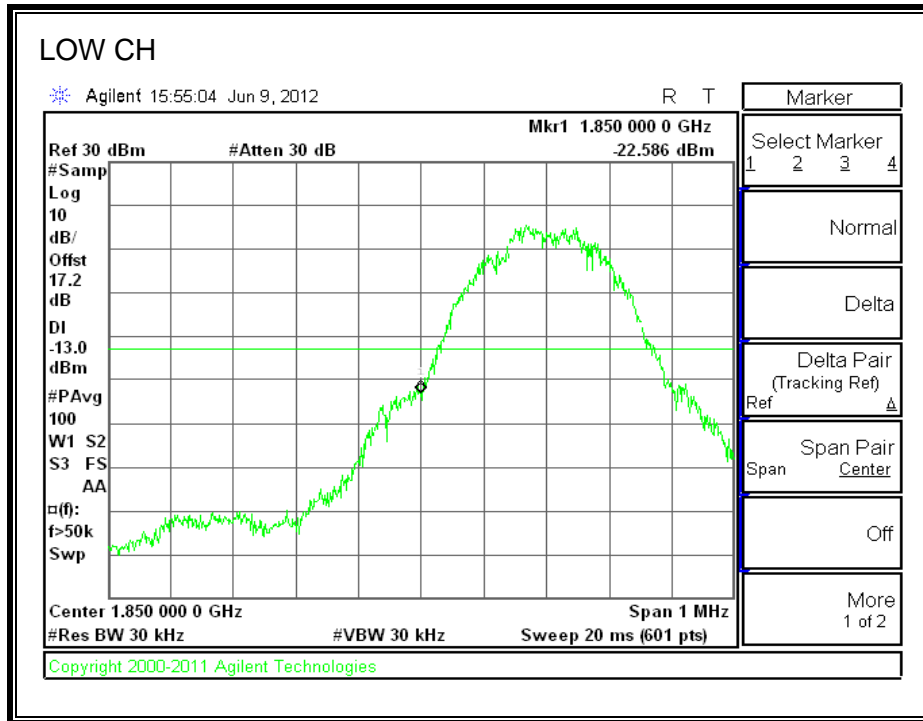
**WCDMA, HSDPA CELL**



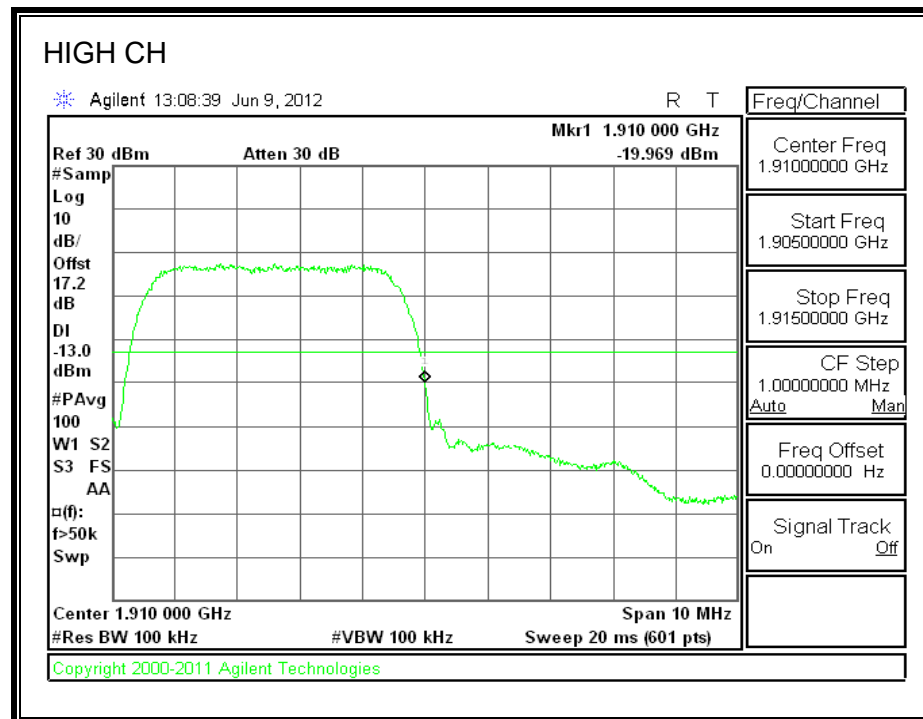
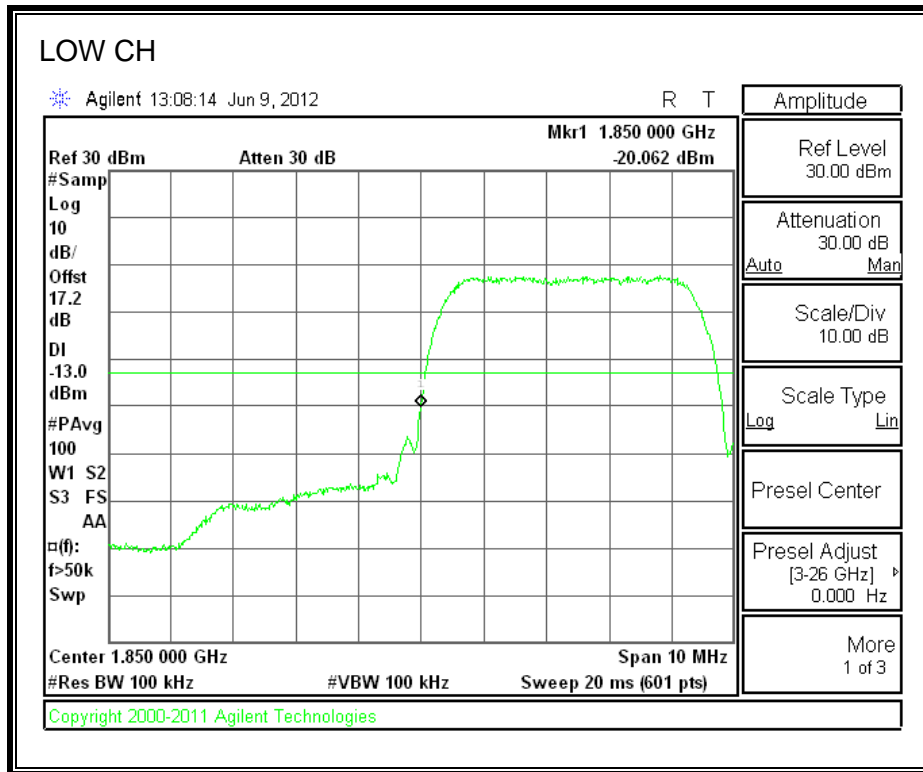
**GSM1900 BAND**



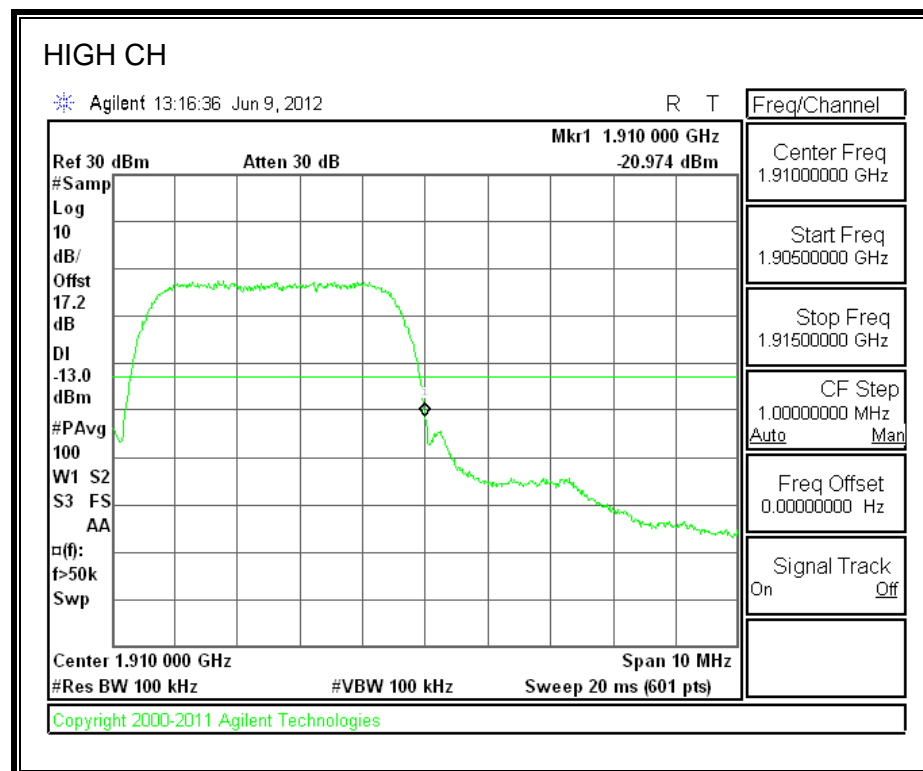
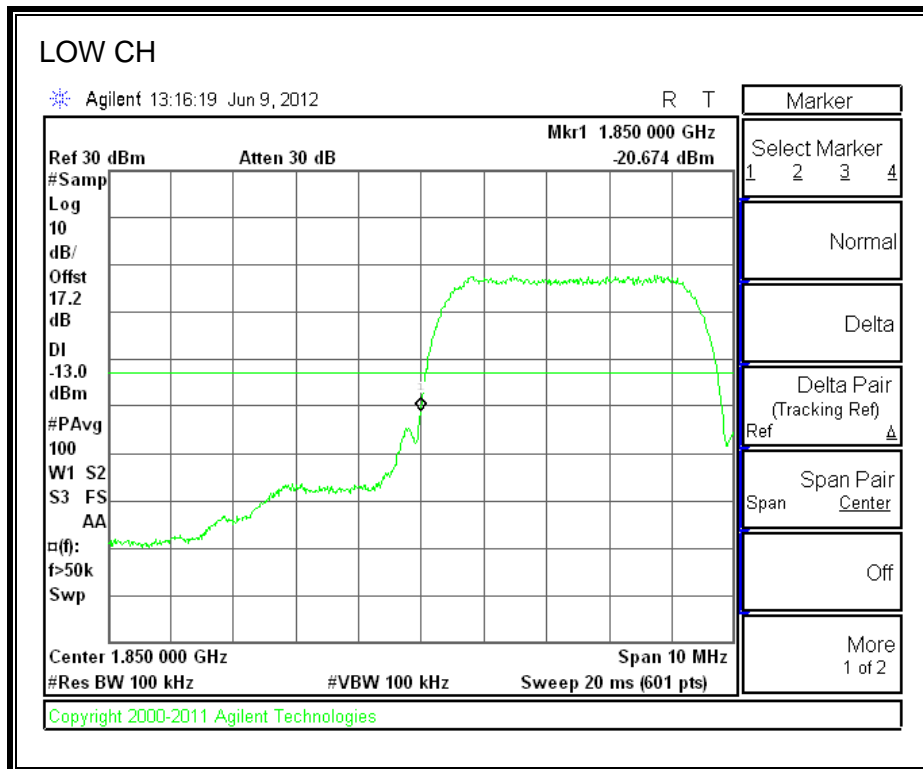
**GPRS1900 BAND**



**WCDMA, REL99, 1900 BAND**



**WCDMA, HSDPA, 1900 BAND**



### **8.1.3. OUT OF BAND EMISSIONS**

#### **RULE PART(S)**

FCC: §2.1051, §22.901, §22.917, §24.238

#### **LIMITS**

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.

#### **TEST PROCEDURE**

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

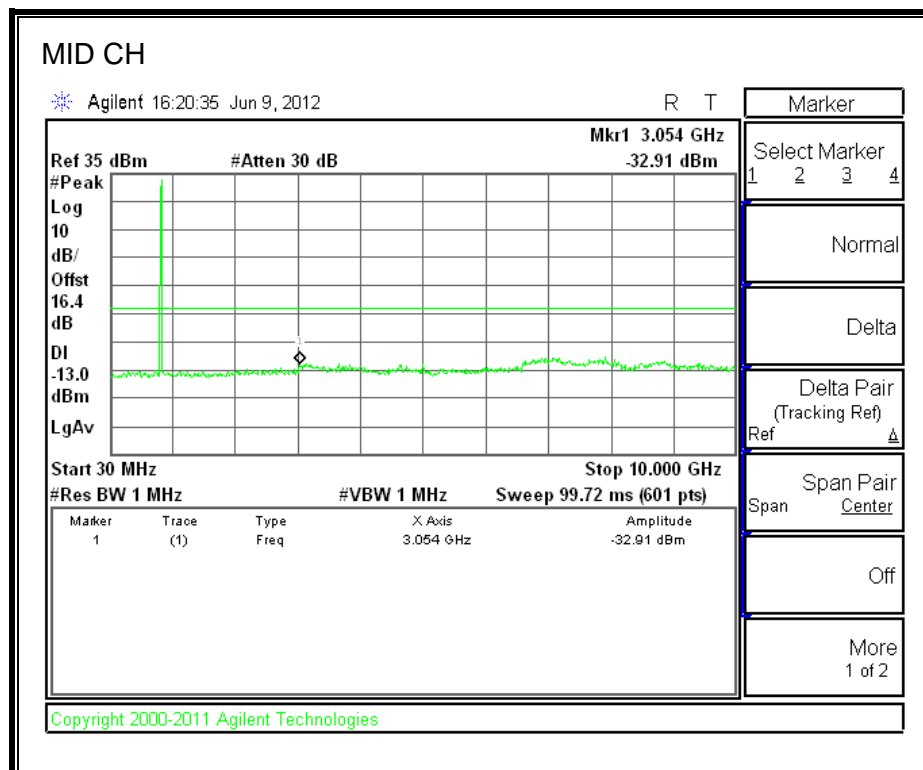
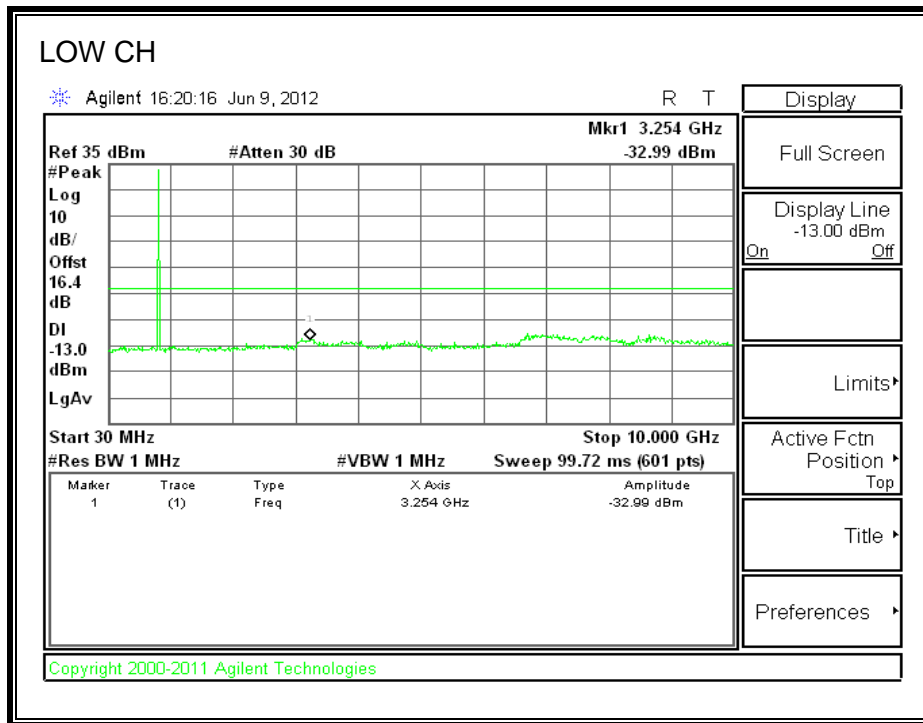
- Set display line at -13 dBm
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

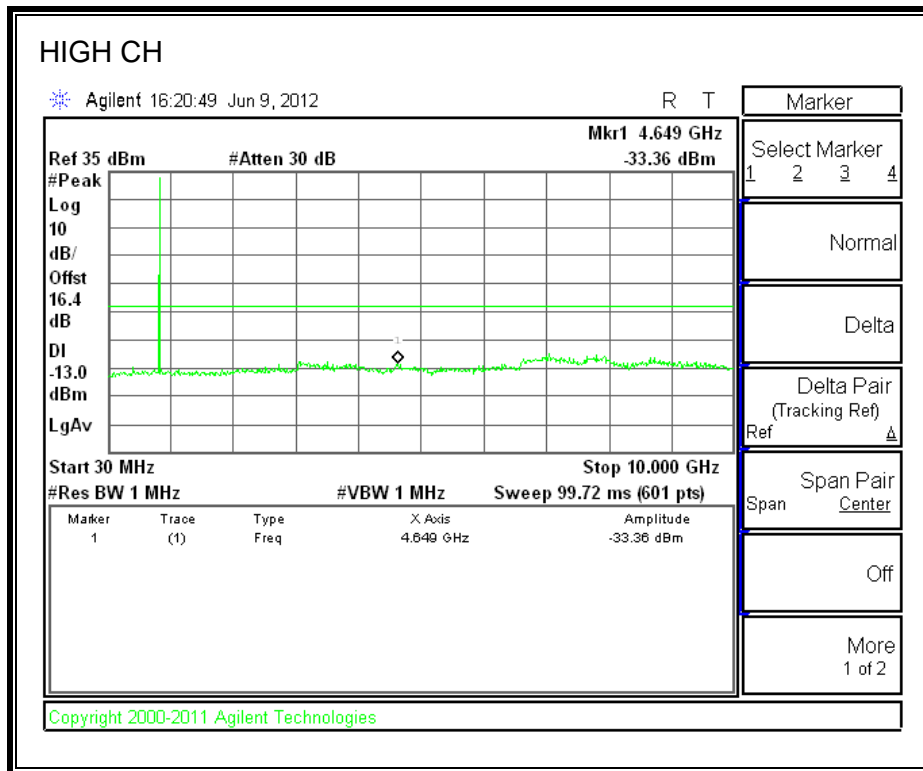
#### **MODES TESTED**

- GSM
- GPRS
- UMTS

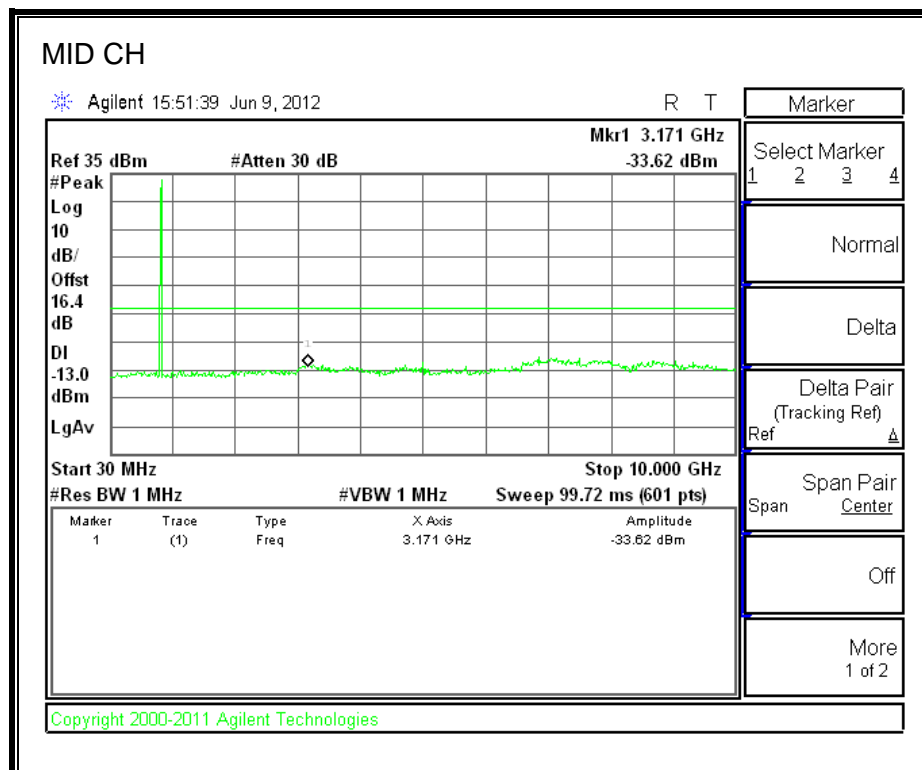
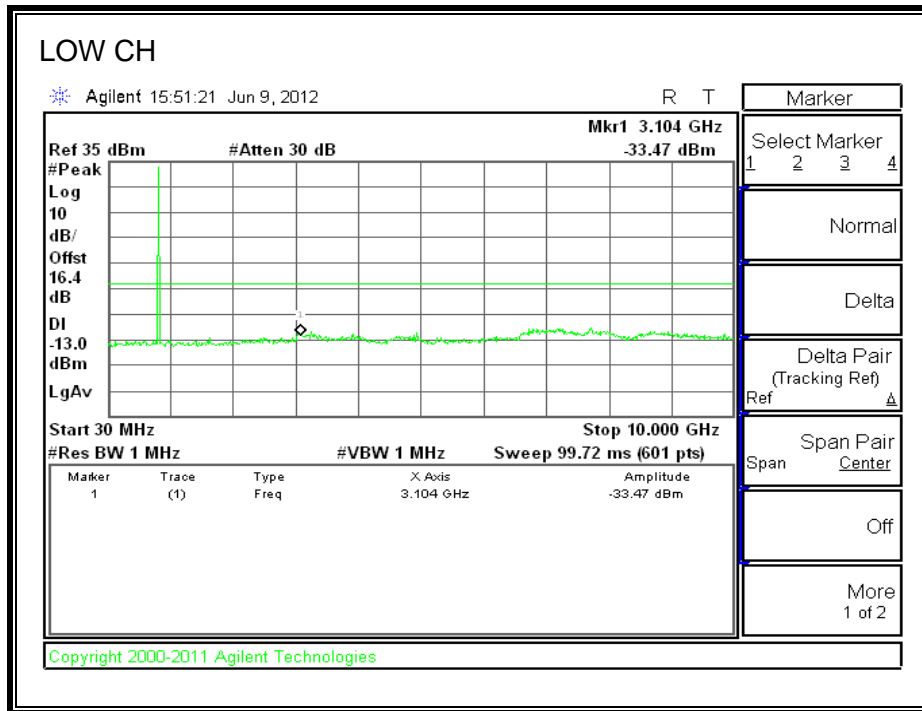
#### **RESULTS**

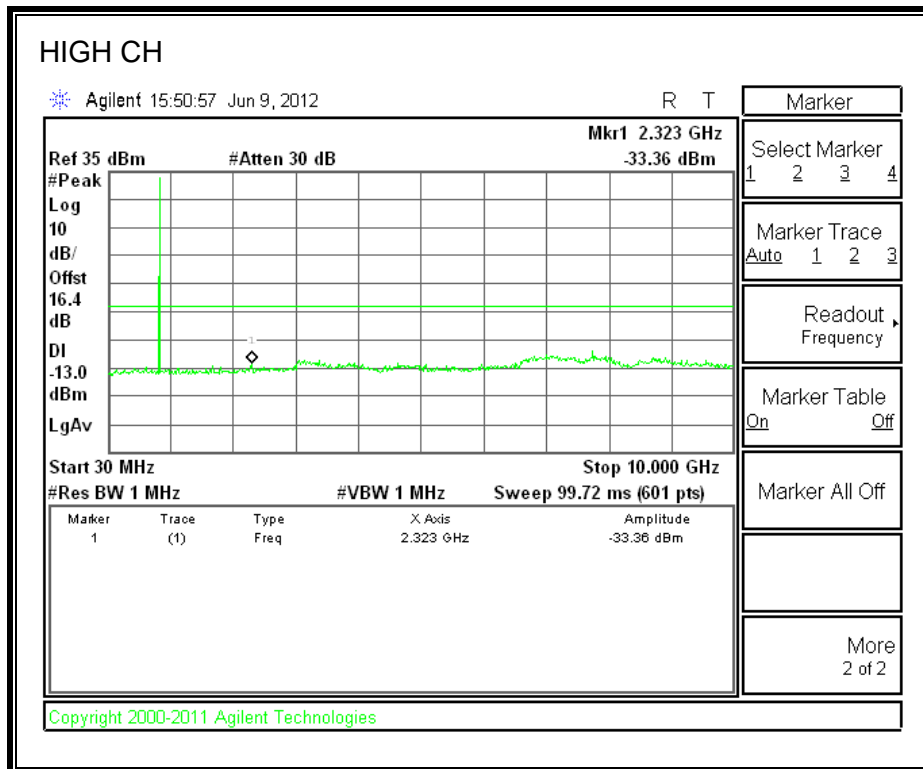
**GSM850 BAND**



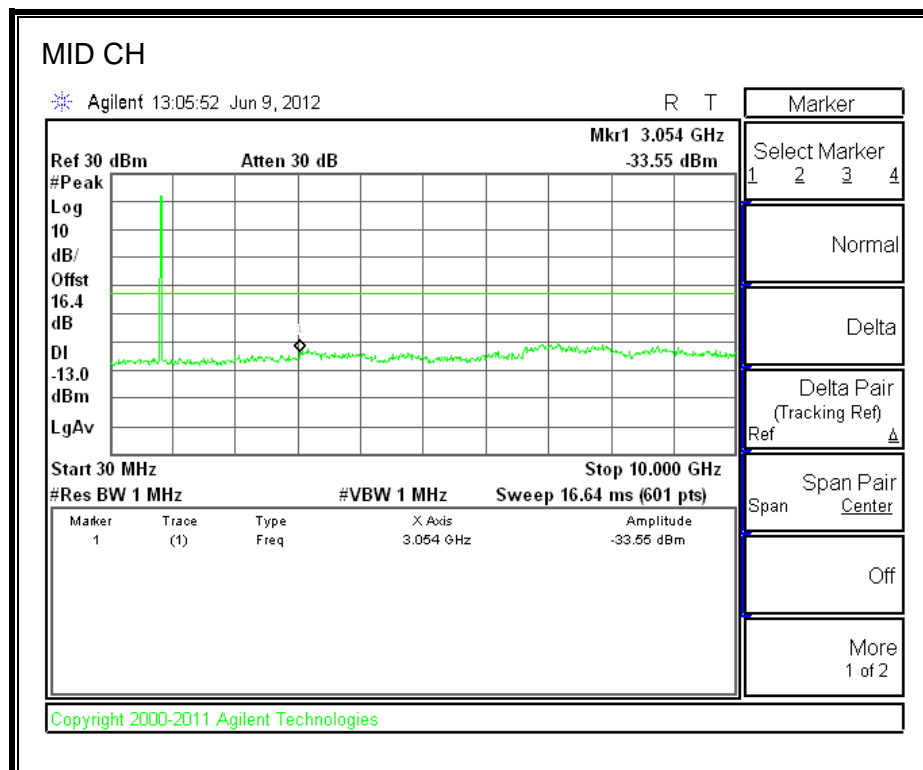
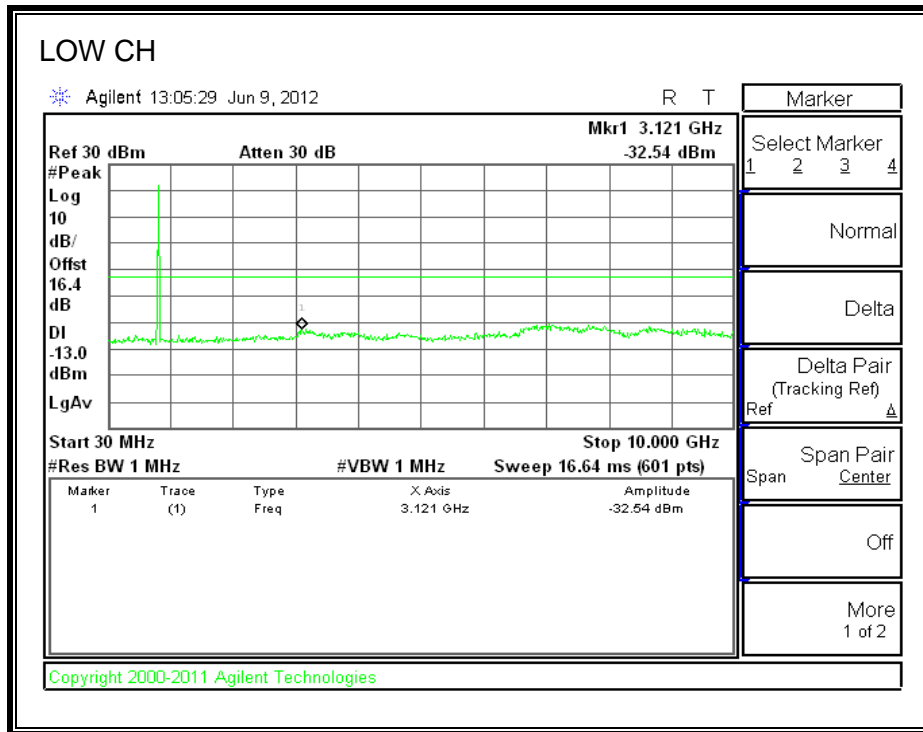


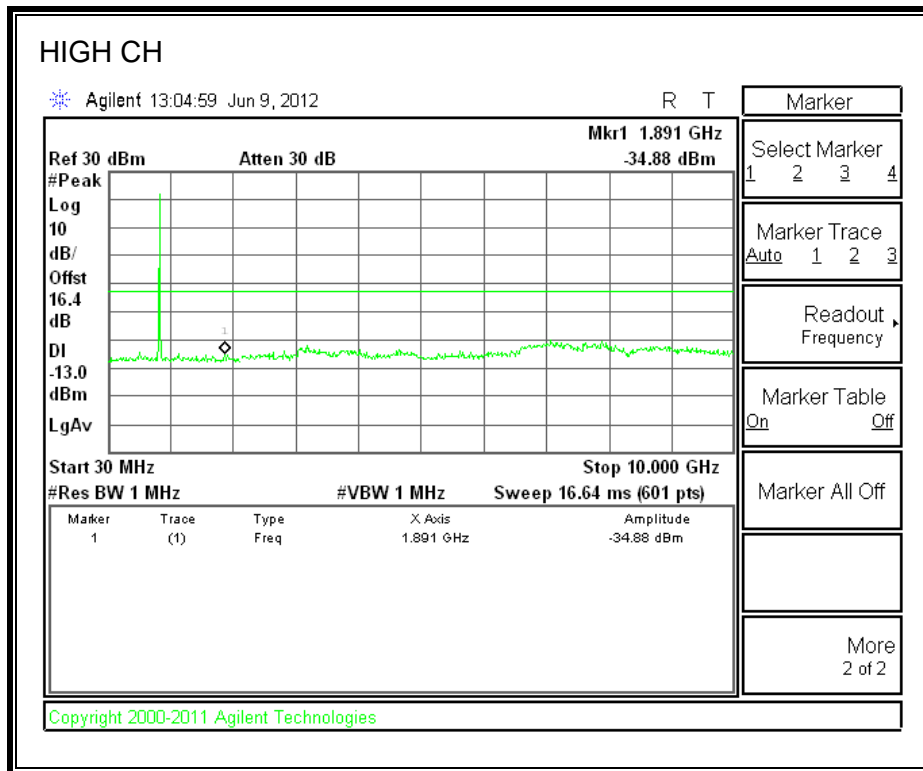
**GPRS850 BAND**



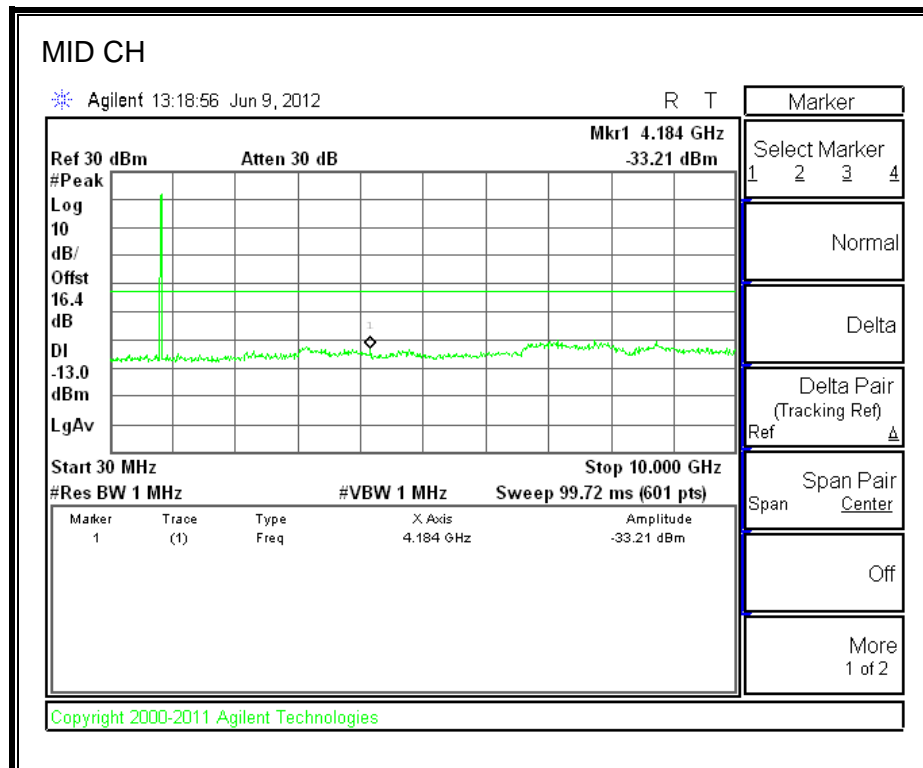
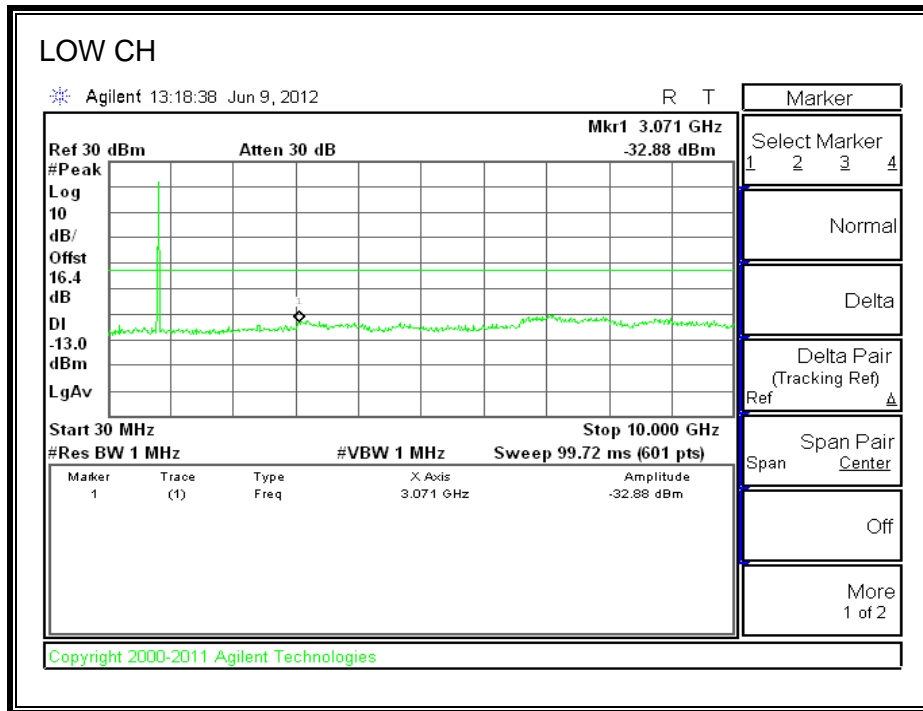


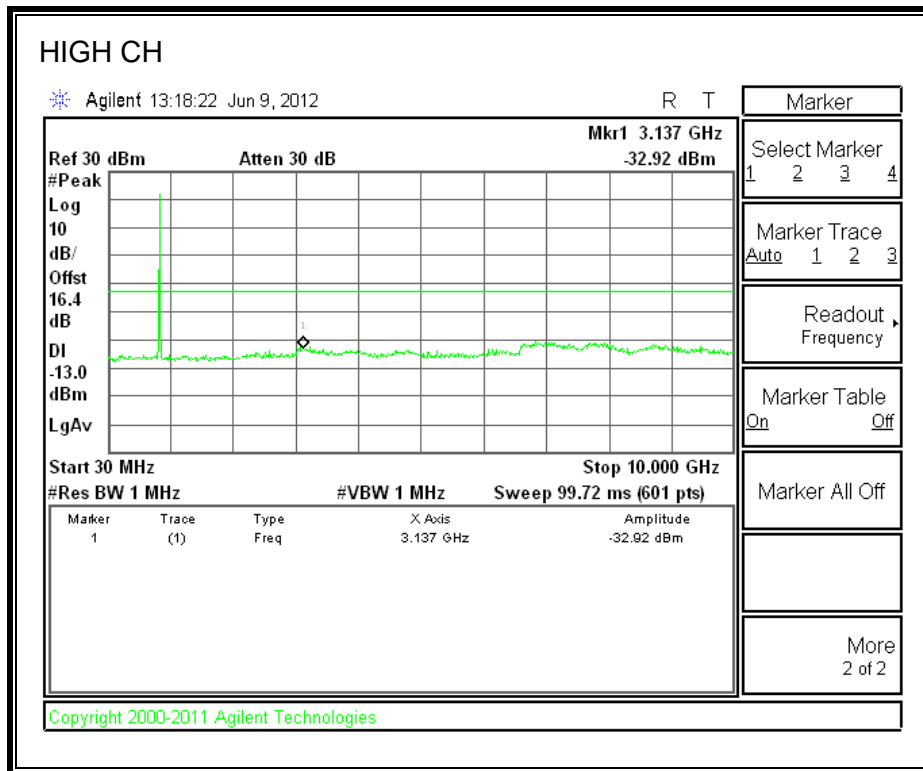
**WCDMA850, REL 99**



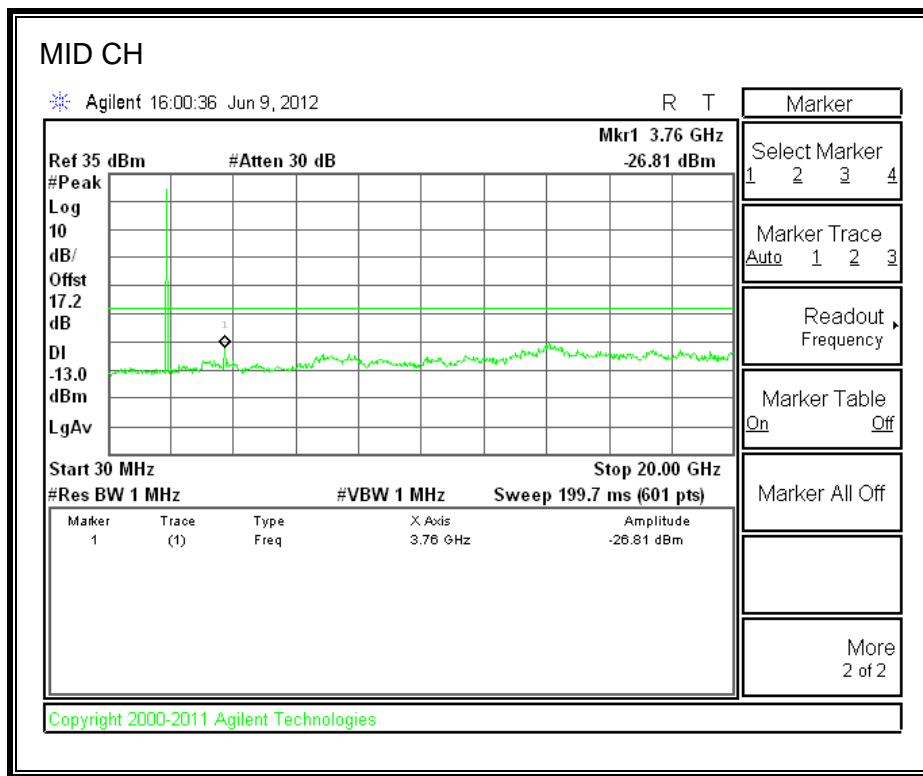
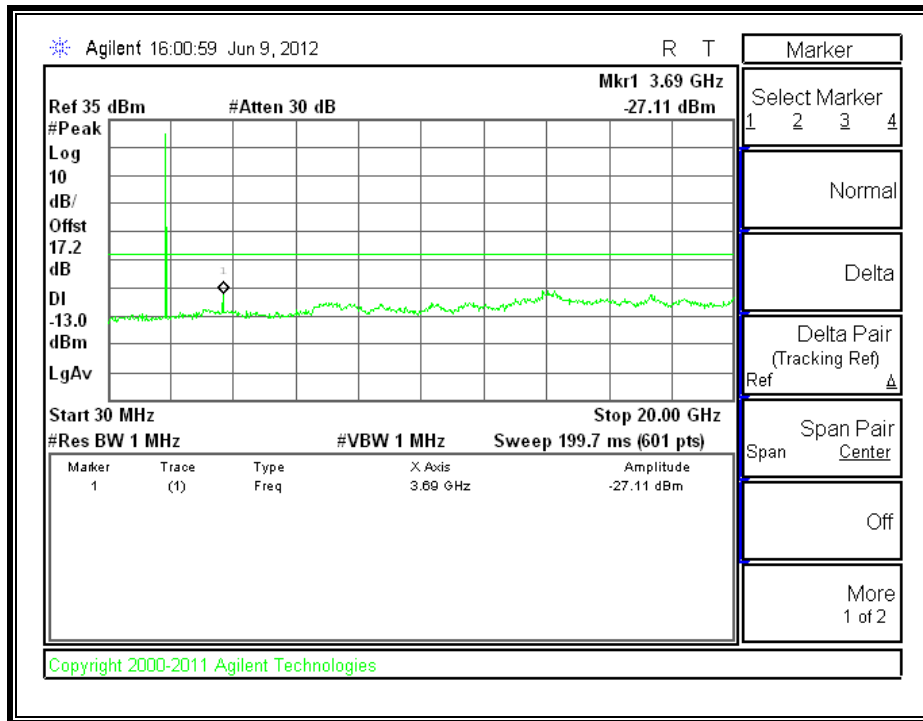


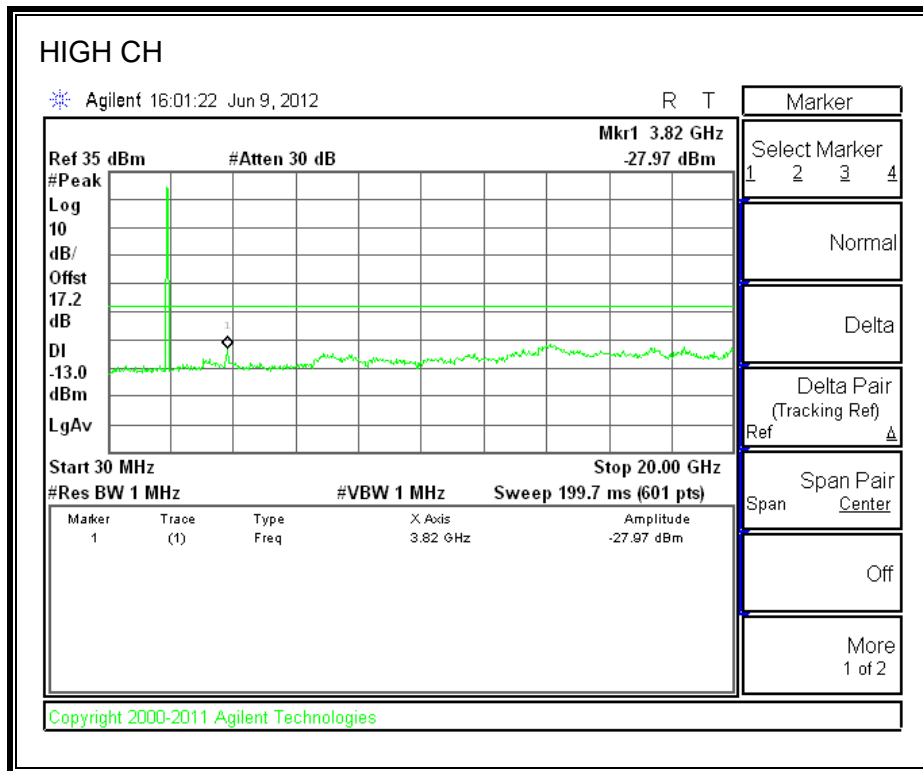
**WCDMA850, HSDPA**



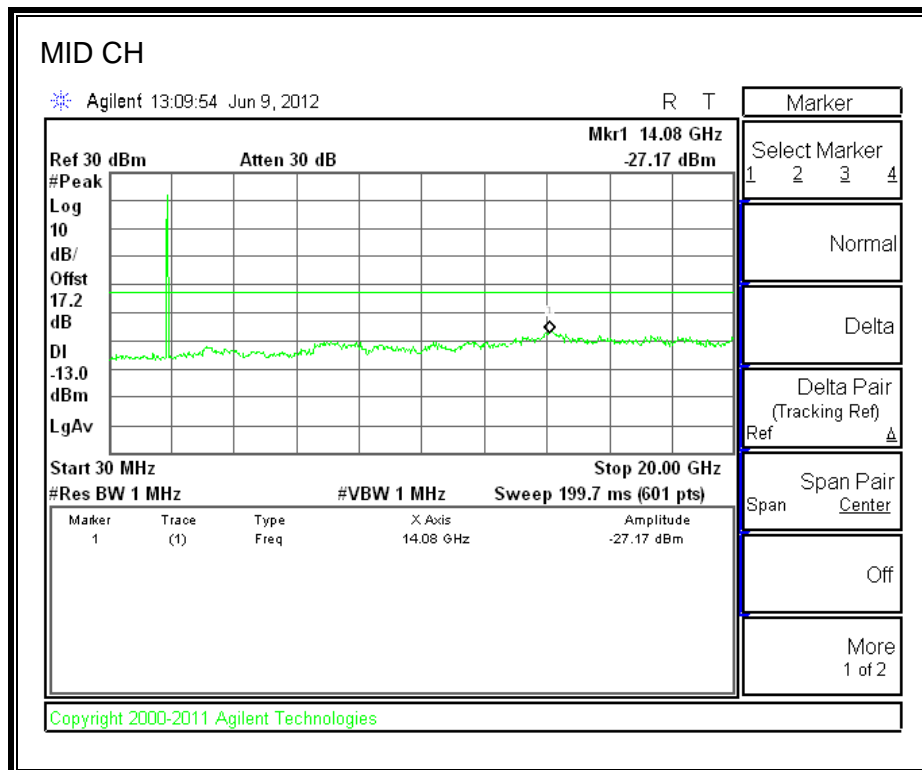
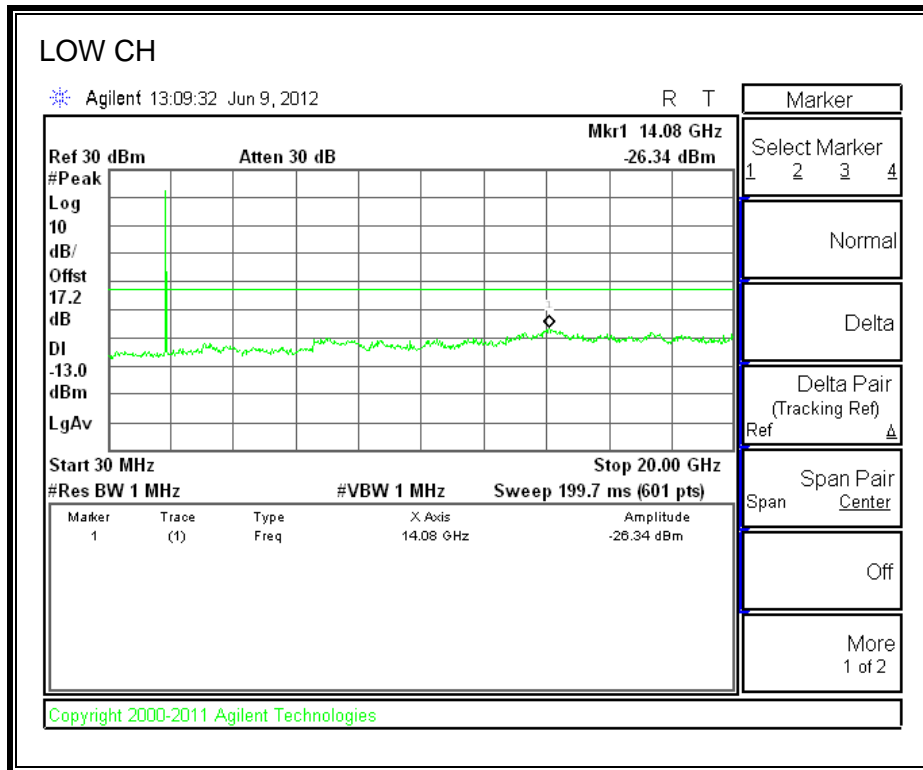


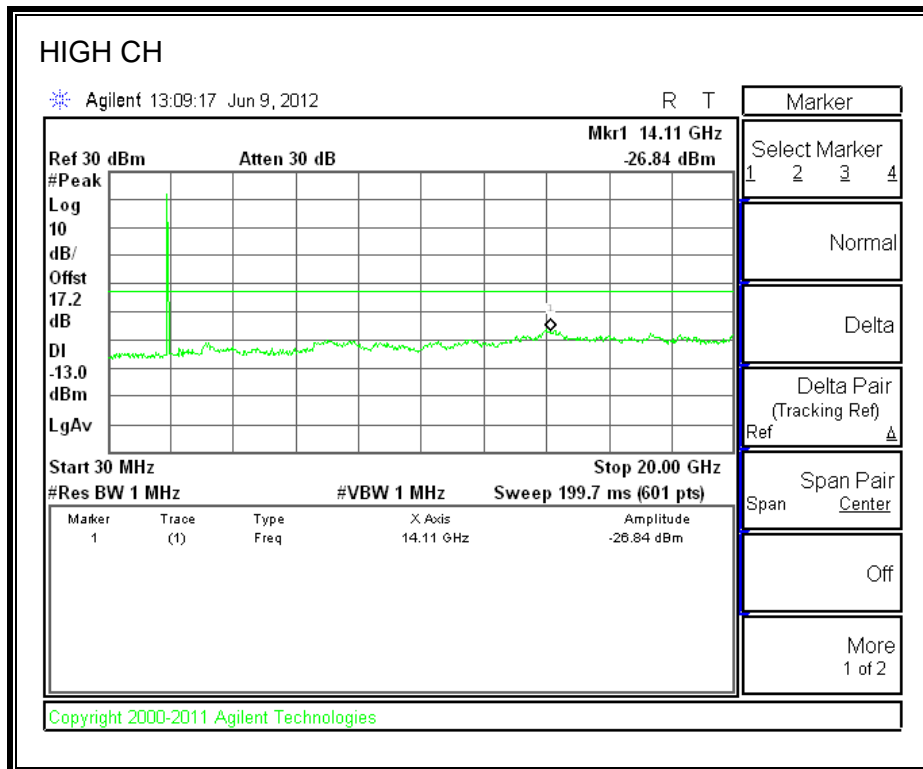
**GPRS1900 BAND**



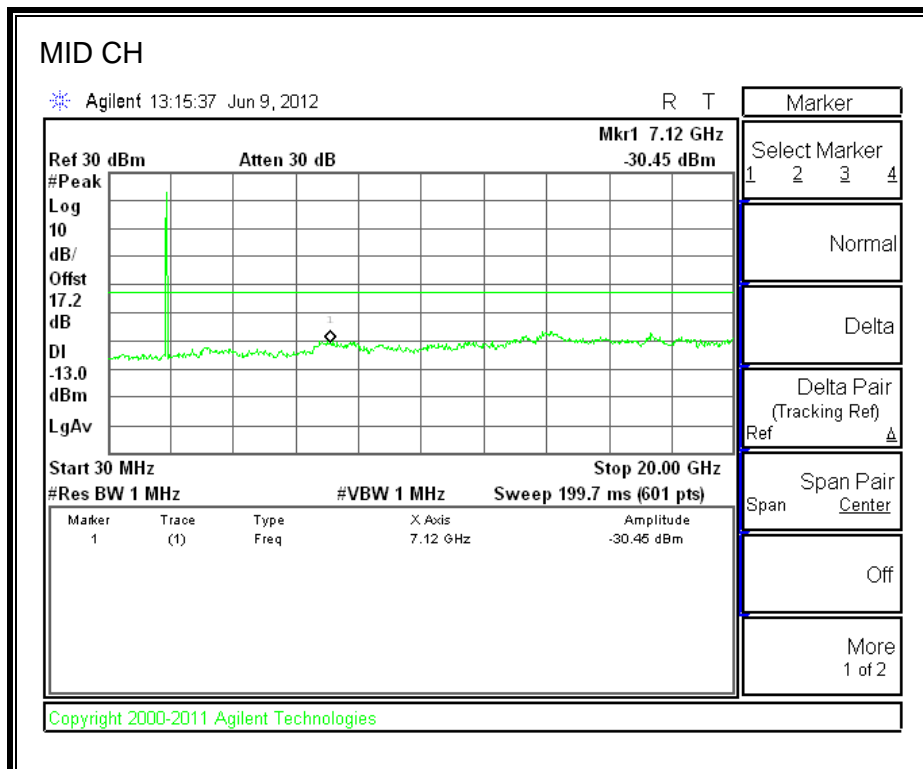
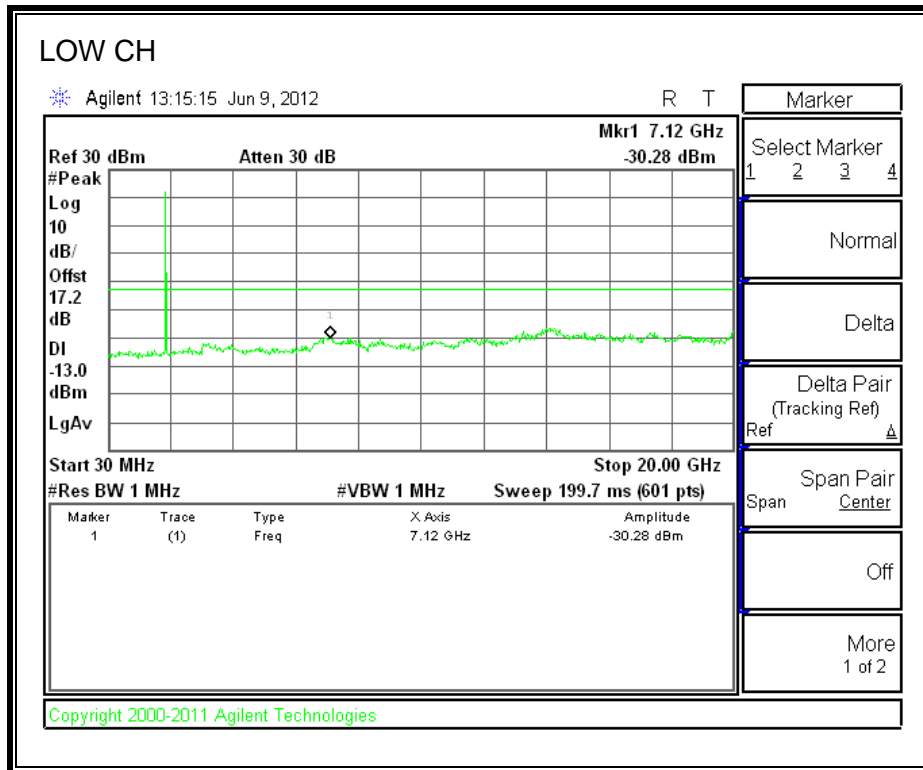


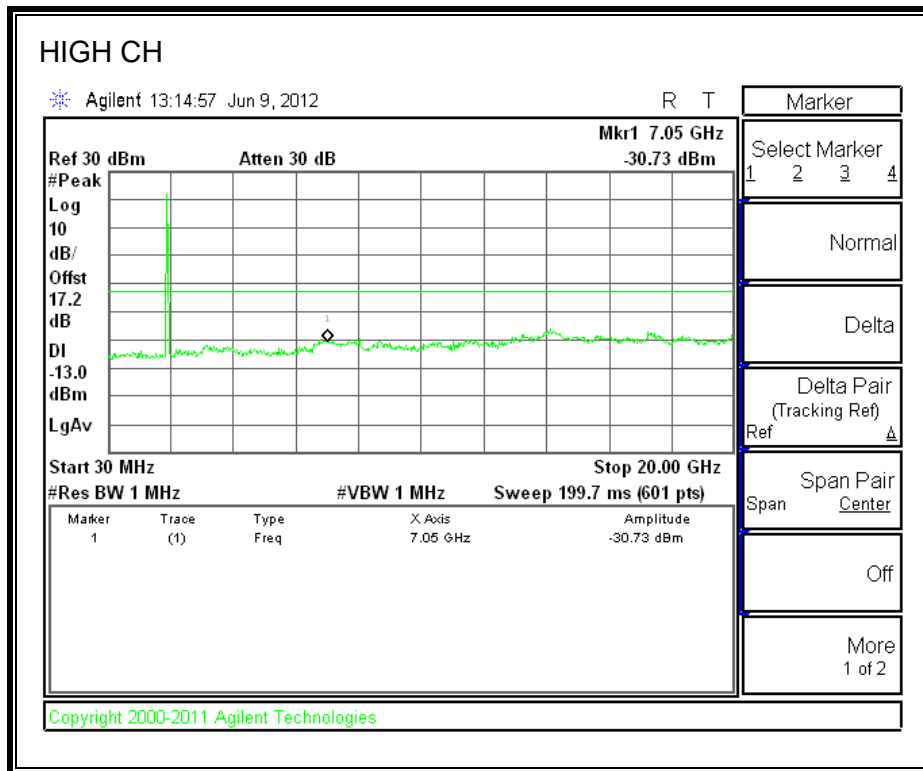
**WCDMA, REL99, 1900 BAND**





**WCDMA, HSDPA, 1900 BAND**





## **8.2. RADIATED TEST RESULTS**

### **8.2.1. RADIATED POWER (ERP & EIRP)**

#### **RULE PART(S)**

FCC: §2.1046, §22.913, §24.232

#### **LIMITS**

22.913(a) - The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

24.232(c) - Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

#### **TEST PROCEDURE**

ANSI / TIA / EIA 603C

#### **MODES TESTED**

- GSM
- GPRS
- UMTS, REL99 and HSDPA

#### **RESULTS**

**CELLULAR BAND (ERP)**

Mode	Channel	f (MHz)	ERP	
			dBm	mW
GSM	128	824.20	27.90	616.60
	192	836.60	27.60	575.44
	251	848.80	28.05	638.26

Mode	Channel	f (MHz)	ERP	
			dBm	mW
GPRS	128	824.20	26.90	489.78
	192	836.60	26.85	484.17
	251	848.80	27.60	575.44

Mode	Channel	f (MHz)	ERP	
			dBm	mW
WCDMA,REL 99	4357	826.40	20.90	123.03
	4405	836.00	21.70	147.91
	4455	846.00	20.80	120.23
WCDMA, HSDPA	4357	826.40	20.95	124.45
	4405	836.00	21.80	151.36
	4455	846.00	20.40	109.65

**PCS BAND (EIRP)**

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
GSM	512	1850.20	29.62	916.22
	661	1880.00	29.01	796.16
	810	1909.80	28.25	668.34

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
GPRS	512	1850.20	30.04	1009.25
	661	1880.00	29.67	926.83
	810	1909.80	28.25	668.34

Mode	Channel	f (MHz)	EIRP	
			dBm	mW
WCDMA,REL 99	9626	1852.40	28.79	756.83
	9800	1880.00	27.45	555.90
	9938	1907.60	27.35	543.25
WCDMA, HSDPA	9662	1852.40	28.47	703.07
	9800	1880.00	27.77	598.41
	9938	1907.60	27.45	555.90

**GSM850 BAND**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
<b>Company:</b>	Samsung							
<b>Project #:</b>	12114431							
<b>Date:</b>	06/11/12							
<b>Test Engineer:</b>	Chin Pang							
<b>Configuration:</b>	EUT and earphone							
<b>Mode:</b>	TX, 850MHz BAND GSM MODE							
<b>Test Equipment:</b>								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	22.10	V	0.5	0.0	21.60	38.5	-16.8	
824.20	28.40	H	0.5	0.0	27.90	38.5	-10.5	
836.60	22.64	V	0.5	0.0	22.14	38.5	-16.3	
836.60	28.10	H	0.5	0.0	27.60	38.5	-10.9	
848.80	21.91	V	0.5	0.0	21.41	38.5	-17.0	
848.80	28.55	H	0.5	0.0	28.05	38.5	-10.4	
Rev. 3.17.11								

**GPRS850 BAND**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
<b>Company:</b>	Samsung							
<b>Project #:</b>	12I14431							
<b>Date:</b>	06/11/12							
<b>Test Engineer:</b>	Chin Pang							
<b>Configuration:</b>	EUT and earphone							
<b>Mode:</b>	TX, 850MHz BAND GPRS MODE							
<b>Test Equipment:</b>								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
824.20	21.90	V	0.5	0.0	21.40	38.5	-17.0	
824.20	27.40	H	0.5	0.0	26.90	38.5	-11.5	
836.60	22.14	V	0.5	0.0	21.64	38.5	-16.8	
836.60	27.35	H	0.5	0.0	26.85	38.5	-11.6	
848.80	21.61	V	0.5	0.0	21.11	38.5	-17.3	
848.80	28.10	H	0.5	0.0	27.60	38.5	-10.8	
Rev. 3.17.11								

**WCDMA850, REL 99**

High Frequency Substitution Measurement Compliance Certification Services Chamber B								
<b>Company:</b>	Samsung							
<b>Project #:</b>	12I14431							
<b>Date:</b>	06/11/12							
<b>Test Engineer:</b>	Chin Pang							
<b>Configuration:</b>	EUT and Earphone							
<b>Mode:</b>	TX, 850MHz BAND WCDMA Rel 99							
<b>Test Equipment:</b>								
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)								
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.								
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes
826.40	13.40	V	0.5	0.0	12.90	38.5	-25.5	
826.40	21.40	H	0.5	0.0	20.90	38.5	-17.5	
836.00	12.64	V	0.5	0.0	12.14	38.5	-26.3	
836.00	22.20	H	0.5	0.0	21.70	38.5	-16.8	
846.00	14.11	V	0.5	0.0	13.61	38.5	-24.8	
846.00	21.30	H	0.5	0.0	20.80	38.5	-17.6	
Rev. 3.17.11								

**WCDMA50, HSDPA**

<b>High Frequency Substitution Measurement Compliance Certification Services Chamber B</b>									
<b>Company:</b>		Samsung							
<b>Project #:</b>		12I14431							
<b>Date:</b>		06/11/12							
<b>Test Engineer:</b>		Chin Pang							
<b>Configuration:</b>		EUT and Earphone							
<b>Mode:</b>		TX, 850MHz BAND WCDMA HSDPA							
<b>Test Equipment:</b>									
Receiving: Sunol T130, and 3m Chamber N-type Cable (Setup this one for testing EUT)									
Substitution: Dipole S/N: 00022117, 6ft SMA Cable (SN # 208947003) Warehouse.									
f MHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBd)	ERP (dBm)	Limit (dBm)	Margin (dB)	Notes	
826.40	13.40	V	0.5	0.0	12.90	38.5	-25.5		
826.40	21.45	H	0.5	0.0	20.95	38.5	-17.5		
836.00	12.84	V	0.5	0.0	12.34	38.5	-26.1		
836.00	22.30	H	0.5	0.0	21.80	38.5	-16.7		
846.00	13.91	V	0.5	0.0	13.41	38.5	-25.0		
846.00	20.90	H	0.5	0.0	20.40	38.5	-18.0		
Rev. 3.17.11									

**GSM1900 BAND**

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
<b>Company:</b>		Samsung						
<b>Project #:</b>		12I14431						
<b>Date:</b>		06/11/12						
<b>Test Engineer:</b>		Chin Pang						
<b>Configuration:</b>		EUT and Earphone						
<b>Mode:</b>		TX, 1900 MHz BAND, GSM						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable (244639001) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.850	21.9	V	0.85	8.62	29.62	33.0	-3.4	
1.850	13.7	H	0.85	8.47	21.32	33.0	-11.7	
1.880	21.4	V	0.85	8.46	29.01	33.0	-4.0	
1.880	14.4	H	0.85	8.36	21.86	33.0	-11.1	
1.910	20.8	V	0.85	8.30	28.25	33.0	-4.8	
1.910	14.5	H	0.85	8.25	21.90	33.0	-11.1	
Rev. 3.17.11								

**GPRS1900 BAND**

High Frequency Fundamental Measurement Compliance Certification Services Chamber B									
<b>Company:</b>		Samsung							
<b>Project #:</b>		12114431							
<b>Date:</b>		06/11/12							
<b>Test Engineer:</b>		Chin Pang							
<b>Configuration:</b>		EUT and Earphone							
<b>Mode:</b>		TX, 1900 MHz BAND, GPRS							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Camber B SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable (244639001) Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
1.850	22.3	V	0.85	8.62	30.04	33.0	-3.0		
1.850	13.6	H	0.85	8.47	21.22	33.0	-11.8		
1.880	22.1	V	0.85	8.46	29.67	33.0	-3.3		
1.880	14.4	H	0.85	8.36	21.86	33.0	-11.1		
1.910	20.8	V	0.85	8.30	28.25	33.0	-4.8		
1.910	14.4	H	0.85	8.25	21.80	33.0	-11.2		
Rev. 3.17.11									

**WCDMA1900, REL 99**

High Frequency Fundamental Measurement Compliance Certification Services Chamber B								
<b>Company:</b>		Samsung						
<b>Project #:</b>		12I14431						
<b>Date:</b>		06/11/12						
<b>Test Engineer:</b>		Chin Pang						
<b>Configuration:</b>		EUT and Earphone						
<b>Mode:</b>		TX, 1900 MHz BAND, WCDMA Rel 99						
<b>Test Equipment:</b>								
Receiving: Horn T59, and Camber B SMA Cables								
Substitution: Horn T217 Substitution, 4ft SMA Cable (244639001) Warehouse								
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
1.852	21.0	V	0.85	8.62	28.79	33.0	-4.2	
1.852	12.1	H	0.85	8.47	19.72	33.0	-13.3	
1.880	19.8	V	0.85	8.46	27.45	33.0	-5.6	
1.880	10.9	H	0.85	8.36	18.36	33.0	-14.6	
1.908	19.9	V	0.85	8.30	27.35	33.0	-5.7	
1.908	11.1	H	0.85	8.25	18.50	33.0	-14.5	
Rev. 3.17.11								

**WCDMA1900, HSDPA**

High Frequency Fundamental Measurement Compliance Certification Services Chamber B									
<b>Company:</b>		Samsung							
<b>Project #:</b>		12I14431							
<b>Date:</b>		06/11/12							
<b>Test Engineer:</b>		Chin Pang							
<b>Configuration:</b>		EUT and Earphone							
<b>Mode:</b>		TX, 1900 MHz BAND, WCDMA HSDPA							
<b>Test Equipment:</b>									
Receiving: Horn T59, and Camber B SMA Cables									
Substitution: Horn T217 Substitution, 4ft SMA Cable (244639001) Warehouse									
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Cable Loss (dB)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes	
1.852	20.7	V	0.85	8.62	28.47	33.0	-4.5		
1.852	12.1	H	0.85	8.47	19.72	33.0	-13.3		
1.880	20.2	V	0.85	8.46	27.77	33.0	-5.2		
1.880	11.1	H	0.85	8.36	18.56	33.0	-14.4		
1.908	20.0	V	0.85	8.30	27.45	33.0	-5.6		
1.908	11.1	H	0.85	8.25	18.50	33.0	-14.5		
Rev. 3.17.11									

## 8.2.2. FIELD STRENGTH OF SPURIOUS RADIATION

### RULE PART(S)

FCC: §2.1053, §22.917, §24.238

### 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.

### TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### MODES TESTED

- GSM
- GPRS
- UMTS, REL 99 and HSDPA

### RESULTS

**GSM850 BAND**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12114431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and earphone  
**Mode:** TX, CELL BAND GSM MODE

**Chamber**  
 5m Chamber A

**Pre-amplifer**  
 T144 8449B

**Filter**  
 Filter 1

**Limit**  
 Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (824.2MHz)</b>									
1.648	-13.2	V	3.0	38.2	1.0	-50.3	-13.0	-37.3	
2.473	-10.3	V	3.0	37.5	1.0	-46.8	-13.0	-33.8	
3.297	-11.0	V	3.0	37.1	1.0	-47.1	-13.0	-34.1	
1.648	-8.5	H	3.0	38.2	1.0	-45.6	-13.0	-32.6	
2.473	-10.0	H	3.0	37.5	1.0	-46.5	-13.0	-33.5	
3.297	-8.1	H	3.0	37.1	1.0	-44.3	-13.0	-31.3	
<b>Mid Ch, (836.6MHz)</b>									
1.673	-7.9	V	3.0	38.1	1.0	-45.0	-13.0	-32.0	
2.510	-6.1	V	3.0	37.5	1.0	-42.6	-13.0	-29.6	
3.346	-8.9	V	3.0	37.1	1.0	-45.0	-13.0	-32.0	
1.673	-8.2	H	3.0	38.1	1.0	-45.3	-13.0	-32.3	
2.510	-5.9	H	3.0	37.5	1.0	-42.3	-13.0	-29.3	
3.346	-6.0	H	3.0	37.1	1.0	-42.1	-13.0	-29.1	
<b>High Ch, (848.8MHz)</b>									
1.698	-4.6	V	3.0	38.1	1.0	-41.7	-13.0	-28.7	
2.546	-2.0	V	3.0	37.5	1.0	-38.5	-13.0	-25.5	
3.395	-11.8	V	3.0	37.1	1.0	-47.8	-13.0	-34.8	
1.698	-8.0	H	3.0	38.1	1.0	-45.1	-13.0	-32.1	
2.546	-3.6	H	3.0	37.5	1.0	-40.1	-13.0	-27.1	
3.395	-9.9	H	3.0	37.1	1.0	-45.9	-13.0	-32.9	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**GPRS850 BAND**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12114431  
**Date:** 06/15/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and Earphone  
**Mode:** TX, CELL BAND GPRS MODE

Chamber  
5m Chamber A

Pre-amplifier  
T144 8449B

Filter  
Filter 1

Limit  
Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (824.2MHz)</b>									
1.648	-7.2	V	3.0	38.2	1.0	-44.3	-13.0	-31.3	
2.473	-9.3	V	3.0	37.5	1.0	-45.8	-13.0	-32.8	
3.297	-9.5	V	3.0	37.1	1.0	-45.6	-13.0	-32.6	
1.648	-0.5	H	3.0	38.2	1.0	-37.6	-13.0	-24.6	
2.473	-5.0	H	3.0	37.5	1.0	-41.5	-13.0	-28.5	
3.297	-5.1	H	3.0	37.1	1.0	-41.3	-13.0	-28.3	
<b>Mid Ch, (836.6MHz)</b>									
1.673	-5.9	V	3.0	38.1	1.0	-43.0	-13.0	-30.0	
2.510	-8.1	V	3.0	37.5	1.0	-44.6	-13.0	-31.6	
3.346	-7.9	V	3.0	37.1	1.0	-44.0	-13.0	-31.0	
1.673	1.8	H	3.0	38.1	1.0	-35.3	-13.0	-22.3	
2.510	-2.9	H	3.0	37.5	1.0	-39.3	-13.0	-26.3	
3.346	-8.0	H	3.0	37.1	1.0	-44.1	-13.0	-31.1	
<b>High Ch, (848.8MHz)</b>									
1.698	1.4	V	3.0	38.1	1.0	-35.7	-13.0	-22.7	
2.546	-3.0	V	3.0	37.5	1.0	-39.5	-13.0	-26.5	
3.395	-10.8	V	3.0	37.1	1.0	-46.8	-13.0	-33.8	
1.698	2.0	H	3.0	38.1	1.0	-35.1	-13.0	-22.1	
2.546	0.4	H	3.0	37.5	1.0	-36.1	-13.0	-23.1	
3.395	-7.9	H	3.0	37.1	1.0	-43.9	-13.0	-30.9	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**WCDMA850, REL99**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12I14431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and Earphone  
**Mode:** TX, WCDMA 850MHz, Rel 99

**Chamber**

5m Chamber A

**Pre-amplifier**

T144 8449B

**Filter**

Filter 1

**Limit**

FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Channel (826.4MHz)</b>									
1.653	-17.1	V	3.0	38.1	1.0	-54.3	-13.0	-41.3	
2.479	-20.3	V	3.0	37.5	1.0	-56.7	-13.0	-43.7	
1.653	-17.4	H	3.0	38.1	1.0	-54.6	-13.0	-41.6	
2.479	-22.0	H	3.0	37.5	1.0	-58.5	-13.0	-45.5	
<b>Mid Channel (836MHz)</b>									
1.672	-14.9	V	3.0	38.1	1.0	-52.0	-13.0	-39.0	
2.508	-18.2	V	3.0	37.5	1.0	-54.6	-13.0	-41.6	
1.672	-17.2	H	3.0	38.1	1.0	-54.3	-13.0	-41.3	
2.508	-21.9	H	3.0	37.5	1.0	-58.3	-13.0	-45.3	
<b>High Channel (846MHz)</b>									
1.692	-17.2	V	3.0	38.1	1.0	-54.3	-13.0	-41.3	
3.384	-17.8	V	3.0	37.1	1.0	-53.9	-13.0	-40.9	
1.692	-15.0	H	3.0	38.1	1.0	-52.1	-13.0	-39.1	
3.384	-15.9	H	3.0	37.1	1.0	-52.0	-13.0	-39.0	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**WCDMA850, HSDPA**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12I14431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and Earphone  
**Mode:** TX, WCDMA 850MHz, HSDPA

Chamber

5m Chamber A

Pre-amplifier

T144 8449B

Filter

Filter 1

Limit

FCC Part 22

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	ERP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Channel (826.4MHz)</b>									
1.653	-13.1	V	3.0	38.1	1.0	-50.3	-13.0	-37.3	
2.479	-18.3	V	3.0	37.5	1.0	-54.7	-13.0	-41.7	
1.653	-15.4	H	3.0	38.1	1.0	-52.6	-13.0	-39.6	
2.479	-20.0	H	3.0	37.5	1.0	-56.5	-13.0	-43.5	
<b>Mid Channel (836MHz)</b>									
1.672	-15.9	V	3.0	38.1	1.0	-53.0	-13.0	-40.0	
2.508	-18.2	V	3.0	37.5	1.0	-54.6	-13.0	-41.6	
1.672	-15.2	H	3.0	38.1	1.0	-52.3	-13.0	-39.3	
2.508	-19.9	H	3.0	37.5	1.0	-56.3	-13.0	-43.3	
<b>High Channel (846MHz)</b>									
1.692	-16.7	V	3.0	38.1	1.0	-53.8	-13.0	-40.8	
3.384	-15.8	V	3.0	37.1	1.0	-51.9	-13.0	-38.9	
1.692	-12.0	H	3.0	38.1	1.0	-49.1	-13.0	-36.1	
3.384	-15.9	H	3.0	37.1	1.0	-52.0	-13.0	-39.0	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**GSM1900 BAND**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12I14431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUTand Earphone  
**Mode:** TX, PCS BAND GSM

Chamber

5m Chamber A

Pre-amplifier

T144 8449B

Filter

Filter 1

Limit

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, (1850.2MHz)</b>									
3.700	-5.1	V	3.0	36.8	1.0	-40.9	-13.0	-27.9	
5.551	-9.7	V	3.0	36.3	1.0	-45.0	-13.0	-32.0	
7.400	3.6	V	3.0	36.6	1.0	-31.9	-13.0	-18.9	
9.251	0.2	V	3.0	37.0	1.0	-35.8	-13.0	-22.8	
3.700	-9.0	H	3.0	36.8	1.0	-44.8	-13.0	-31.8	
5.551	-10.1	H	3.0	36.3	1.0	-45.4	-13.0	-32.4	
7.400	-3.1	H	3.0	36.6	1.0	-38.7	-13.0	-25.7	
9.251	5.2	H	3.0	37.0	1.0	-30.8	-13.0	-17.8	
<b>Mid Ch, (1880.0MHz)</b>									
3.760	-4.9	V	3.0	36.8	1.0	-40.7	-13.0	-27.7	
5.640	-8.6	V	3.0	36.3	1.0	-43.9	-13.0	-30.9	
7.520	2.0	V	3.0	36.6	1.0	-33.6	-13.0	-20.6	
9.400	0.4	V	3.0	37.0	1.0	-35.6	-13.0	-22.6	
3.760	-8.8	H	3.0	36.8	1.0	-44.6	-13.0	-31.6	
5.640	-9.9	H	3.0	36.3	1.0	-45.2	-13.0	-32.2	
7.520	-2.9	H	3.0	36.6	1.0	-38.5	-13.0	-25.5	
9.400	6.4	H	3.0	37.0	1.0	-29.6	-13.0	-16.6	
<b>High Ch, (1909.8MHz)</b>									
3.820	-5.8	V	3.0	36.7	1.0	-41.5	-13.0	-28.5	
5.729	-8.5	V	3.0	36.3	1.0	-43.8	-13.0	-30.8	
7.639	3.1	V	3.0	36.6	1.0	-32.5	-13.0	-19.5	
9.549	2.6	V	3.0	37.1	1.0	-33.5	-13.0	-20.5	
3.820	-7.7	H	3.0	36.7	1.0	-43.4	-13.0	-30.4	
5.729	-9.8	H	3.0	36.3	1.0	-45.1	-13.0	-32.1	
7.639	-0.8	H	3.0	36.6	1.0	-36.4	-13.0	-23.4	
9.549	7.6	H	3.0	37.1	1.0	-28.5	-13.0	-15.5	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**GPRS1900 BAND**

Compliance Certification Services									
Above 1GHz High Frequency Substitution Measurement									
<b>Company:</b>		Samsung							
<b>Project #:</b>		12114431							
<b>Date:</b>		06/15/12							
<b>Test Engineer:</b>		Chin Pang							
<b>Configuration:</b>		EUTand Earphone							
<b>Mode:</b>		TX, PCS BAND GPRS							
<b>Chamber</b>		<b>Pre-amplifier</b>		<b>Filter</b>		<b>Limit</b>			
5m Chamber A		T144 8449B		Filter 1		Part 24			
f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
Low Ch, (1850.2MHz)									
3.700	-5.1	V	3.0	36.8	1.0	-40.9	-13.0	-27.9	
5.551	-5.7	V	3.0	36.3	1.0	-41.0	-13.0	-28.0	
7.400	3.8	V	3.0	36.6	1.0	-31.7	-13.0	-18.7	
9.251	2.2	V	3.0	37.0	1.0	-33.8	-13.0	-20.8	
3.700	-5.0	H	3.0	36.8	1.0	-40.8	-13.0	-27.8	
5.551	-5.1	H	3.0	36.3	1.0	-40.4	-13.0	-27.4	
7.400	2.9	H	3.0	36.6	1.0	-32.7	-13.0	-19.7	
9.251	1.2	H	3.0	37.0	1.0	-34.8	-13.0	-21.8	
Mid Ch, (1880.0MHz)									
3.760	-7.9	V	3.0	36.8	1.0	-43.7	-13.0	-30.7	
5.640	-2.6	V	3.0	36.3	1.0	-37.9	-13.0	-24.9	
7.520	9.0	V	3.0	36.6	1.0	-26.6	-13.0	-13.6	
9.400	4.4	V	3.0	37.0	1.0	-31.6	-13.0	-18.6	
3.760	-8.8	H	3.0	36.8	1.0	-44.6	-13.0	-31.6	
5.640	-1.9	H	3.0	36.3	1.0	-37.2	-13.0	-24.2	
7.520	8.1	H	3.0	36.6	1.0	-27.5	-13.0	-14.5	
9.400	13.4	H	3.0	37.0	1.0	-22.6	-13.0	-9.6	
11.280	-0.2	H	3.0	36.8	1.0	-36.0	-13.0	-23.0	
High Ch, (1909.8MHz)									
3.820	-6.8	V	3.0	36.7	1.0	-42.5	-13.0	-29.5	
5.729	1.5	V	3.0	36.3	1.0	-33.8	-13.0	-20.8	
7.639	8.1	V	3.0	36.6	1.0	-27.5	-13.0	-14.5	
9.549	7.6	V	3.0	37.1	1.0	-28.5	-13.0	-15.5	
3.820	-7.7	H	3.0	36.7	1.0	-43.4	-13.0	-30.4	
5.729	-2.8	H	3.0	36.3	1.0	-38.1	-13.0	-25.1	
7.639	8.2	H	3.0	36.6	1.0	-27.4	-13.0	-14.4	
9.549	13.6	H	3.0	37.1	1.0	-22.5	-13.0	-9.5	
11.459	-1.3	H	3.0	36.8	1.0	-37.0	-13.0	-24.0	
Rev. 03.03.09									
Note: No other emissions were detected above the system noise floor.									

**WCDMA1900, REL 99**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12I14431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and Earphone  
**Mode:** TX, PCS BAND WCDMA, Rel 99

Chamber

5m Chamber A

Pre-amplifer

T144 8449B

Filter

Filter 1

Limit

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 1852.4MHz</b>									
3.704	-7.1	V	3.0	36.8	1.0	-42.9	-13.0	-29.9	
5.557	-12.7	V	3.0	36.3	1.0	-48.0	-13.0	-35.0	
3.704	-10.0	H	3.0	36.8	1.0	-45.8	-13.0	-32.8	
5.557	-12.0	H	3.0	36.3	1.0	-47.3	-13.0	-34.3	
<b>Mid Ch, 1880.0MHz</b>									
3.760	-5.9	V	3.0	36.8	1.0	-41.7	-13.0	-28.7	
5.640	-10.6	V	3.0	36.3	1.0	-45.9	-13.0	-32.9	
3.760	-9.8	H	3.0	36.8	1.0	-45.6	-13.0	-32.6	
5.640	-10.9	H	3.0	36.3	1.0	-46.2	-13.0	-33.2	
<b>High Ch, 1907.6MHz</b>									
3.815	-0.8	V	3.0	36.7	1.0	-36.6	-13.0	-23.6	
5.723	-6.5	V	3.0	36.3	1.0	-41.8	-13.0	-28.8	
3.815	-8.7	H	3.0	36.7	1.0	-44.4	-13.0	-31.4	
5.723	-8.8	H	3.0	36.3	1.0	-44.1	-13.0	-31.1	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

**WCDMA1900, HSDPA**

**Compliance Certification Services**  
**Above 1GHz High Frequency Substitution Measurement**

**Company:** Samsung  
**Project #:** 12114431  
**Date:** 06/18/12  
**Test Engineer:** Chin Pang  
**Configuration:** EUT and Earphone  
**Mode:** TX, PCS BAND WCDMA, HSDPA

Chamber

5m Chamber A

Pre-amplifier

T144 8449B

Filter

Filter 1

Limit

Part 24

f GHz	SG reading (dBm)	Ant. Pol. (H/V)	Distance (m)	Preamp (dB)	Filter (dB)	EIRP (dBm)	Limit (dBm)	Delta (dB)	Notes
<b>Low Ch, 1852.4MHz</b>									
3.704	-7.6	V	3.0	36.8	1.0	-43.4	-13.0	-30.4	
5.557	-12.7	V	3.0	36.3	1.0	-48.0	-13.0	-35.0	
3.704	-10.0	H	3.0	36.8	1.0	-45.8	-13.0	-32.8	
5.557	-12.3	H	3.0	36.3	1.0	-47.6	-13.0	-34.6	
<b>Mid Ch, 1880.0MHz</b>									
3.760	4.9	V	3.0	36.8	1.0	-40.7	-13.0	-27.7	
5.640	-11.6	V	3.0	36.3	1.0	-46.9	-13.0	-33.9	
3.760	-9.3	H	3.0	36.8	1.0	-45.1	-13.0	-32.1	
5.640	-9.9	H	3.0	36.3	1.0	-45.2	-13.0	-32.2	
<b>High Ch, 1907.6MHz</b>									
3.815	-1.8	V	3.0	36.7	1.0	-37.6	-13.0	-24.6	
5.723	-7.5	V	3.0	36.3	1.0	-42.8	-13.0	-29.8	
3.815	-8.7	H	3.0	36.7	1.0	-44.4	-13.0	-31.4	
5.723	-5.8	H	3.0	36.3	1.0	-41.1	-13.0	-28.1	

Rev. 03.03.09  
 Note: No other emissions were detected above the system noise floor.

### **8.3. FREQUENCY STABILITY**

#### **RULE PART(S)**

FCC: §2.1055, §22.355, §24.235

#### **LIMITS**

§22.355 - The carrier frequency shall not depart from the reference frequency in excess of  $\pm 2.5$  ppm for mobile stations.

§24.235 - The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### **TEST PROCEDURE**

##### **Frequency Stability vs Temperature:**

The EUT is placed inside a temperature chamber. The temperature is set to 20°C and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50°C is reached. Reference power supply voltage for these tests is 3.7 Vdc.

##### **Frequency Stability vs Voltage:**

The peak frequency error is recorded (worst-case). The test voltage ranges from 3.50 to 4.26VDC.

#### **MODES TESTED**

- GPRS
- UMTS

#### **RESULTS**

See the following pages.

**CELL, GSM MODULATION – MID CHANNEL**

Reference Frequency: Cellular Mid Channel 836.599978MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	836.600025	-0.056	2.5
3.70	40	836.600022	-0.053	2.5
3.70	30	836.600021	-0.051	2.5
<b>3.70</b>	<b>20</b>	<b>836.599978</b>	<b>0</b>	<b>2.5</b>
3.70	10	836.600037	-0.071	2.5
3.70	0	836.600040	-0.074	2.5
3.70	-10	836.600058	-0.096	2.5
3.70	-20	836.600038	-0.072	2.5
3.70	-30	836.600040	-0.074	2.5
Reference Frequency: Cellular Mid Channel 836.599978MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2091.500 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.70</b>	<b>20</b>	<b>836.599978</b>	<b>0</b>	<b>2.5</b>
4.26	20	836.599974	0.005	2.5
3.50	20	836.599982	-0.005	2.5
End Voltage(3.4V)	20	836.599982	-0.005	2.5

**PCS, GSM MODULATION – MID CHANNEL**

Reference Frequency: PCS Mid Channel 1880.000025MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1880.000026	-0.001	2.5
3.70	40	1880.000024	0.001	2.5
3.70	30	1880.000026	-0.001	2.5
<b>3.70</b>	<b>20</b>	<b>1880.000025</b>	<b>0</b>	<b>2.5</b>
3.70	10	1880.000380	-0.189	2.5
3.70	0	1880.000044	-0.010	2.5
3.70	-10	1880.000045	-0.011	2.5
3.70	-20	1880.000044	-0.010	2.5
3.70	-30	1880.000038	-0.007	2.5

Reference Frequency: PCS Mid Channel 1880.000025MHz @ 20°C				
Limit: within the authorized block or +/- 2.5 ppm = 4700.000 Hz				
Power Supply (Vdc)	Environment Temperature (°C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.70</b>	<b>20</b>	<b>1880.000025</b>	<b>0</b>	<b>2.5</b>
4.26	20	1880.000026	-0.001	2.5
3.50	20	1880.000018	0.004	2.5
End Voltage( 3.4)	20	1880.000020	0.003	2.5

**CELL WCDMA – MID CHANNEL**

Reference Frequency: Cellular Mid Channel 835.999974MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2090.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	836.000340	-0.438	2.5
3.70	40	836.000018	-0.053	2.5
3.70	30	836.000016	-0.050	2.5
<b>3.70</b>	<b>20</b>	<b>835.999974</b>	<b>0</b>	2.5
3.70	10	835.999982	-0.010	2.5
3.70	0	836.000023	-0.059	2.5
3.70	-10	836.000020	-0.055	2.5
3.70	-20	835.999984	-0.012	2.5
3.70	-30	835.999975	-0.001	2.5

Reference Frequency: Cellular Mid Channel 835.999974MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 2090.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.70</b>	<b>20</b>	<b>835.999974</b>	<b>0</b>	<b>2.5</b>
4.26	20	835.999990	-0.019	2.5
3.50	20	835.999985	-0.013	2.5
3.4V (End Point)	20	835.999978	-0.005	2.5

**PCS, WCDMA – MID CHANNEL**

Reference Frequency: Cellular Mid Channel 1879.999973MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
3.70	50	1879.999979	-0.003	2.5
3.70	40	1879.999982	-0.005	2.5
3.70	30	1879.999986	-0.007	2.5
<b>3.70</b>	<b>20</b>	<b>1879.999973</b>	<b>0</b>	2.5
3.70	10	1879.999985	-0.006	2.5
3.70	0	1880.000052	-0.042	2.5
3.70	-10	1880.000017	-0.023	2.5
3.70	-20	1880.000019	-0.024	2.5
3.70	-30	1880.000018	-0.024	2.5

Reference Frequency: Cellular Mid Channel 1879.999973MHz @ 20°C				
Limit: to stay +/- 2.5 ppm = 4700.000 Hz				
DC Power Supply (Vdc)	Environment Temperature (*C)	Frequency Deviation Measured with Time Elapse		
		(MHz)	Delta (ppm)	Limit (ppm)
<b>3.70</b>	<b>20</b>	<b>1879.999973</b>	<b>0</b>	<b>2.5</b>
4.26	20	1879.999977	-0.002	2.5
3.50	20	1879.999974	-0.001	2.5
3.4V (End Point)	20	1879.999970	0.002	2.5