

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

### INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 22 SUBPART H, PART 24 SUBPART E REQUIREMENT

OF

<b>Product Name:</b>	<b>E-Pos mini</b>
<b>Brand Name:</b>	<b>e-taxfree</b>
<b>Model No.:</b>	<b>TF1</b>
<b>Model Difference:</b>	<b>N/A</b>
<b>FCC ID:</b>	<b>2AF3A-TF1</b>
<b>Report No.:</b>	<b>ER/2015/90086</b>
<b>Issue Date:</b>	<b>Oct. 08, 2015</b>
<b>FCC Rule Part:</b>	<b>2 , 22H &amp; 24E</b>
<b>Prepared for:</b>	<b>e-Taxfree Nordic Oy</b> <b>Tammasaarenlaituri 3, 00180 Helsinki,</b> <b>Finland</b>
<b>Prepared by:</b>	<b>SGS Taiwan Ltd.</b> <b>Electronics &amp; Communication Laboratory</b> <b>No.134, Wu Kung Road, New Taipei Industrial Park,</b> <b>Wuku District, New Taipei City, Taiwan 24803</b>

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## VERIFICATION OF COMPLIANCE

**Applicant:** e-Taxfree Nordic Oy  
Tammasaarenlaituri 3, 00180 Helsinki, Finland

**Product Name:** E-Pos mini

**Brand Name:** e-taxfree

**Model No.:** TF1

**Model Difference:** N/A

**FCC ID:** 2AF3A-TF1

**File Number:** ER/2015/90086

**Date of test:** Sep. 21, 2015 ~ Oct. 08, 2015

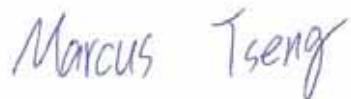
**Date of EUT Received:** Sep. 21, 2015

### We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C-2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

**Test By:**



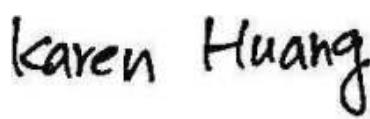
**Date:**

Oct. 08, 2015

*Marcus Tseng / Engineer*

**Prepared**

**By:**



**Date:**

Oct. 08, 2015

*Karen Huang / Clerk*

**Approved**

**By:**



**Date:**

Oct. 08, 2015

*Jim Chang / Asst. Manager*

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## Revision History

Report Number	Revision	Description	Issue Date
ER/2015/90086	Rev.00	Initial creation of document	Oct. 08, 2015

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## 1. GENERAL PRODUCT INFORMATION

### 1.1. Product Description

General:

Product Name:	E-Pos mini	
Brand Name:	e-taxfree	
Model No.:	TF1	
Model Difference:	N/A	
Product SW/HW version:	4.4 / 4.0	
Radio SW/HW version:	N/A	
Test SW Version:	N/A	
RF power setting in TEST SW:	N/A	
Power Supply:	5V from AC/DC Adapter	
	Adapter:	Model No.: FSP015-DPAN2, Supplier: FSP GROUP INC.
IMEI:	354300070000019	

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## GSM / WCDMA:

Cellular Phone Standards Frequency Range and Power	Operating Frequency		Rated Power
	GPRS 850, Class 12	824.2 MHz– 848.8 MHz	33dBm
	EDGE 850, Class 12	824.2 MHz– 848.8 MHz	27dBm
	GPRS 1900, Class 12	1850.2MHz – 1909.8MHz	30dBm
	EDGE 1900, Class 12	1850.2MHz – 1909.8MHz	26dBm
	WCDMA/HSUPA/HSDPA /HSPA+ Band V	826.4MHz - 846.6MHz	24dBm

Type of Emission:	GPRS 850	247KGXW
	EDGE 850	250KG7W
	GPRS 1900	252KGXW
	EDGE 1900	247KG7W
	WCDMA Band V Type of Emission:	4M15F9W
	HSDPA Band V	4M17F9W
	HSUPA Band V	4M17F9W

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**Max ERP/EIRP Power Measurement Result:**

	dBm		W
GPRS 850 Band	19.07	ERP	0.081
EDGE 850 Band	18.77	ERP	0.075
GPRS 1900 Band	24.85	EIRP	0.305
EDGE 1900 Band	22.98	EIRP	0.199
WCDMA Band V	16.42	ERP	0.044
HSDPA Band V	16.94	ERP	0.049
HSUPA Band V	17.59	ERP	0.057

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## 1.2. Product Feature of Equipment Under Test

The equipment under Test (Hereafter Called: EUT) is E-Pos mini supporting, GPRS / WCDMA, Wi-Fi 802.11abgn, Bluetooth features, and below is details of information.

Product Feature	
Product Name:	E-Pos mini
Brand Name:	e-taxfree
Model No.:	TF1
Model Difference:	N/A
FCC ID	2AF3A-TF1
GPRS / EGPRS Multi Slot Class	Class 12
WCDMA Operating Band(s)	FDD Band V
WCDMA Rel. Version	Release 8
Wi-Fi Specification	802.11a/b/g/n
Bluetooth Version	V4.0 Single mode

Note: The above EUT information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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### 1.3. Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22, 24

ANSI / TIA / EIA 603C-C-2004

KDB971168 D01 Power Meas license Digital System v02r01

KDB941225 of the Output power Procedure of (SAR Measurement Procedures for 3G Devices, WCDMA / HSPA) was used for EUT and Base station setting.

TS 151 010-1 is used to set, and measure the output power.

Note:

1. All test items have been performed and record as per the above standards.
2. The composite system is compliance with FCC Subpart B is authorized under the certification procedure.

### 1.4. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan. (TAF code 0513)

FCC Registration Numbers are: 990257

Canada Registration Number: 4620A-4

### 1.5. Special Accessories

No special accessories were used during testing.

### 1.6. Equipment Modifications

There were no modifications incorporated into the EUT.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 Conducted Measurement at Antenna Port

According to measurement procured TIA/EIA 603C, the EUT is placed on a turn table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

#### 2.3.2 Radiated Emissions (ERP/EIRP)

According to measurement procured TIA/EIA 603C, The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

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## 2.4. Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

### Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation example with cable loss 0.8 dB for low band and 1 dB for high band with 10 dB attenuator and 3.2 splitter.

Low Band: Offset = RF cable loss (dB)+ attenuation factor(dB) =0.8+10+3.2=14.2(dB)

High Band: Offset = RF cable loss (dB)+ attenuation factor(dB) =1+10+3.2=14(dB)

## 2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
GPRS 850	5 Vdc	220
GPRS 1900	5 Vdc	177
EDGE 850	5 Vdc	158
EDGE 1900	5 Vdc	136
WCDMA B5	5 Vdc	350
HSUPA B5	5 Vdc	394
HSDPA B5	5 Vdc	411

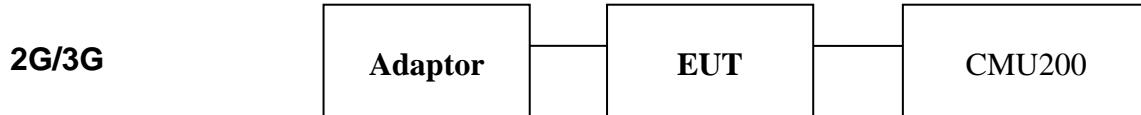
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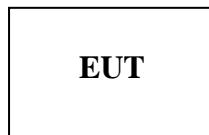
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## 2.6. Configuration of Tested System

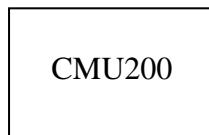
**Fig. 2-1 Configuration of Tested System (Conducted)**



**Fig. 2-2 Configuration of Tested System (Radiated)**



**Remote Side**



**Table 2-1 Equipment Used in**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Universal Radio Communication Tester	R&S	CMU200	102189	shielded	Un-shielded

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### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§2.1046(a) §22.913(a)(2) §24.232(c)	ERP/ EIRP measurement	Compliant
§2.1049(h)	Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a)	Out of Band Emissions at Antenna Terminals and Band Edge	Compliant
§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation	Compliant
§24.232(d)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235	Frequency Stability	Compliant

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## 4. DESCRIPTION OF TEST MODES

### 4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

BAND	ERP/EIRP	RADIATED EMISSION
GPRS/EDGE 850	E2-plan	E2-plan
GPRS/EDGE 1900	E2-plan	E2-plan
WCDMA/HSPA Band V	E2-plan	E2-plan

#### GPRS/EDGE MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	128 to 251	128, 190, 251	GPRS/EDGE 850
EIRP	512 to 810	512, 661, 810	GPRS/EDGE 1900
FREQUENCY STABILITY	128 to 251 512 to 810	190 661	GPRS 850 GPRS 1900
OCCUPIED BANDWIDTH	128 to 251 512 to 810	190 661	GPRS/EDGE 850 GPRS/EDGE 1900
PEAK TO AVERAGE RATIO	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GPRS/EDGE 850 GPRS/EDGE 1900
BAND EDGE	128 to 251 512 to 810	128, 251 512, 810	EDGE 850 EDGE 1900
CONDUCETED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	EDGE 850 EDGE 1900
RADIATED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GPRS 850 GPRS 1900

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## WCDMA/HSPA MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
FREQUENCY STABILITY	4132 to 4233	4183	WCDMA Band V
OCCUPIED BANDWIDTH	4132 to 4233	4183	WCDMA/HSPA Band V
PEAK TO AVERAGE RATIO	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
BAND EDGE	4132 to 4233	4132, 4233	WCDMA Band V
CONDUCETED EMISSION	4132 to 4233	4132, 4183, 4233	WCDMA Band V
RADIATED EMISSION	4132 to 4233	4132, 4183, 4233	HSDPA Band V

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## 5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP/ EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.70 dB
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC=+/- 0.2%

### Radiated Spurious Emission:

Measurement uncertainty (Polarization : <b>Vertical</b> )	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : <b>Horizontal</b> )	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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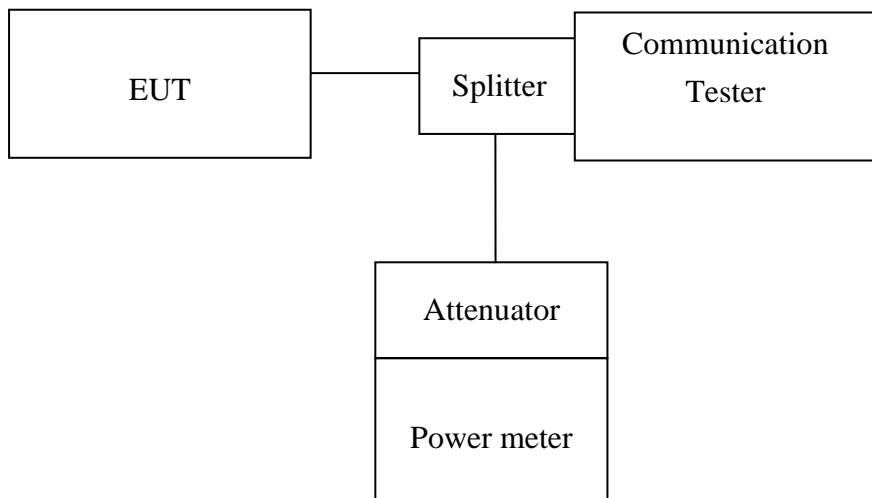
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## 6. RF CONDUCTED OUTPUT POWER MEASUREMENT

### 6.1. Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

### 6.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

### 6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCDMA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results

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## 6.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/20/2014	12/19/2015
Power Sensor	Anritsu	MA2411B	917032	12/20/2014	12/19/2015
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
Temperature Chamber	TERCHY	MHG-120LF	911009	05/06/2015	05/05/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016
DC Power Supply	Agilent	E3640A	MY52410006	11/10/2014	11/09/2015

## 6.5. Measurement Result

Refer to next pages.

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## RF Conducted Output Power

## GPRS/EDGE (GMSK; 8-PSK) Result:

EUT Mode	Frequency (MHz)	CH	Peak Power (4DN 1UP) Class 8 (dBm)	Average Burst Power (4DN 1UP) Class 8 (dBm)	Peak Power (4DN 2UP) Class 10 (dBm)	Average Burst Power (4DN 2UP) Class 10 (dBm)	Peak Power (4DN 3UP) Class 12 (dBm)	Average Burst Power (4DN 3UP) Class 12 (dBm)	Peak Power (4DN 4UP) Class 12 (dBm)	Average Burst Power (4DN 4UP) Class 12 (dBm)
GPRS 850	824.2	128	<b>32.50</b>	32.40	31.80	31.70	30.00	29.90	28.70	28.50
	836.6	190	32.20	32.10	31.50	31.40	29.70	29.60	28.40	28.20
	848.8	251	32.50	32.40	31.80	31.70	30.00	29.90	28.70	28.50
GPRS 1900	1850.2	512	<b>30.30</b>	30.20	29.30	29.20	27.40	27.30	26.40	26.30
	1880.0	661	30.10	30.00	29.20	29.10	27.30	27.10	26.30	26.10
	1909.8	810	30.30	30.20	29.40	29.30	27.50	27.30	26.50	26.40
EDGE 850	824.2	128	<b>32.80</b>	29.80	31.60	28.40	31.50	28.30	31.20	28.20
	836.6	190	32.50	29.60	31.50	28.30	31.20	28.20	31.00	28.10
	848.8	251	32.60	29.30	31.30	28.00	31.10	27.90	30.80	27.80
EDGE 1900	1850.2	512	<b>28.80</b>	25.80	27.70	24.40	25.80	22.10	24.30	20.70
	1880.0	661	28.70	25.60	27.60	24.30	25.30	21.90	23.80	20.50
	1909.8	810	28.30	25.30	27.20	23.90	24.70	21.40	23.40	20.10

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**WCDMA MODE:**

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 V8.4.0 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7). RMC 12.2kps is used for this testing.

**Results:**

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
WCDMA Band V	826.4	4132	<b>26.97</b>	23.12
	836.6	4183	26.74	23.13
	846.6	4233	26.83	23.06
HSDPA Band V	826.4	4132	26.18	21.99
	836.6	4183	26.01	21.97
	846.6	4233	<b>26.65</b>	22.08
HSUPA Band V	826.4	4132	26.55	21.96
	836.6	4183	26.00	21.94
	846.6	4233	<b>26.60</b>	22.04

Note: The results above reflect max power with all up bits.

Cable loss offset Low Band: 14dB

Cable loss offset High Band: 14.2dB

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## HSDPA Release 6 MODE:

The following 4 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C10.1.4 & C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing.

## HSDPA SUB-TEST Setting

Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH(FOR HSDPA)

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)	RMC (Kbps)
1	2/15	15/15	64	2/15	4/15	0.0	0.0	12.2
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0	12.2
3	15/15	8/15	64	15/8	30/15	1.5	0.5	12.2
4	15/15	4/15	64	15/4	30/15	1.5	0.5	12.2

**Note: The recommended HSDPA MPRs are implemented as per following sub-tests.**

## Results:

Mode	Sub-test	Avg. Power (dBm) Channel			Power Class 3 Lim- itation (dBm)	Comments
		4132	4183	4233		
HSDPA (B5)	1	23.34	23.38	23.25	20.3dBm – 25.7dBm	Pass
	2	23.05	23.02	22.93	20.3dBm – 25.7dBm	Pass
	3	22.88	22.9	22.76	19.8dBm – 25.7dBm	Pass
	4	22.93	22.94	22.82	19.8dBm – 25.7dBm	Pass

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## HSPA (HSDPA & HSUPA) Release 6 MODE

The following 5 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 V8.4.0 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C11.1.3 in the 3GPP TS34.121-1 V8.4.0. RMC 12.2kps is used for this testing

### HSPA SUB-TEST Setting

Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH(FOR HSUPA)

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Code s)	CM (dB)	MPR (dB)	AG Index	E-TFCI	RMC (Kbps )
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75	12.2
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67	12.2
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	4 4	2	2.0	1.0	15	92	12.2
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71	12.2
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81	12.2

**Note: The recommended HSUPA MPRs are implemented as per following sub-tests.**

### Results:

Mode	Sub-test	Avg. Power (dBm) Channel			Power Class 3 Limitation (dBm)	Comments
HSUPA(B5)		4132			4183	
	1	23.07			22.97	
	2	21.14			18.8dBm – 25.7dBm	
	3	22.05			21.01	
	4	21.19			16.8dBm – 25.7dBm	
	5	22.94			22.89	

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## 7. EFFECTIVE RADIATED POWER AND EQUIVALENT ISOTROPIC RADIATED POWER MEASUREMENT

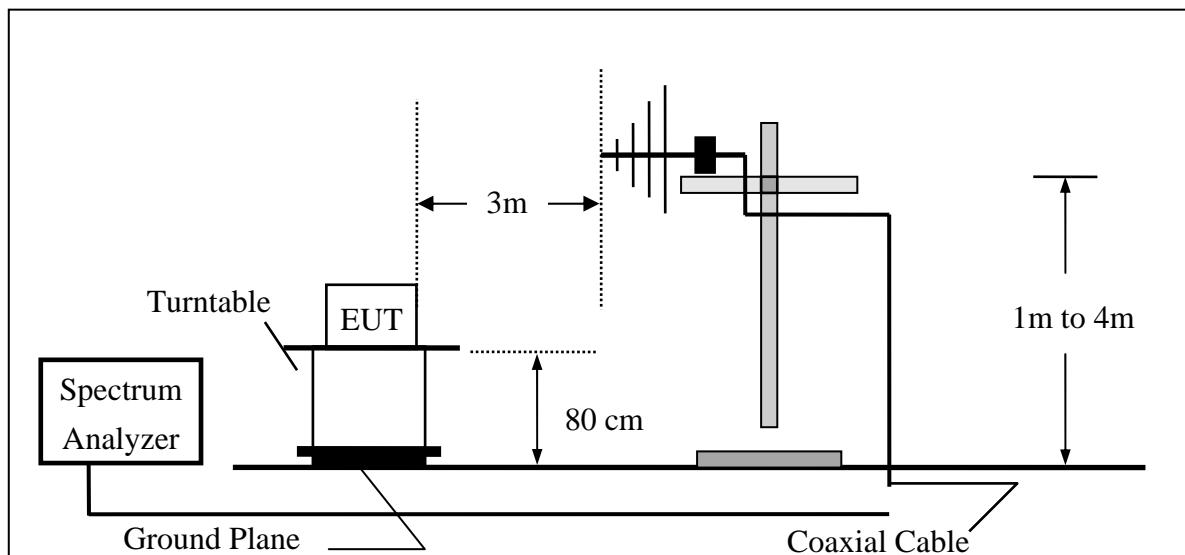
### 7.1 Standard Applicable

FCC 22.913(a) Mobile station is limited to 7W.

FCC 24.232(b) Mobile station is limited to 2W.

### 7.2 Test SET-UP

(A) Radiated Power Test Set-Up, Frequency Below 1000MHz

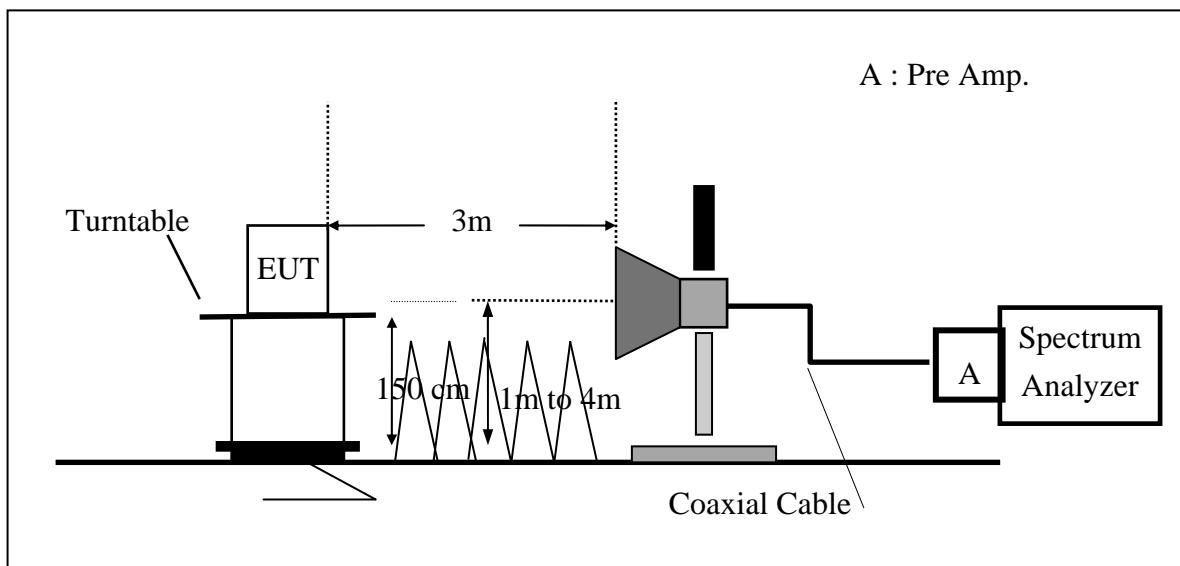


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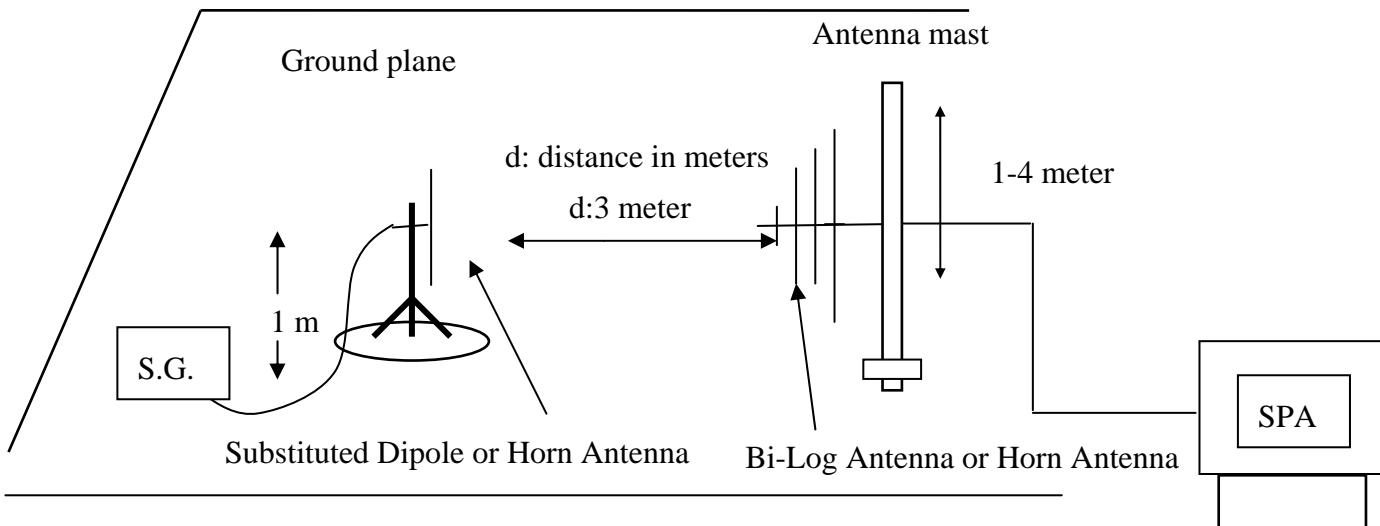
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## (B) Radiated Power Test Set-UP Frequency Over 1 GHz



## (C) Substituted Method Test Set-UP



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### 7.3 Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 971168 D01
2. The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
3. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated
4. The testing follows the Measurement Procedure of FCC KDB 971168 D01
5. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
6.  $ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$
7.  $ERP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$
8. Spectrum setting:
  - (1) Detector = Peak, marker the highest value of the detector by maximum hold, set RBW wide enough to capture the entire signal of emission, and VBW > =3xRBW.
  - (2) KDB 971168 D01 is adopted, and the procedure as lists under item 4, Measurement of the Average Power over the Fundamental Signal Bandwidth, is followed to set correspondingly for the acquisition of proper measurement data.

Set frequency = nominal signal center frequency;  
Set span = 2 X occupied BW;  
Set RBW  $\approx$  1~5% of the span, not to exceed 1 MHz  
Set VBW = 3 x RBW;  
Select average power (RMS) detector  
Set sweep time and number of measurement points to achieve a minimum of 1 millisecond/pt  
integration time (ex. Point = 601points, then sweet time =  $601 \times 10^{-3} = 6s$ .

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Activate trace averaging routine over a minimum of 10 sweeps;  
Activate marker/span pair and set span = signal or channel bandwidth;  
Activate the band/interval power marker function;  
Record the band power level;

Record adjusted value as the average signal power level. Then activate the occupied bandwidth measurement function.

The proper adjustment due to limitation of spectrum capability is given compensated to spectrum with conversion factor of  $10^{\log}(\text{TBW}/\text{RBW})$ , where TBW is the transmission of UE exceeding the maximum BW UE can extends, and RBW is the resolution BW in UE.

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## 7.4 Measurement Equipment Used

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	12/22/2014	12/21/2015
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/23/2014	12/22/2015
Bilog Antenna	SCHWAZBECK	VULB9160	3158	10/31/2014	10/30/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/05/2015	05/04/2016
Horn antenna	ETS.LINDGREN	3117	123991	12/19/2014	12/18/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2014	12/24/2015
Horn Antenna	Schwarzbeck	BBHA9170	185	07/25/2015	07/24/2016
Network Analyze	Anritsu	MS4644A	1216312	05/23/2015	05/22/2016
Signal Generator	Agilent	E4438C	MY45093613	07/31/2015	07/30/2016
Pre-Amplifier	Agilent	8447D	1937A02834	01/02/2015	01/01/2016
Pre-Amplifier	Agilent	8449B	3008A00578	01/02/2015	01/01/2016
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	004	01/02/2015	01/01/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	966_Tx	10m	01/02/2015	01/01/2016
Low Loss Cable	HUBER+SUHNER	966_Rx	3m	01/02/2015	01/01/2016
3m Site NSA	SGS	966 chamber	N/A	07/01/2015	06/30/2016

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## 7.5 Measurement Result: (Peak) –using option of peak measurement

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
GPRS 850	824.2	128	V	18.13	3.45	-2.94	18.64	38.45
			H	18.22	3.45	-2.94	18.73	38.45
	836.6	190	V	12.8	3.46	-2.98	13.28	38.45
			H	18.1	3.46	-2.97	18.59	38.45
	848.8	251	V	16.19	3.47	-3.01	16.65	38.45
			H	18.61	3.47	-3.01	<b>19.07</b>	38.45

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
EDGE 850	824.2	128	V	17.35	3.45	-2.94	17.86	38.45
			H	18.26	3.45	-2.94	<b>18.77</b>	38.45
	836.6	190	V	12.41	3.46	-2.97	12.9	38.45
			H	17.59	3.46	-2.97	18.08	38.45
	848.8	251	V	15.37	3.47	-3.01	15.83	38.45
			H	17.67	3.47	-3.01	18.13	38.45

**Remark :** (1) The RBW,VBW of SPA for frequency RBW=300 KHz, VBW=1MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
GPRS 1900	1850.2	512	V	24.5	4.84	-4.49	<b>24.85</b>	33.01
			H	19.46	4.84	-4.49	19.82	33.01
	1880.0	661	V	24.29	4.79	-4.53	24.56	33.01
			H	20.62	4.79	-4.53	20.89	33.01
	1909.8	810	V	23.97	4.74	-4.57	24.15	33.01
			H	21.21	4.74	-4.57	21.39	33.01

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
EDGE 1900	1850.2	512	V	22.41	4.84	-4.49	22.76	33.01
			H	16.96	4.84	-4.49	17.31	33.01
	1880.0	661	V	22.71	4.79	-4.53	<b>22.98</b>	33.01
			H	19.02	4.79	-4.53	19.29	33.01
	1909.8	810	V	22.35	4.74	-4.57	22.52	33.01
			H	19.29	4.74	-4.57	19.47	33.01

**Remark :**

(1) The RBW,VBW of SPA for frequency RBW=300K, VBW=1MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
WCDMA B5	826.4	4132	V	15.38	3.46	-2.94	15.9	38.45
			H	15.9	3.46	-2.94	<b>16.42</b>	38.45
	836.6	4183	V	10.5	3.46	-2.97	10.99	38.45
			H	15.76	3.46	-2.97	16.25	38.45
	846.6	4233	V	12.67	3.47	-3	13.14	38.45
			H	15.22	3.47	-3	15.69	38.45

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
HSDPA B5	826.4	4132	V	15.15	3.46	-2.94	15.67	38.45
			H	16.42	3.46	-2.94	<b>16.94</b>	38.45
	836.6	4183	V	10.34	3.46	-2.97	10.83	38.45
			H	15.47	3.46	-2.97	15.96	38.45
	846.6	4233	V	13.51	3.47	-3	13.98	38.45
			H	16.25	3.47	-3	16.72	38.45

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
HSUPA B5	826.4	4132	V	16.18	3.46	-2.94	16.7	38.45
			H	17.07	3.46	-2.94	<b>17.59</b>	38.45
	836.6	4183	V	11.5	3.46	-2.97	11.99	38.45
			H	16.21	3.46	-2.97	16.7	38.45
	846.6	4233	V	13.62	3.47	-3	14.09	38.45
			H	16.45	3.47	-3	16.92	38.45

### Remark :

(1) The RBW,VBW of SPA for frequency RBW= 5MHz , VBW= 8MHz

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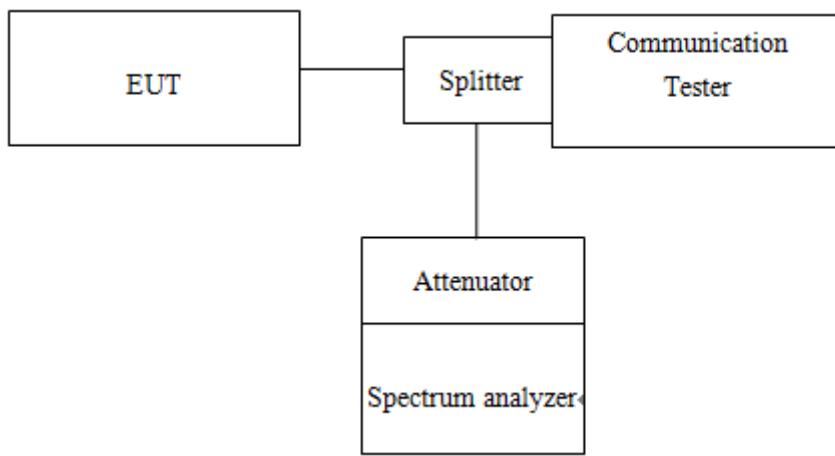
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## 8. OCCUPIED BANDWIDTH MEASUREMENT

### 8.1. Standard Applicable

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.

### 8.2. Test Set-up



### 8.3. Measurement Procedure

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% of emission BW, VBW= 3 times RBW, -26dBc display line was placed on the screen (or 26dB bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace. Then set RBW to 99% bandwidth, RBW= 1%, VBW= 3 RBW, with span > 2 \* Signal BW, set % Power = 99%.

**NOTE: For the plot of bandwidth measurement, the marker of the 99% bandwidth is diamond-shape while the marker of the 26dB BW is arrow-mark**

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## 8.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016
DC Power Supply	Agilent	E3640A	MY52410006	11/10/2014	11/09/2015

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## 8.5. Measurement Result

### 99% Bandwidth

Frequency (MHz)	CH	99% Bandwidth (MHz)	99% Bandwidth (MHz)
		GPRS 850	EDGE 850
824.20	128	<b>0.247</b>	0.249
836.60	190	0.241	<b>0.250</b>
848.80	251	0.246	0.245

Frequency (MHz)	CH	99% Bandwidth (MHz)	99% Bandwidth (MHz)
		GPRS 1900	EDGE 1900
1850.20	512	0.246	<b>0.247</b>
1880.00	661	<b>0.252</b>	0.241
1909.80	810	0.243	0.243

Frequency (MHz)	CH	99% Band- width (MHz)	99% Bandwidth (MHz)	99% Bandwidth (MHz)
		WCDMA V	HSDPA V	HSUPA V
826.40	4132	<b>4.1545</b>	<b>4.1743</b>	<b>4.1671</b>
836.60	4183	4.1285	4.1421	4.1327
846.60	4233	4.1389	4.1543	4.1364

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## 26dB Bandwidth

Frequency (MHz)	CH	26dB Band- width (MHz)	26dB Band- width (MHz)
		GPRS 850	EDGE 850
824.20	128	0.317	0.320
836.60	190	0.312	0.315
848.80	251	0.308	0.319

Frequency (MHz)	CH	26dB Band- width (MHz)	26dB Band- width (MHz)
		GPRS 1900	EDGE 1900
1850.20	512	0.318	0.319
1880.00	661	0.330	0.324
1909.80	810	0.319	0.317

Frequency (MHz)	CH	26dB Band- width (MHz)	26dB Band- width (MHz)	26dB Band- width (MHz)
		WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.639	4.670	4.655
836.60	4183	4.619	4.639	4.625
846.60	4233	4.641	4.645	4.656

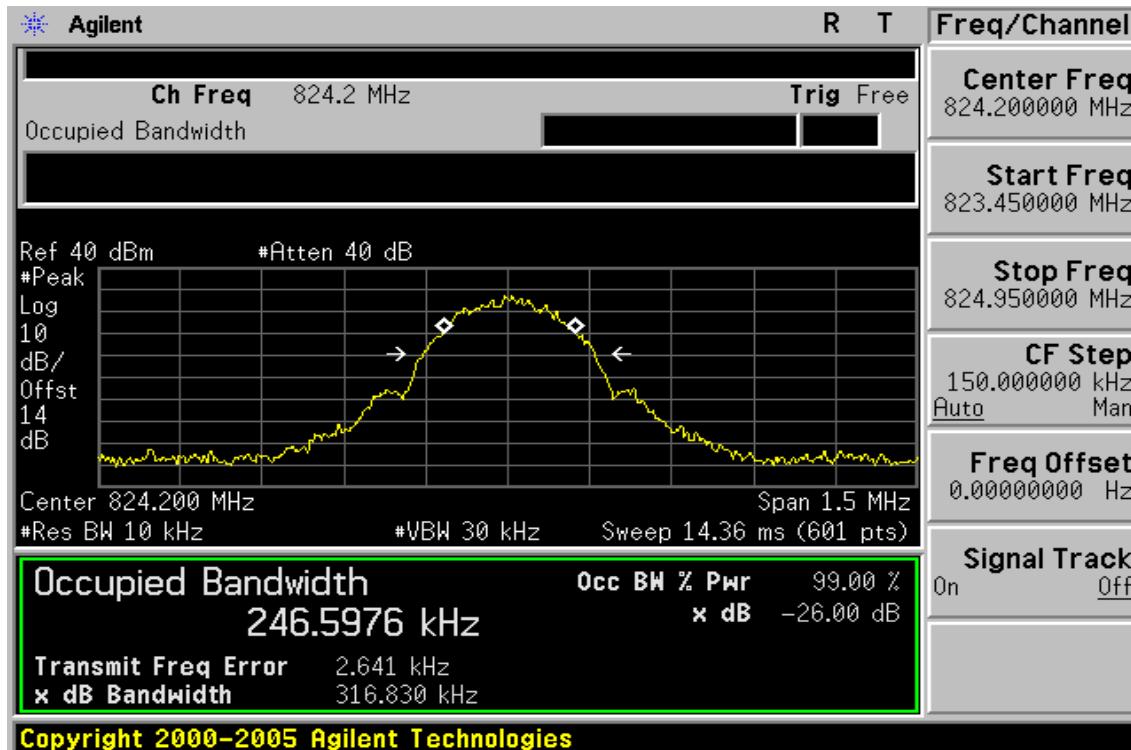
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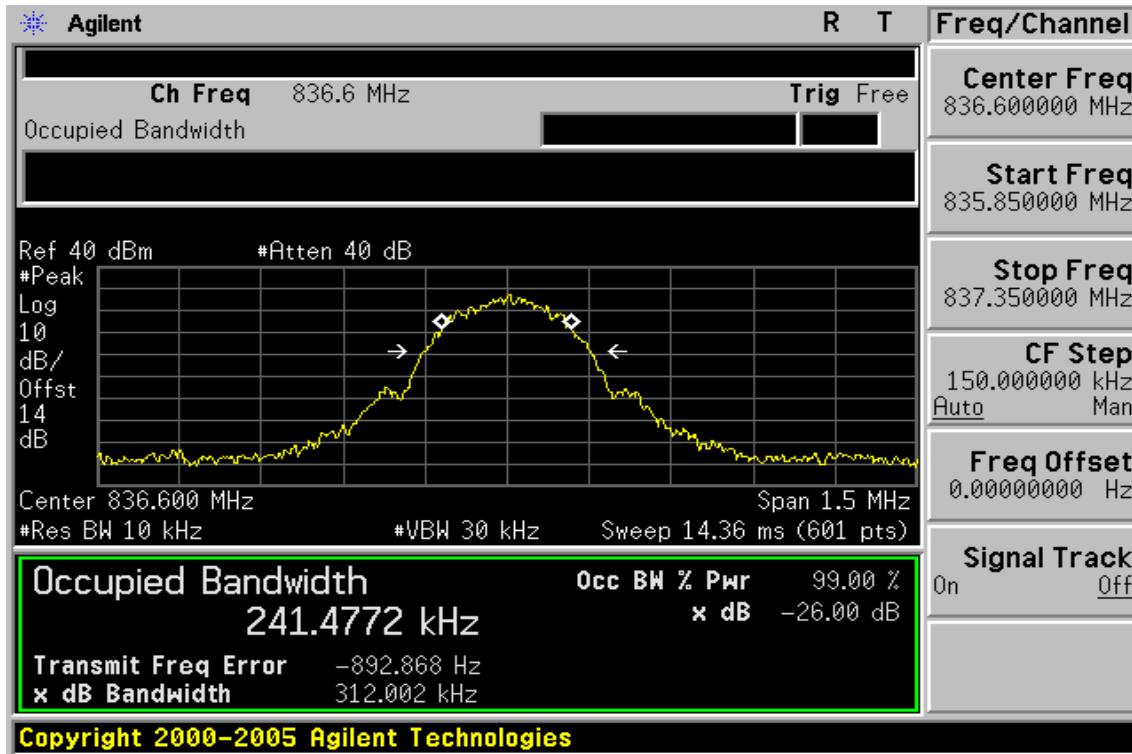
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## 99% Bandwidth Test Data

## GPRS 850 Channel Low



## GPRS 850 Channel Mid



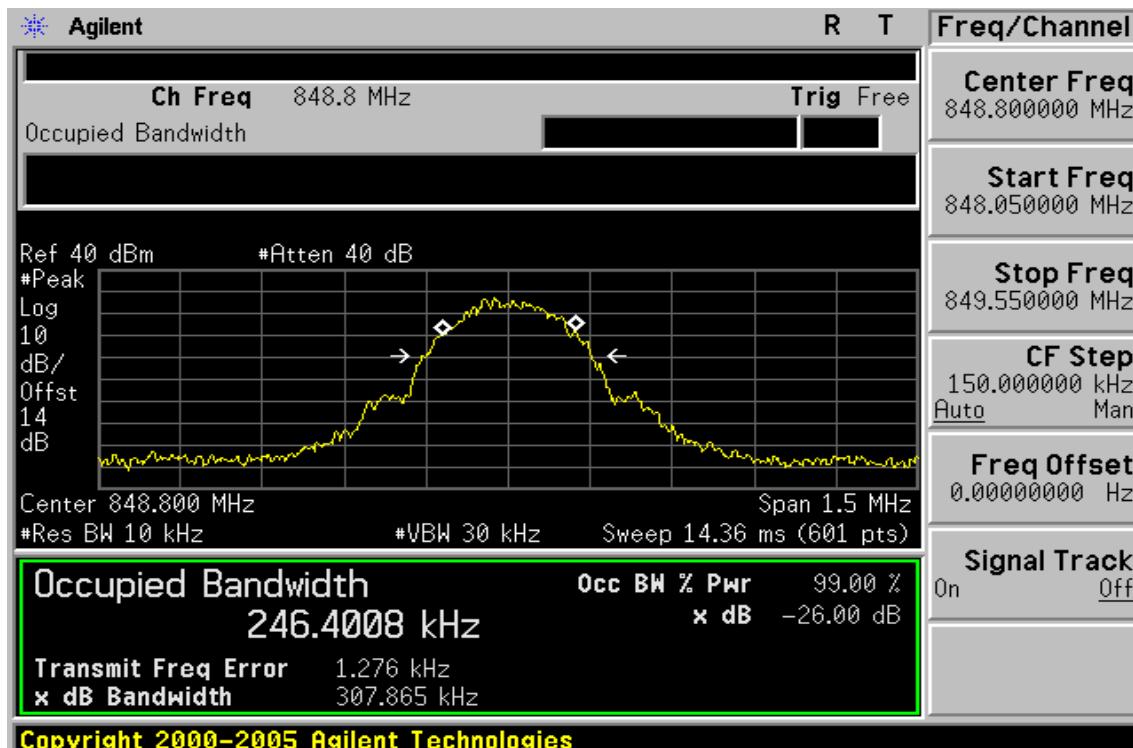
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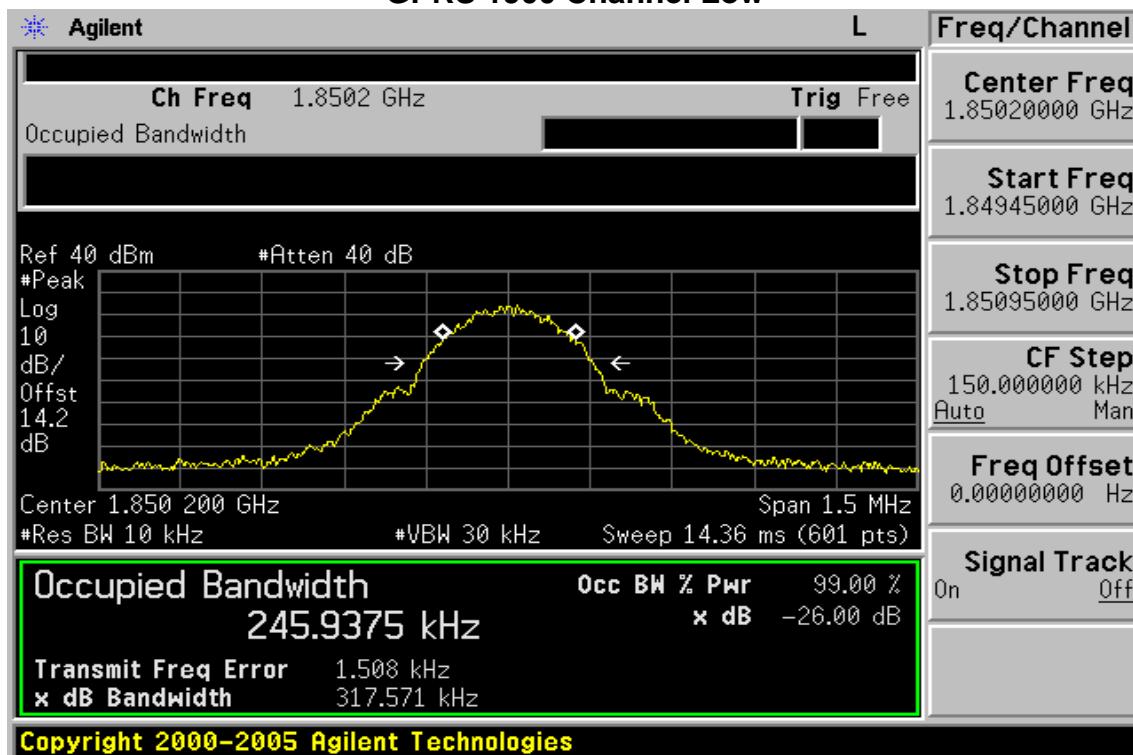
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## GPRS 850 Channel High



## GPRS 1900 Channel Low



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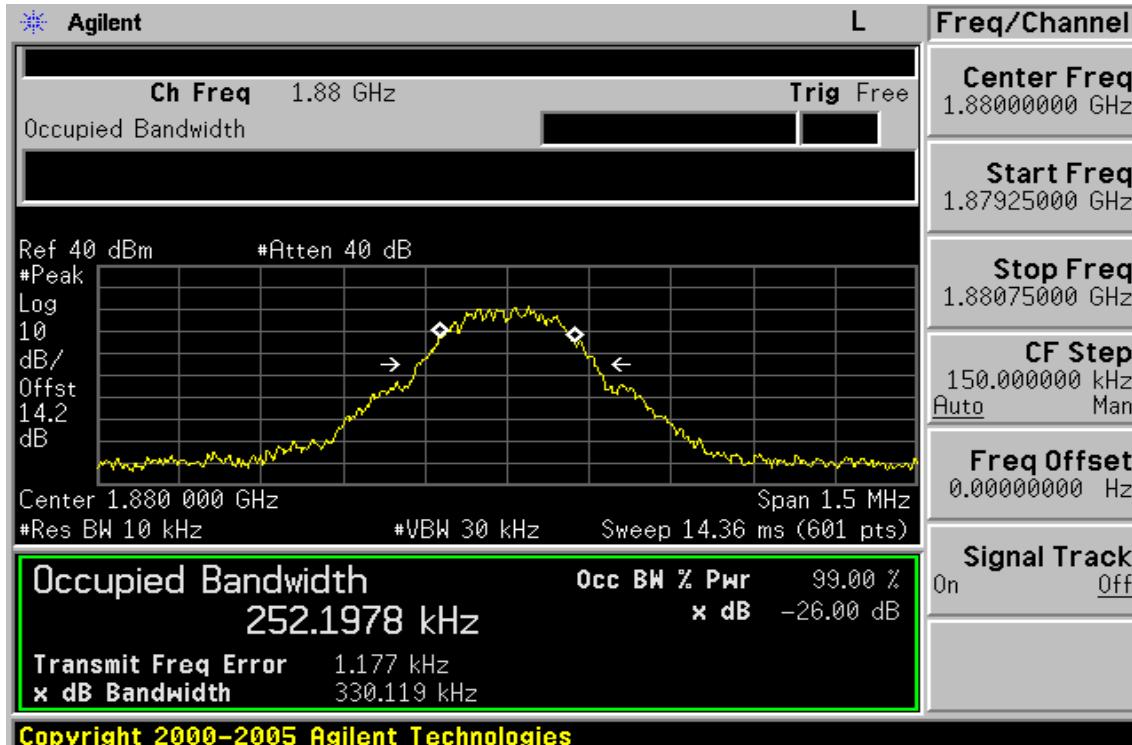
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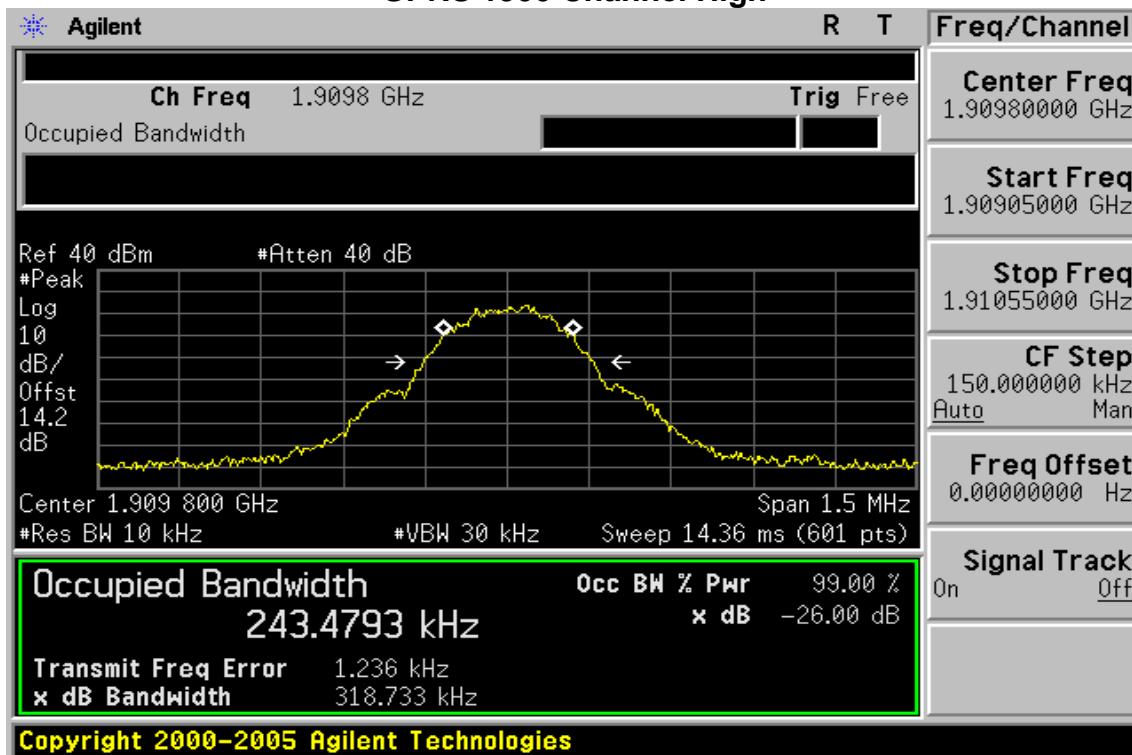
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## GPRS 1900 Channel Mid



## GPRS 1900 Channel High



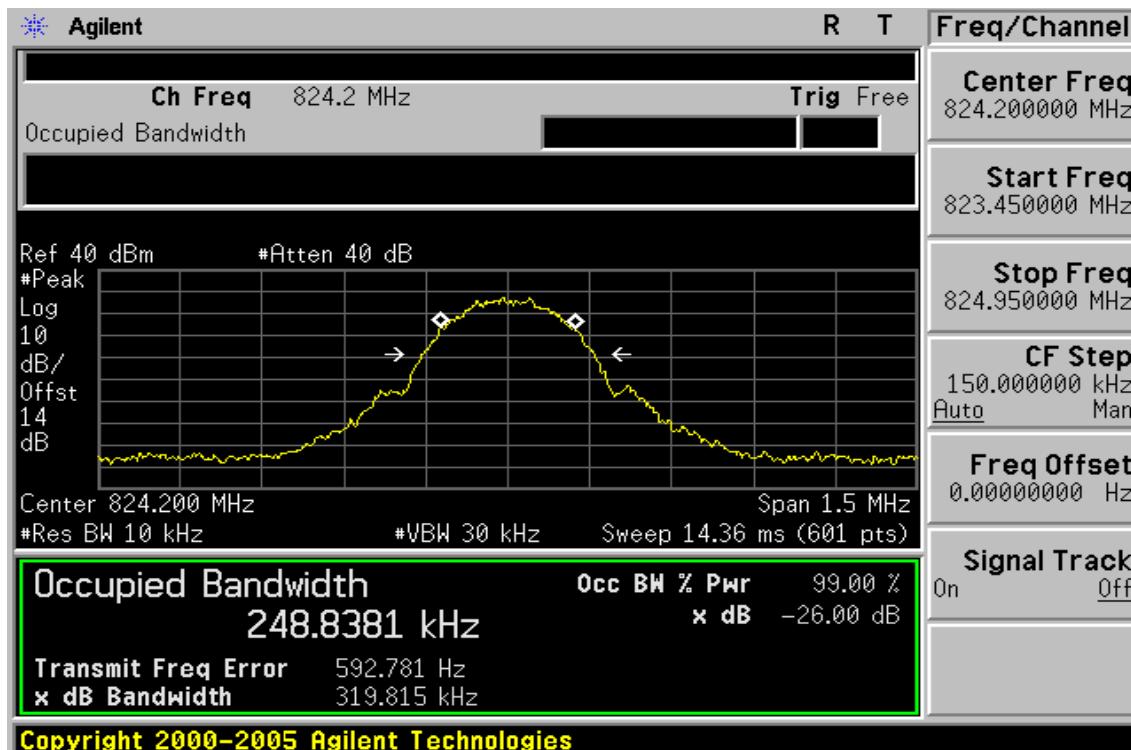
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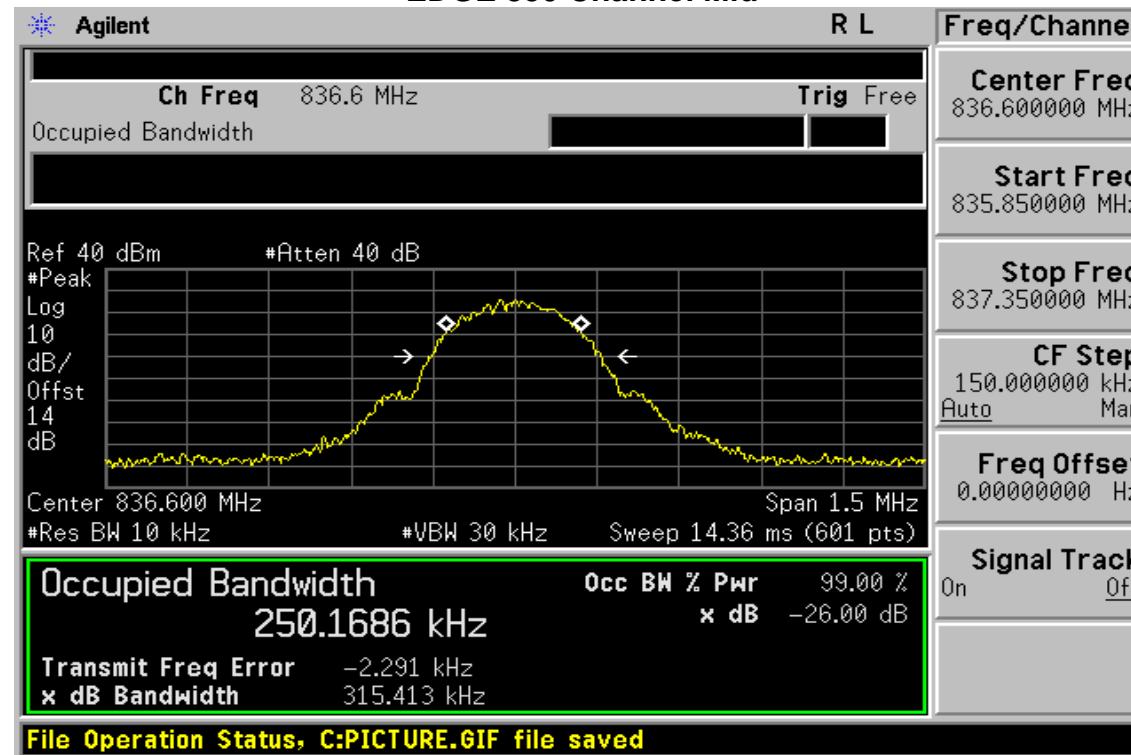
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## EDGE 850 Channel Low



## EDGE 850 Channel Mid

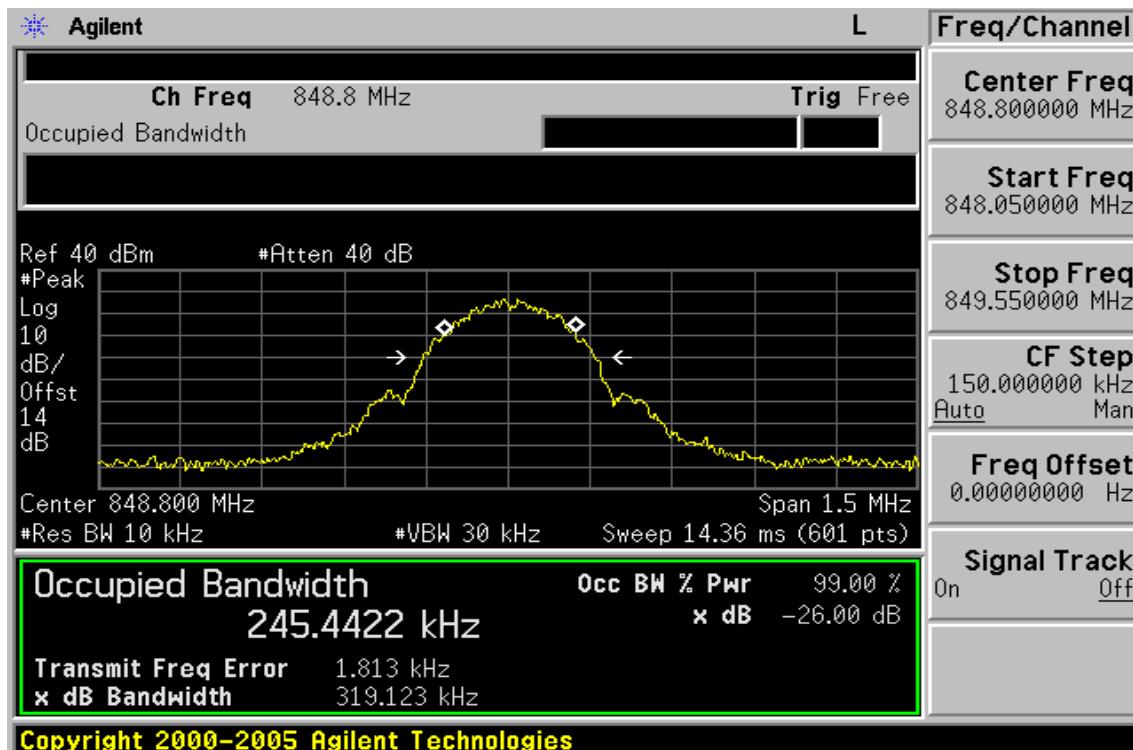


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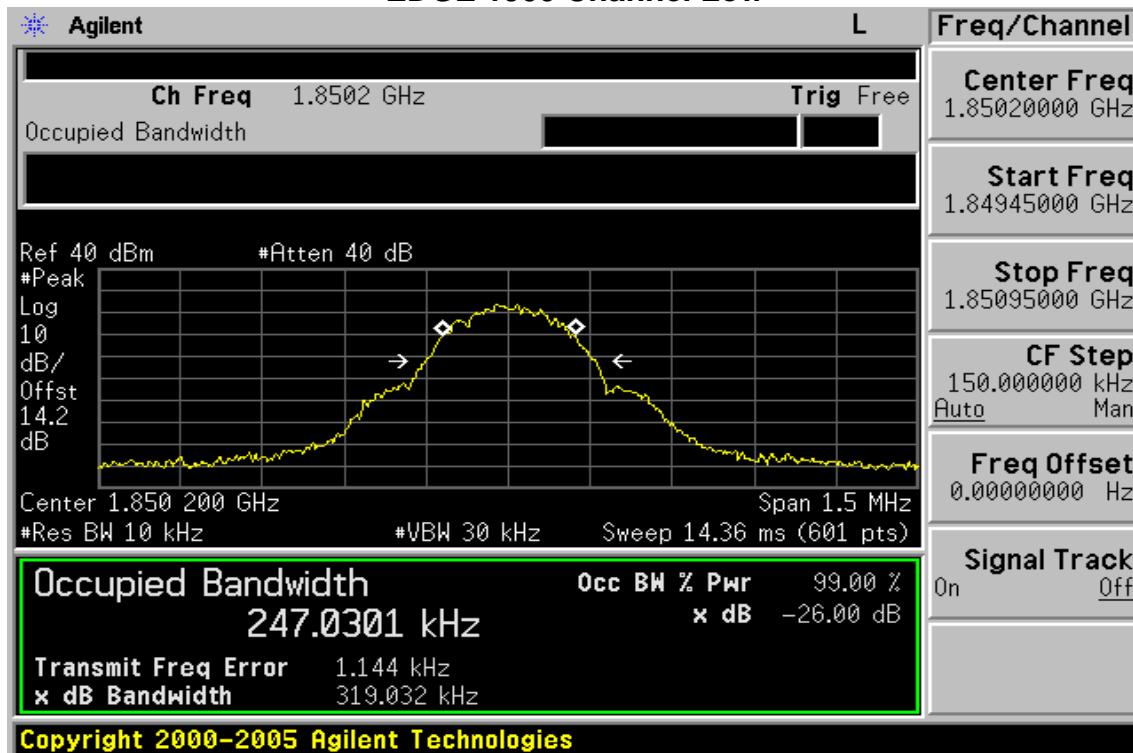
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## EDGE 850 Channel High



## EDGE 1900 Channel Low



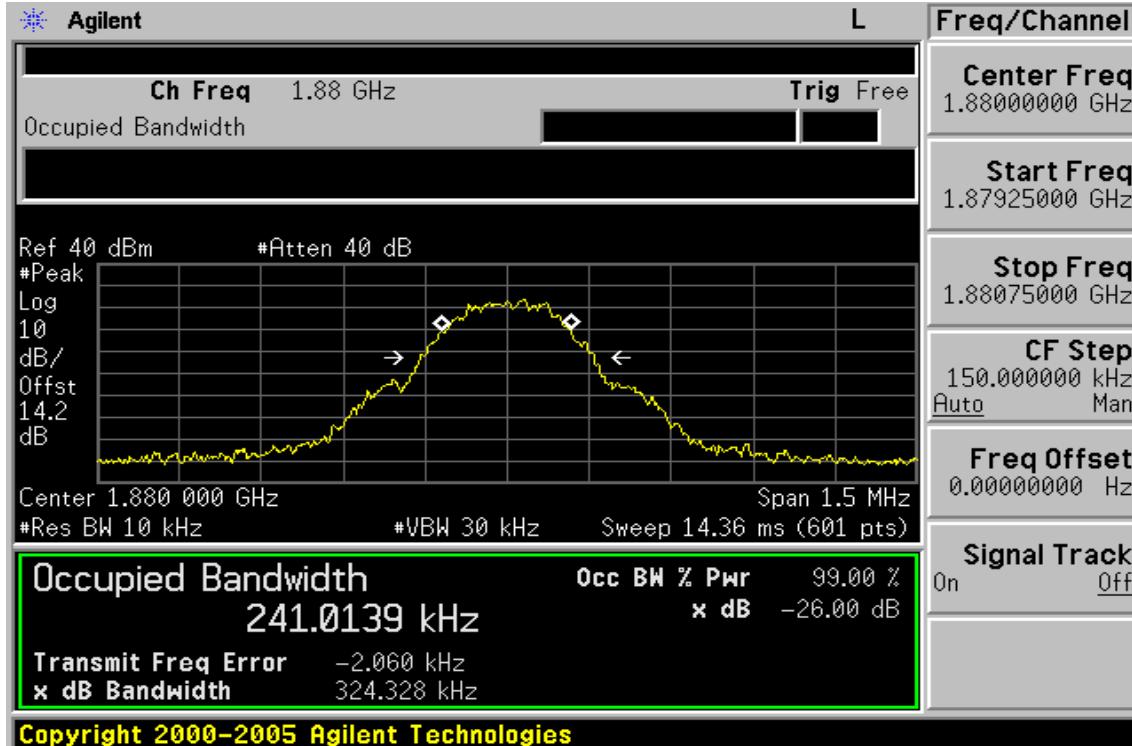
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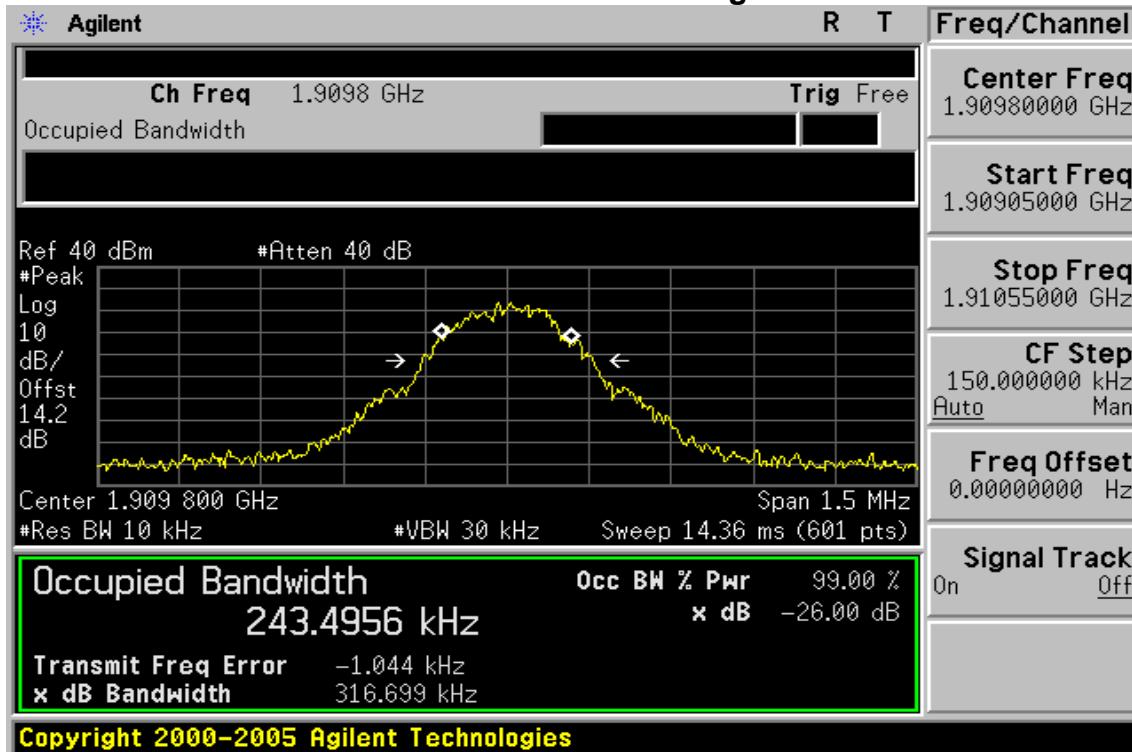
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## EDGE 1900 Channel Mid



## EDGE 1900 Channel High

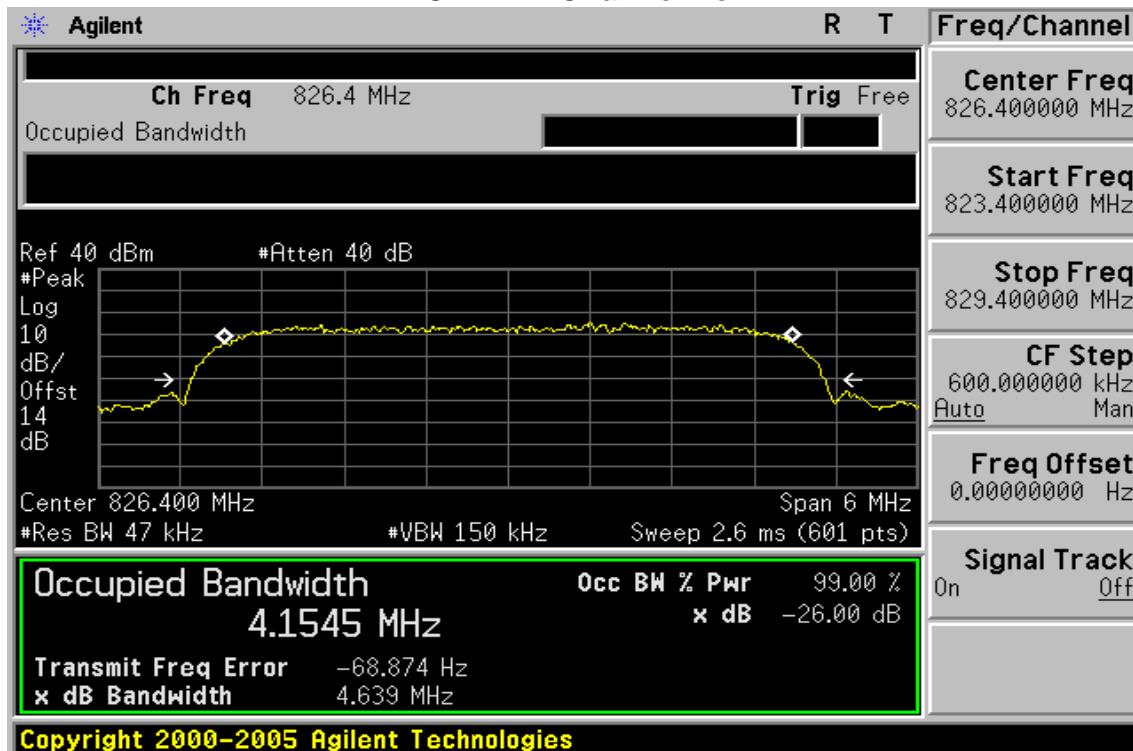


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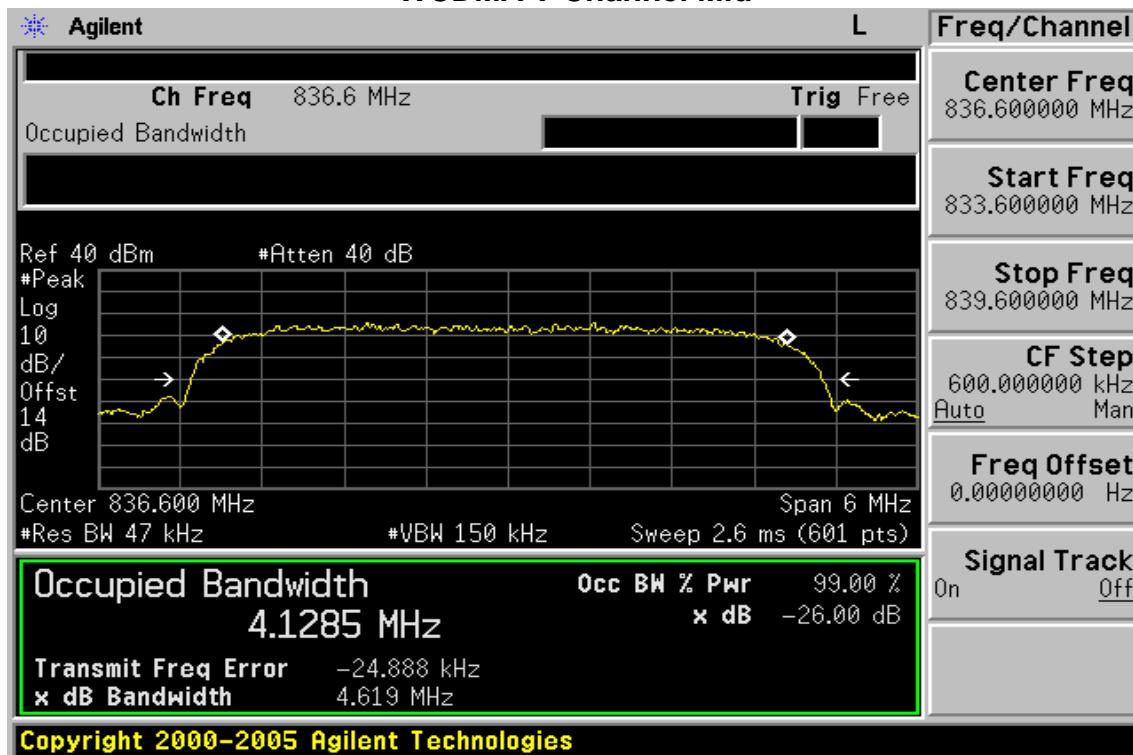
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## WCDMA V Channel Low



## WCDMA V Channel Mid

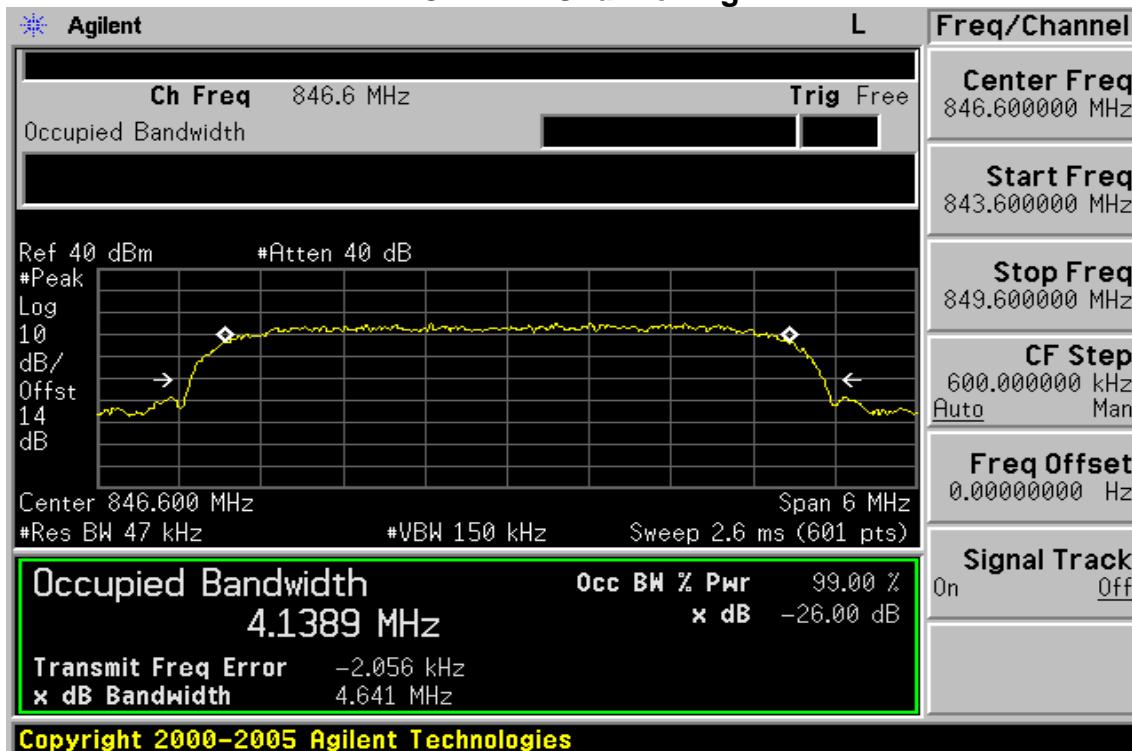


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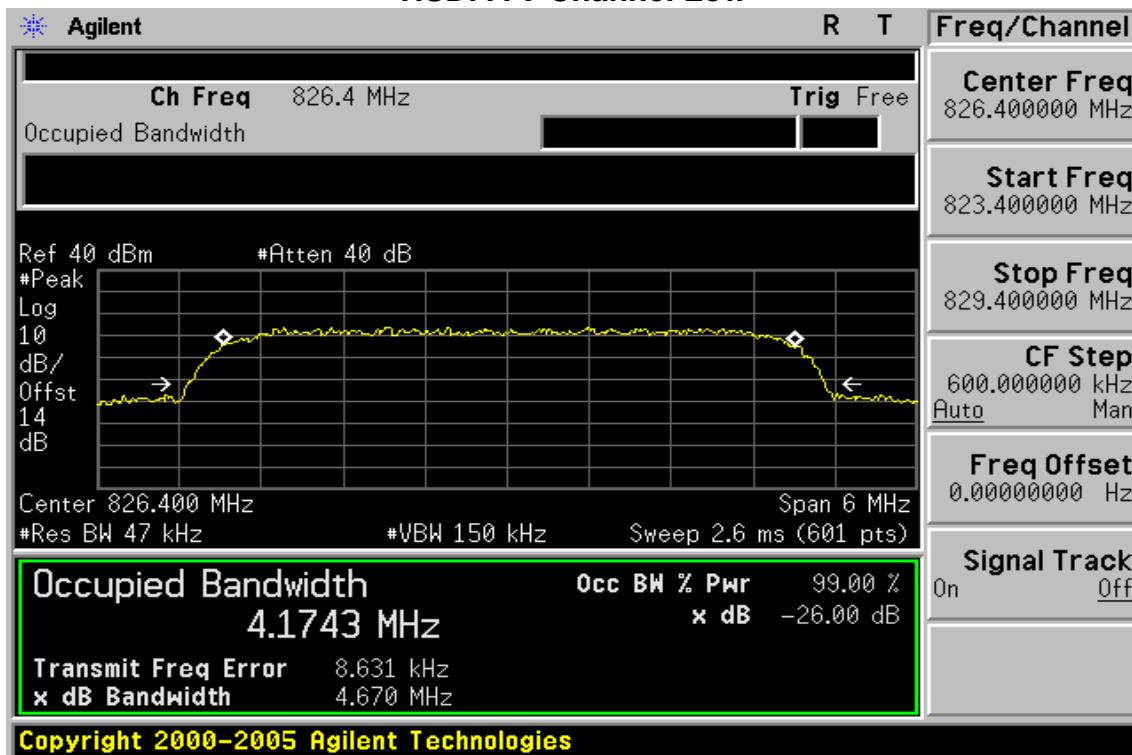
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## WCDMA V Channel High



## HSDPA V Channel Low



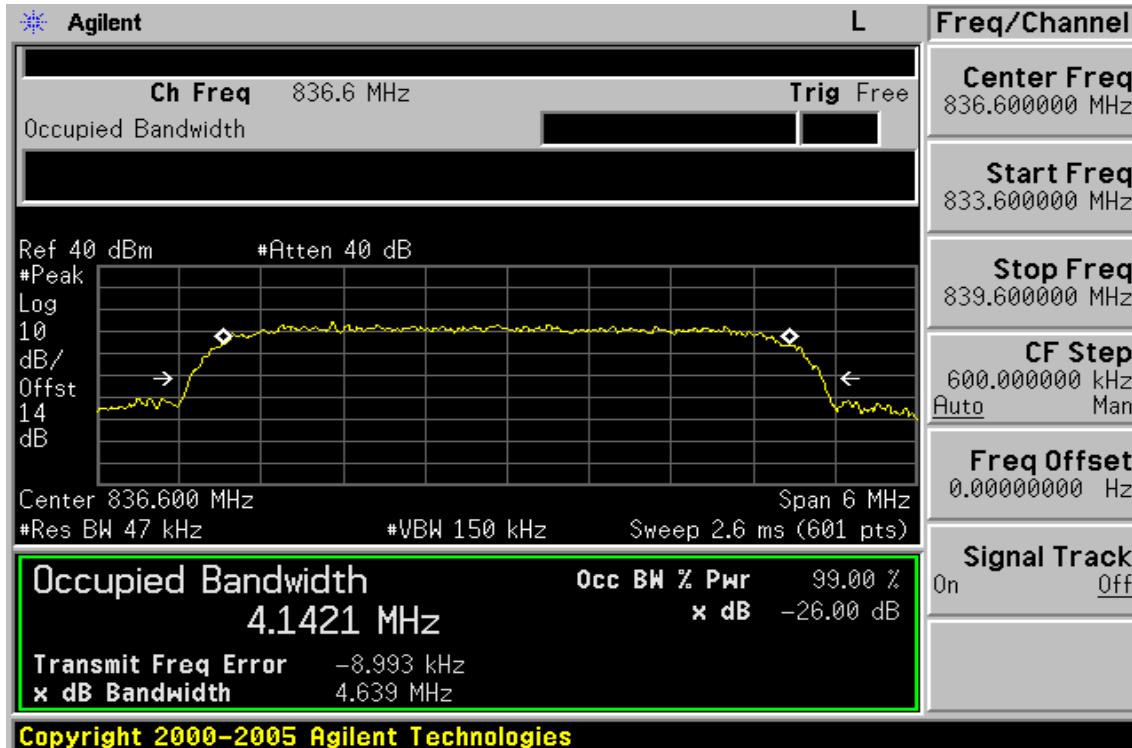
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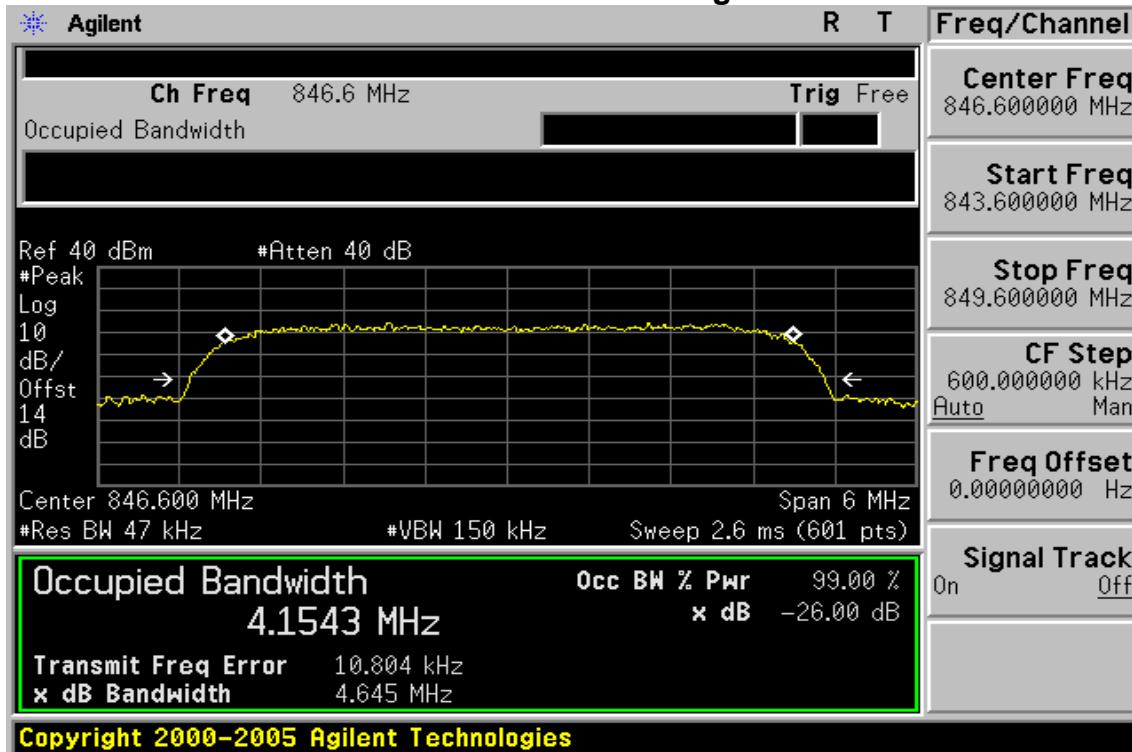
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## HSDPA V Channel Mid



## HSDPA V Channel High

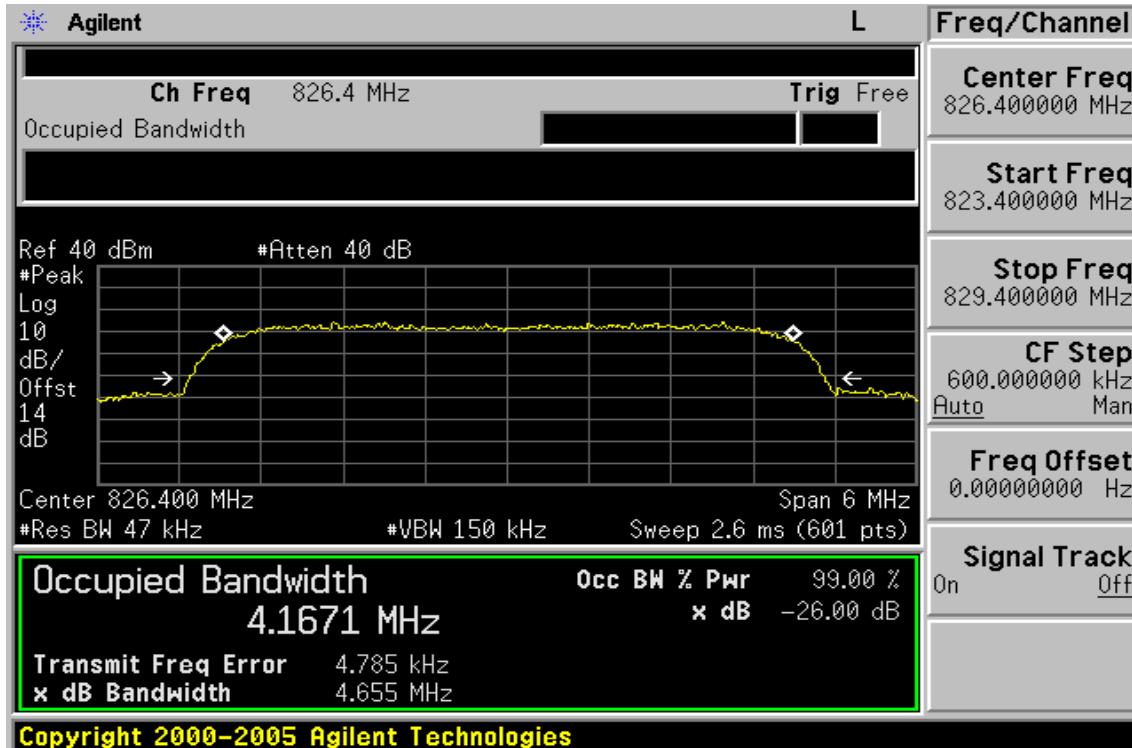


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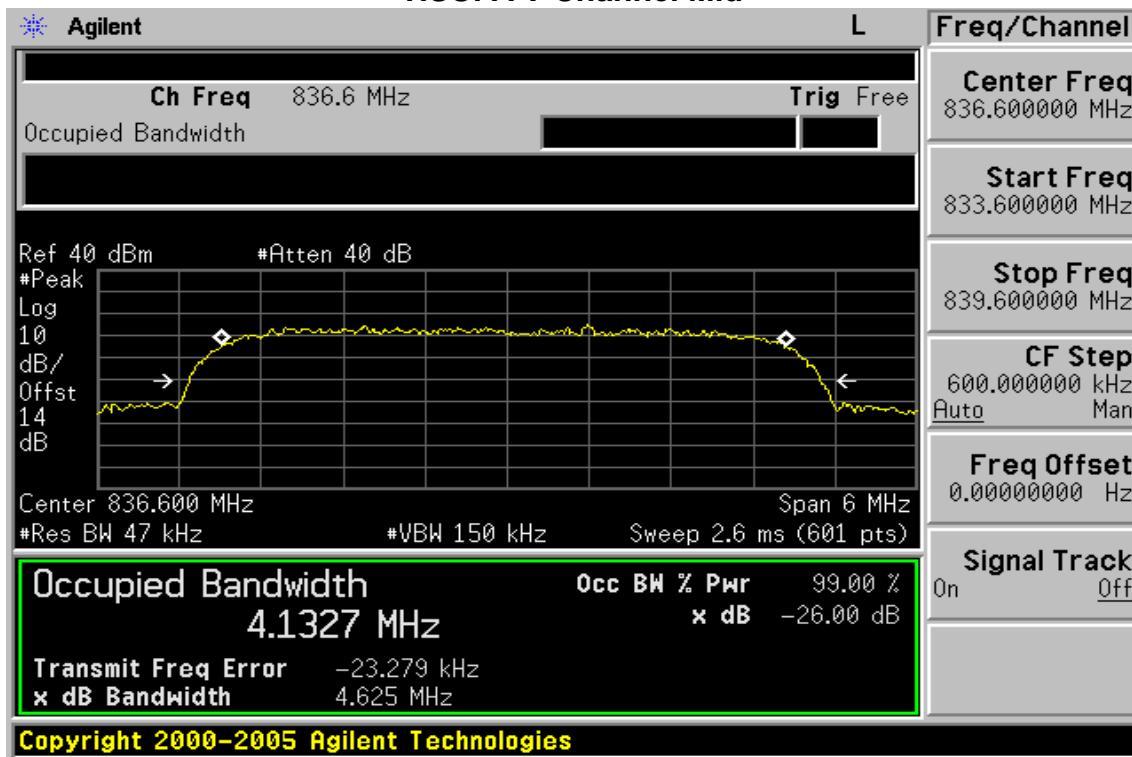
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## HSUPA V Channel Low



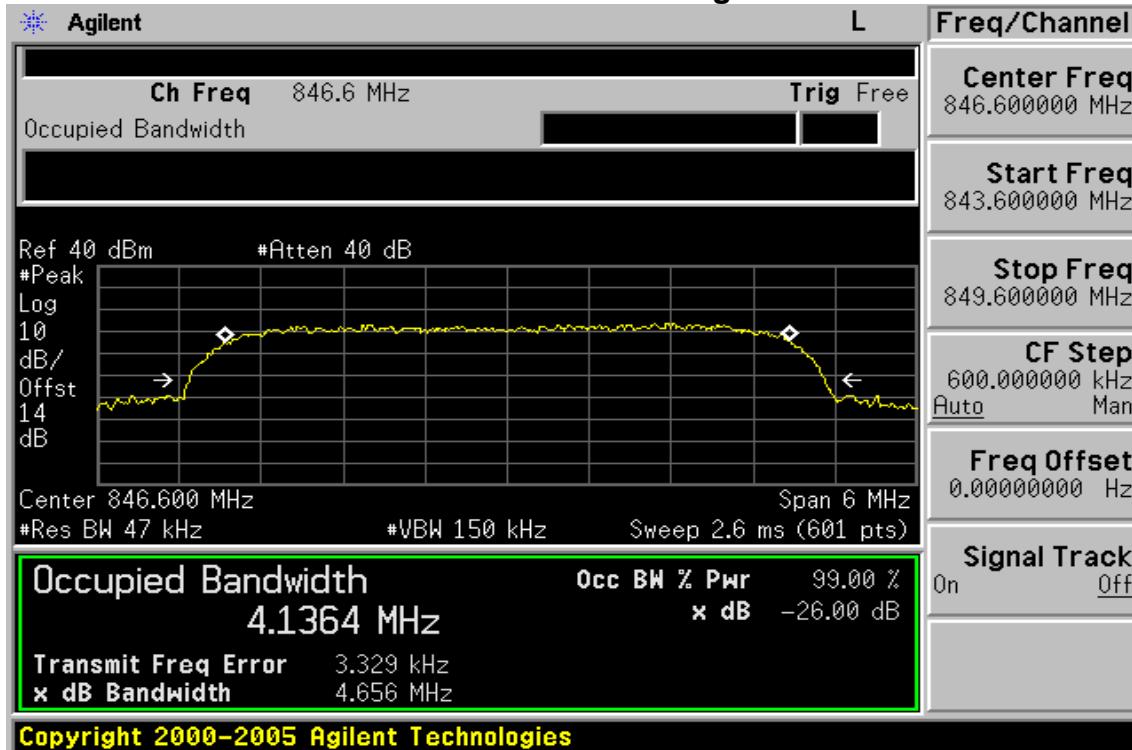
## HSUPA V Channel Mid



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**HSUPA V Channel High**

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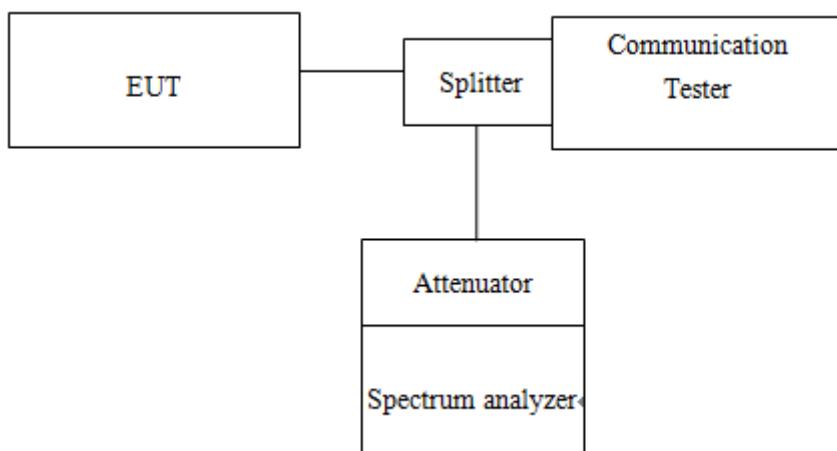
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## 9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 9.1. Standard Applicable

FCC §22.917(a), §24.238(a) the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

### 9.2. Test SET-UP



### 9.3. Measurement Procedure

#### Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

#### Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting RBW  $\geq 1\%$  EBW.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

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#### 9.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016
DC Power Supply	Agilent	E3640A	MY52410006	11/10/2014	11/09/2015

#### 9.5. Measurement Result:

Refer to next pages.

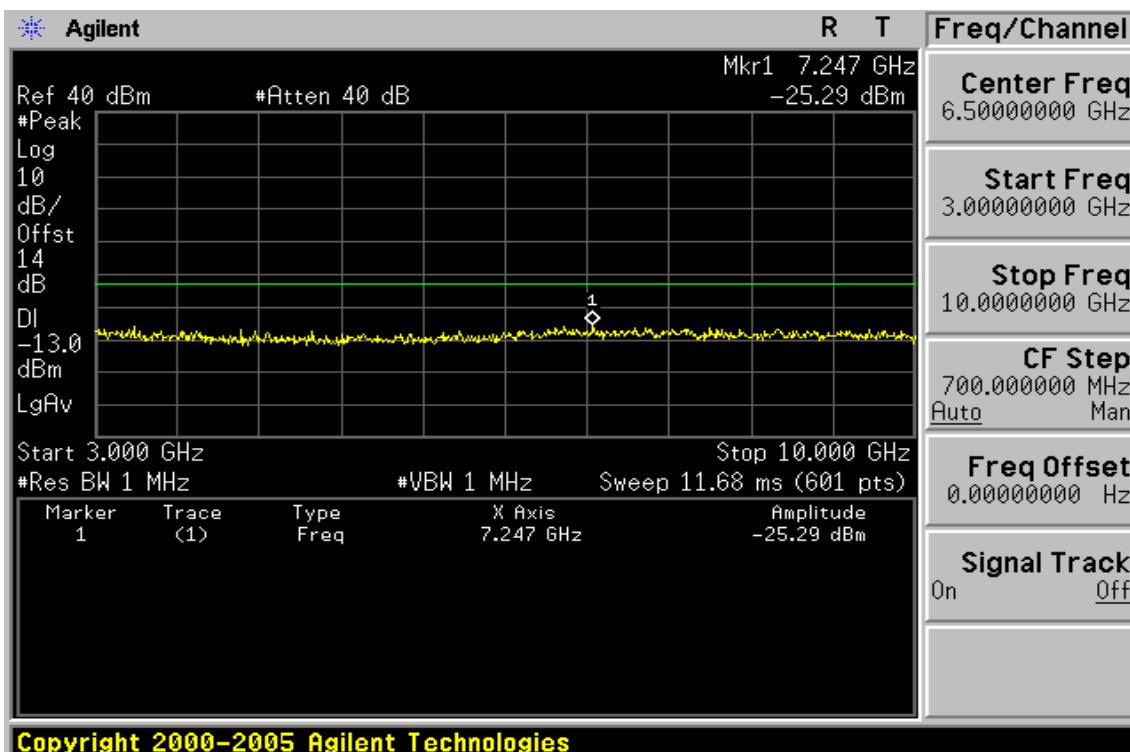
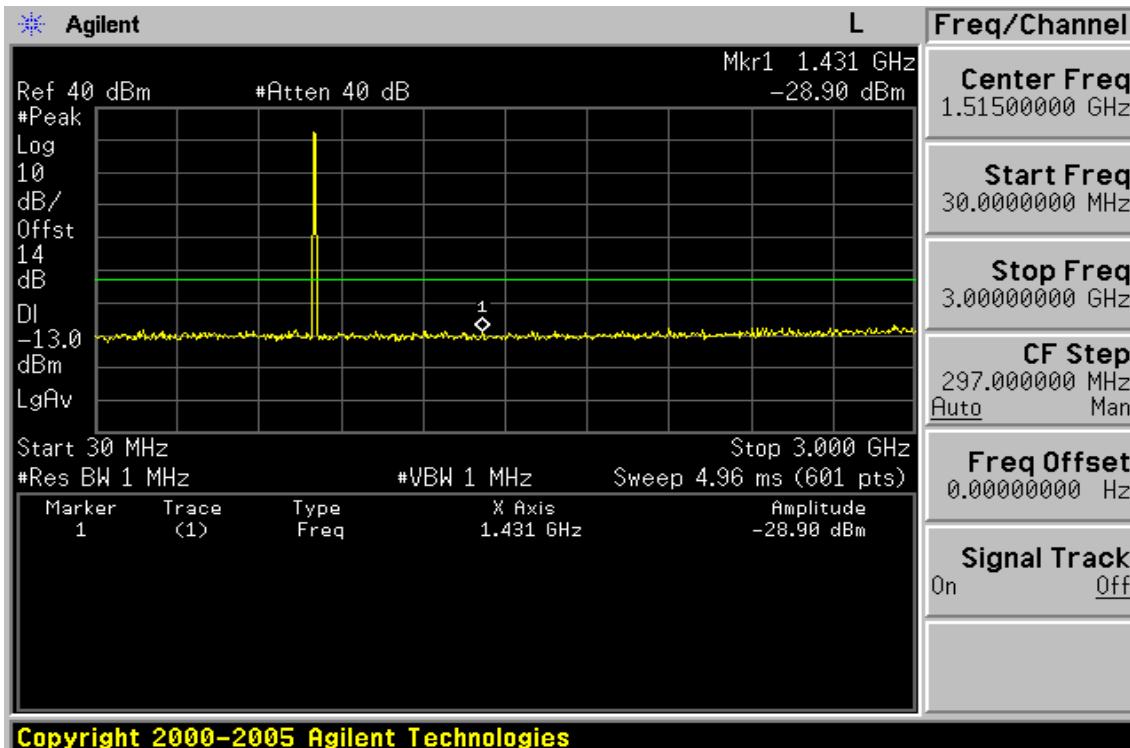
**NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.**

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## Out of Band emission at antenna terminals – GPRS 850 Channel Lowest



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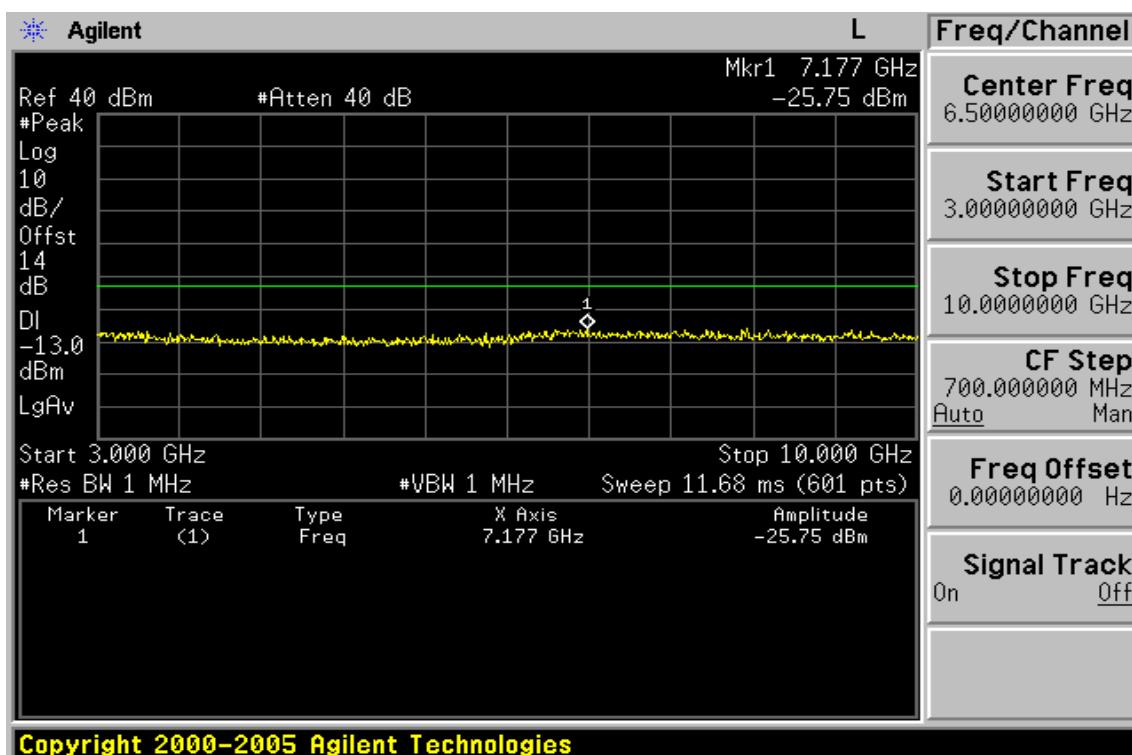
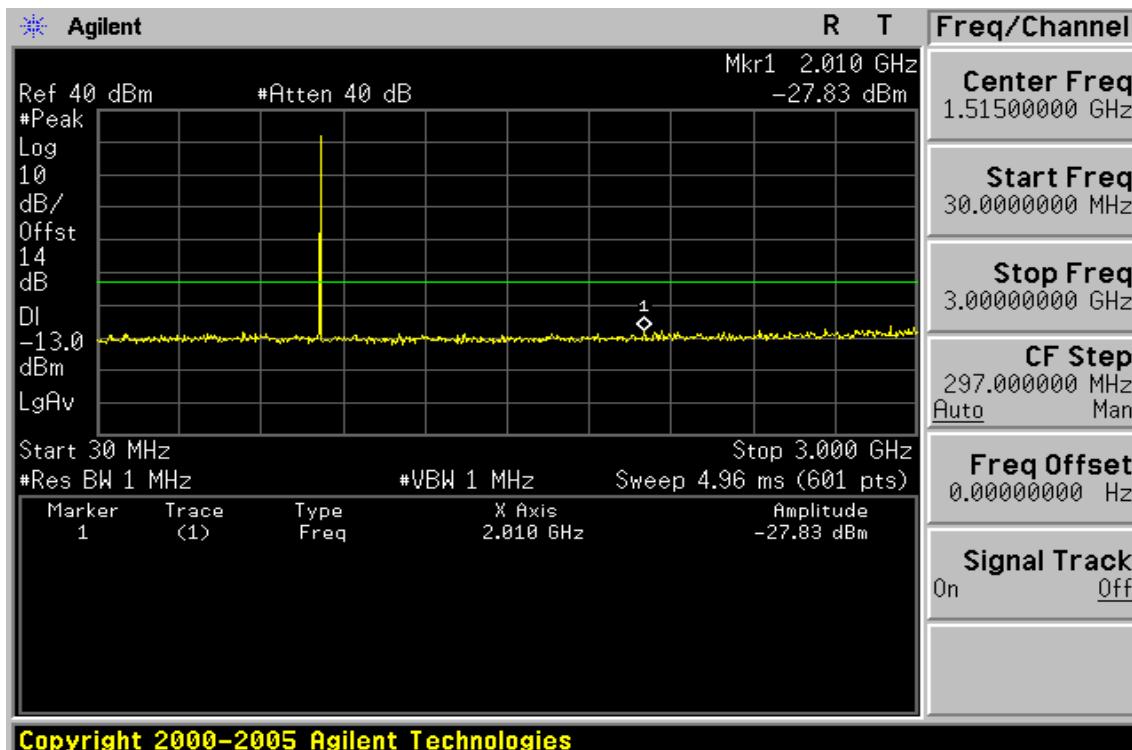
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## Out of Band emission at antenna terminals – GPRS 850 Channel Mid



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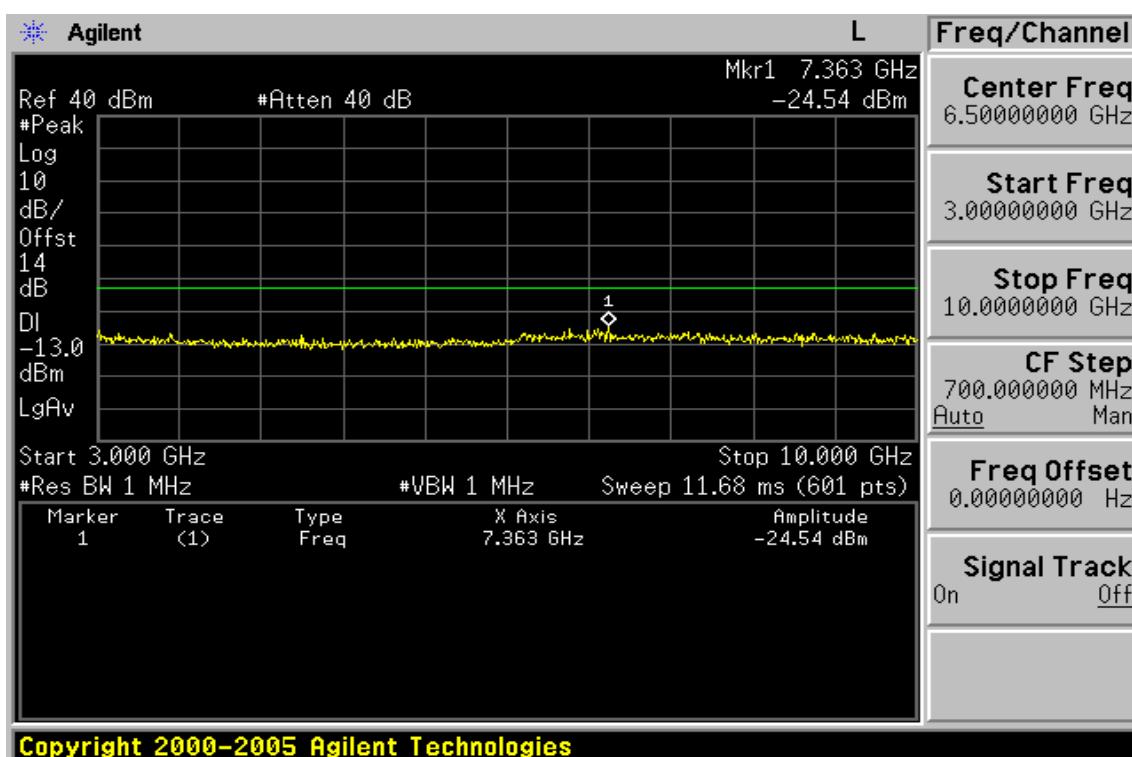
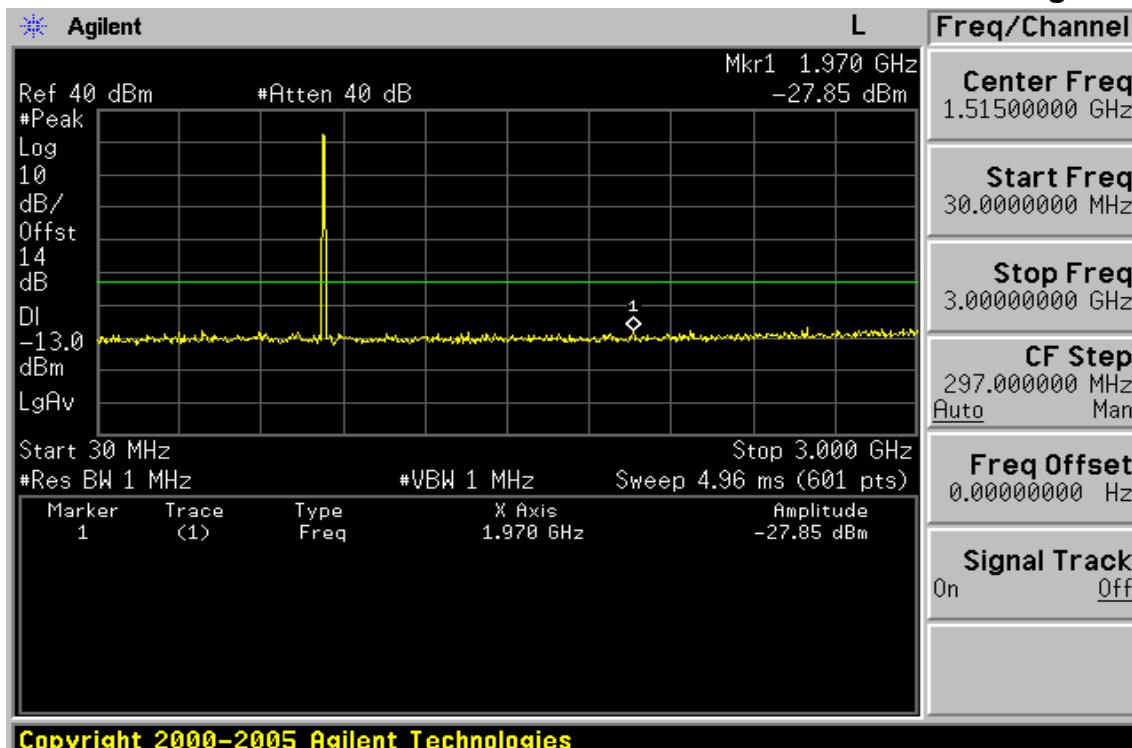
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## Out of Band emission at antenna terminals – GPRS 850 Channel Highest

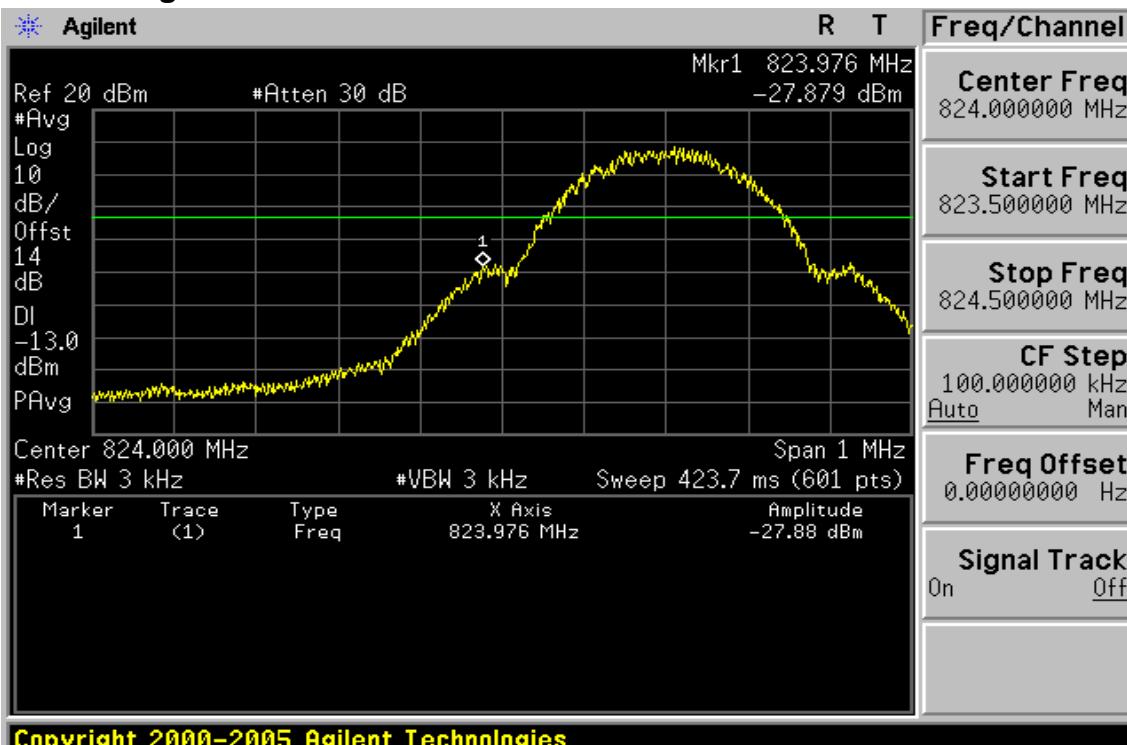


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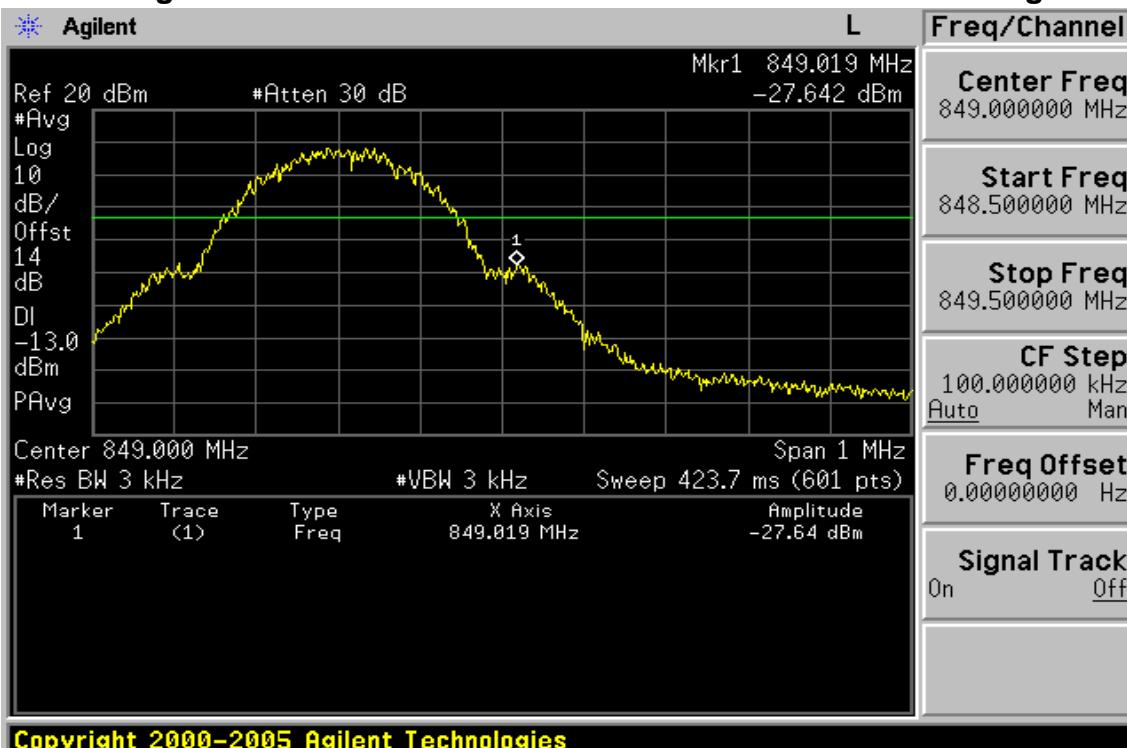
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### Band edge emission at antenna terminals – GPRS 850 Channel Lowest



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### Band edge emission at antenna terminals – GPRS 850 Channel Highest



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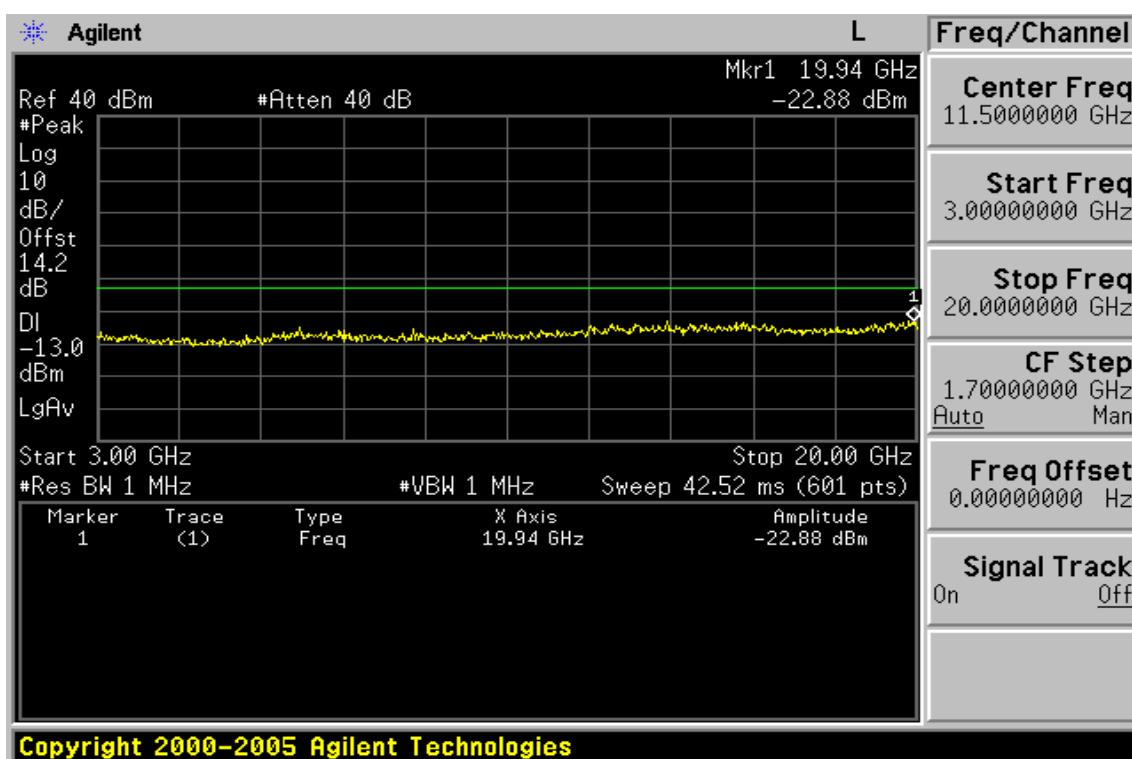
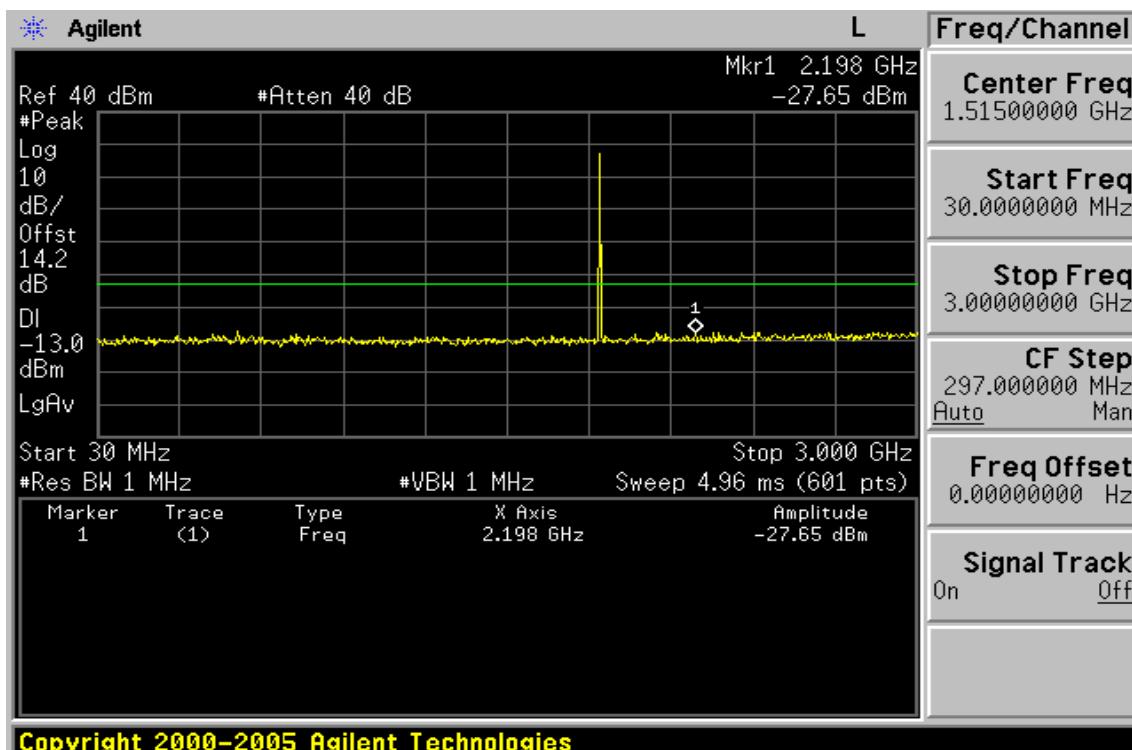
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## Out of Band emission at antenna terminals – GPRS 1900 Channel Lowest

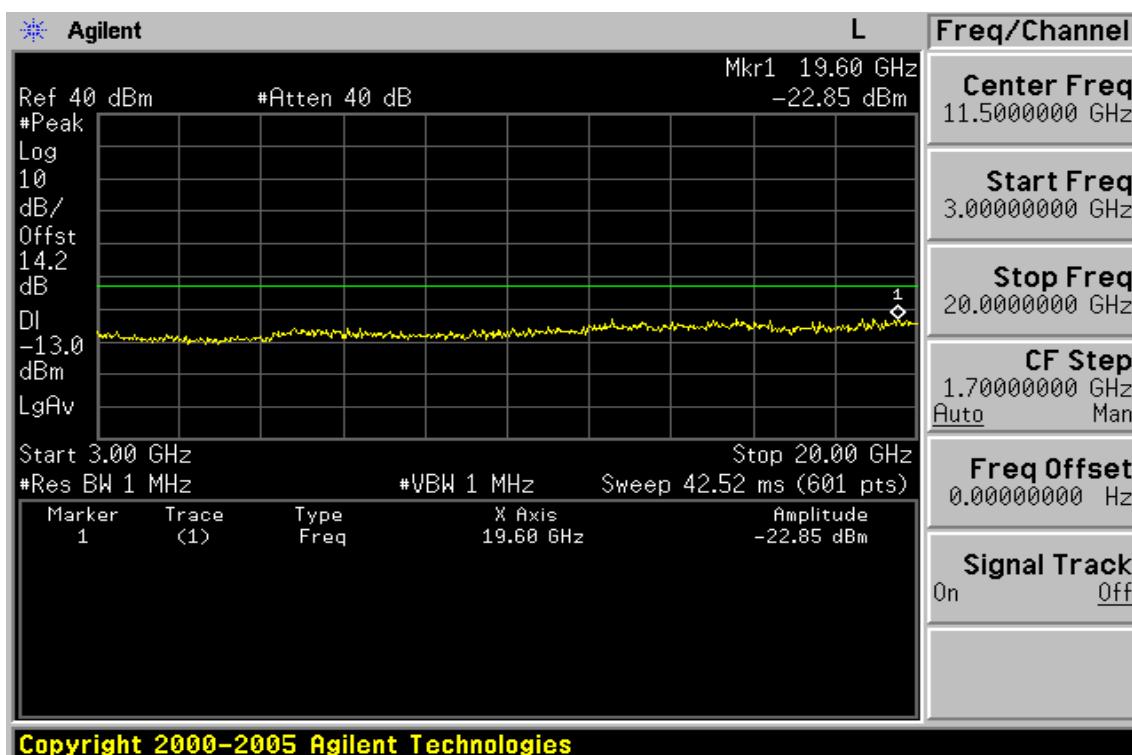
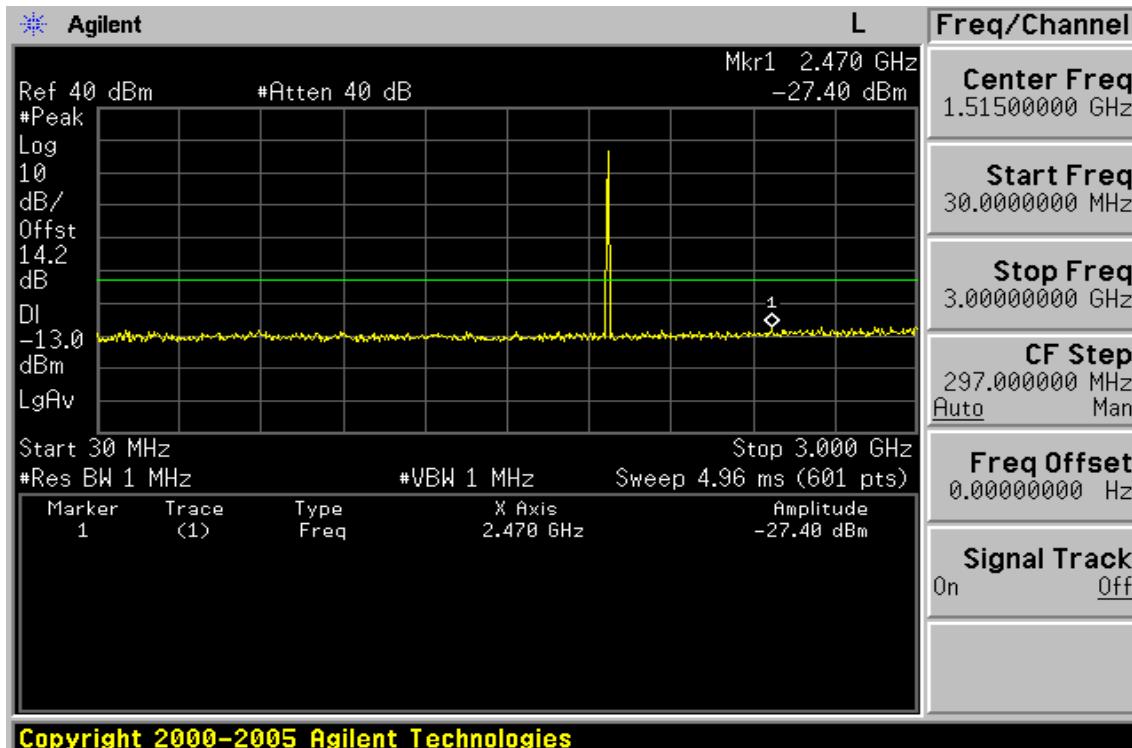


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## Out of Band emission at antenna terminals – GPRS 1900 Channel Mid



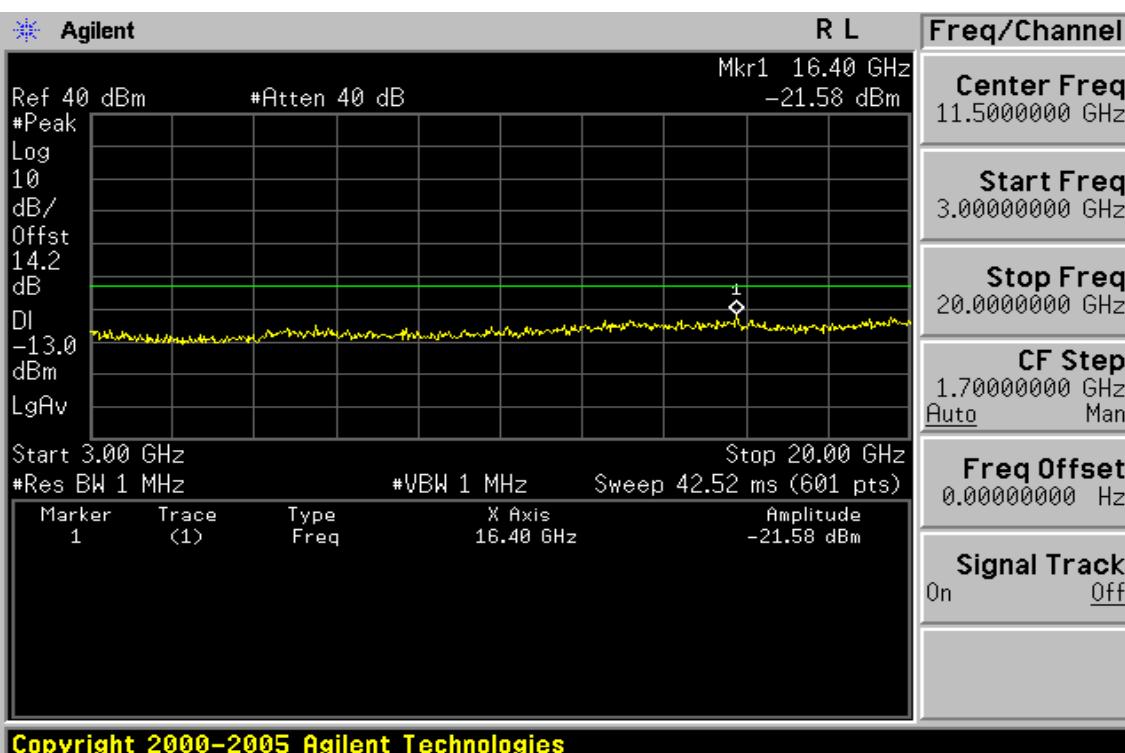
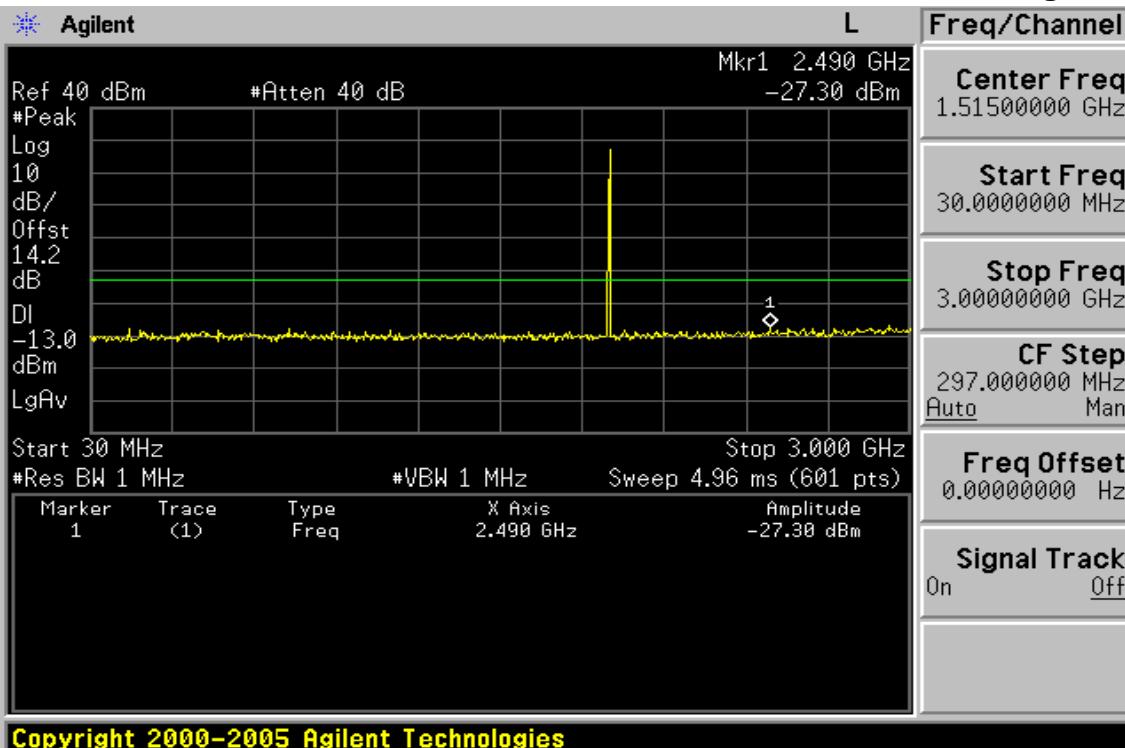
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## Out of Band emission at antenna terminals – GPRS 1900 Channel Highest



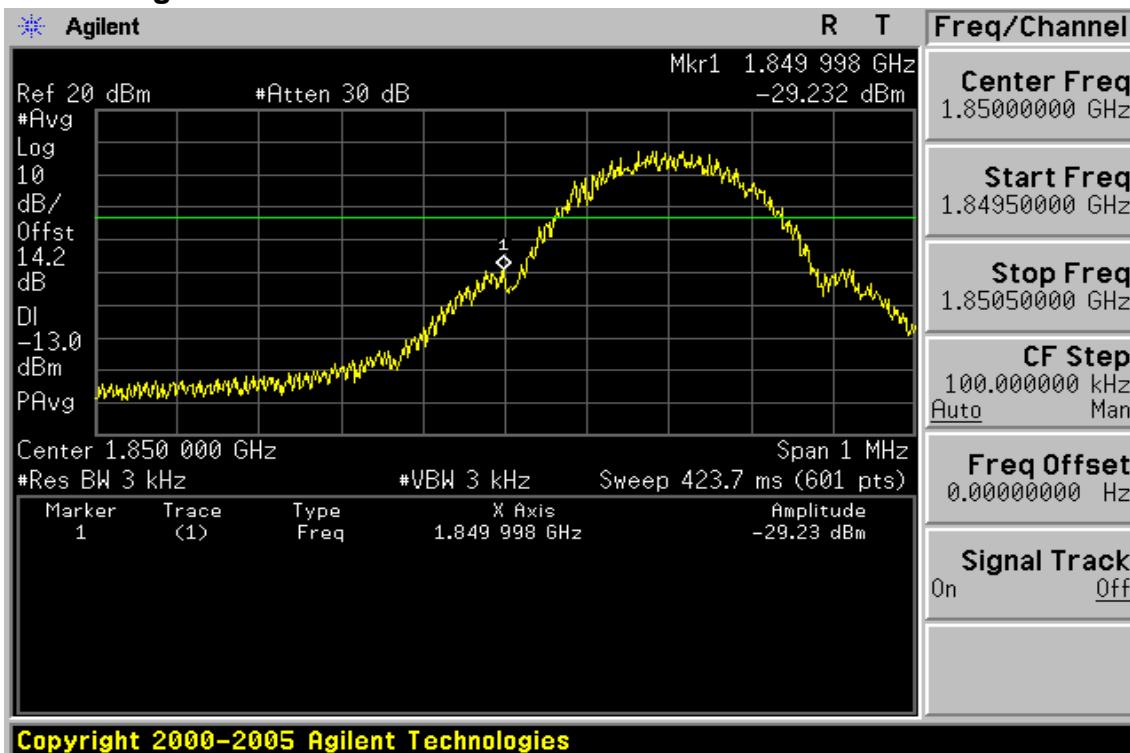
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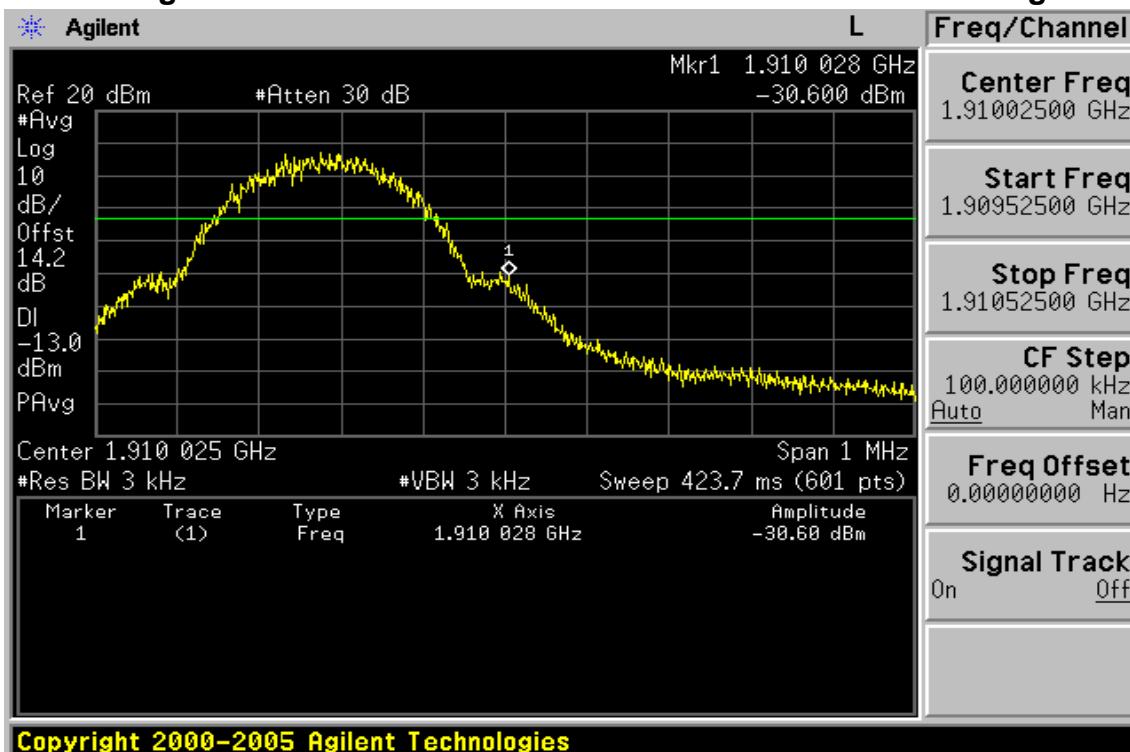
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## Band edge emission at antenna terminals – GPRS 1900 Channel Lowest



## Band edge emission at antenna terminals – GSM 1900 Channel Highest



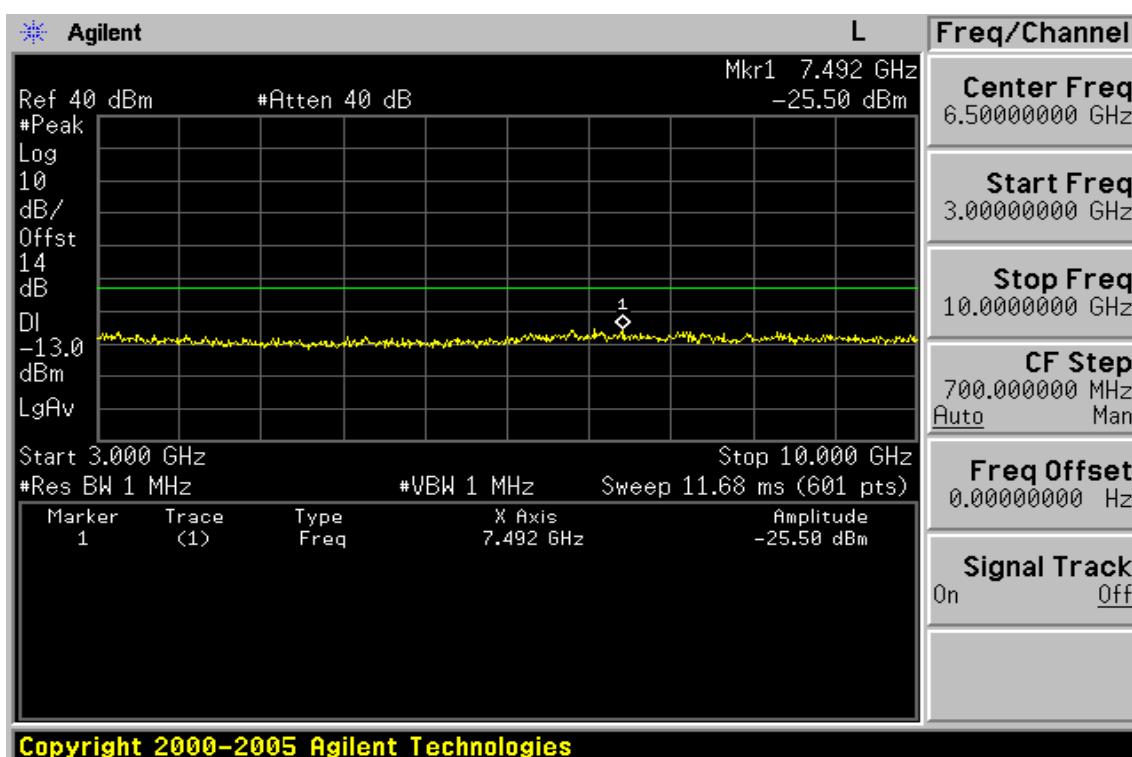
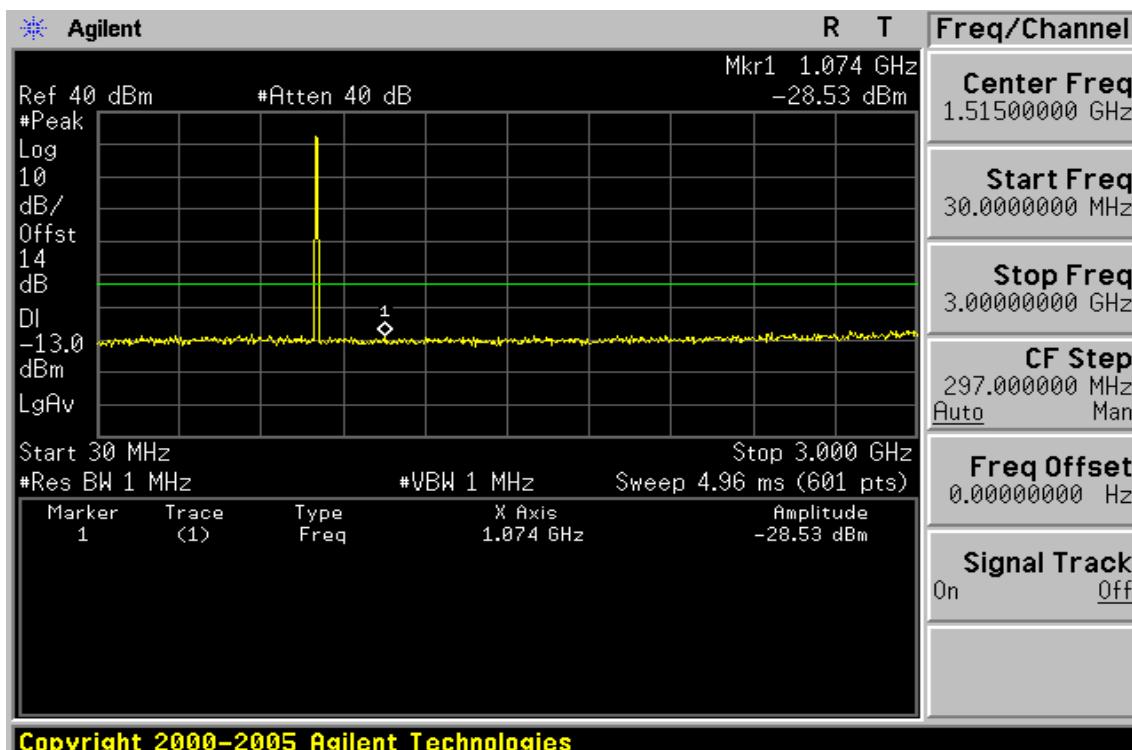
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## Out of Band emission at antenna terminals – EDGE 850 Channel Lowest



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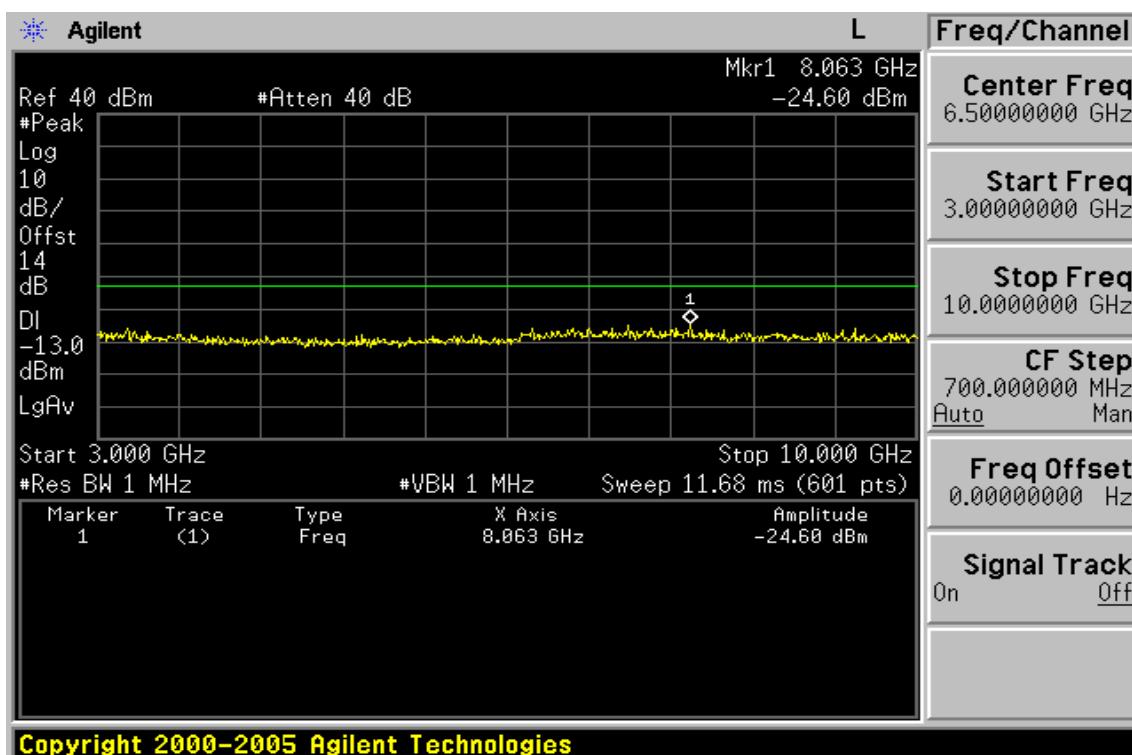
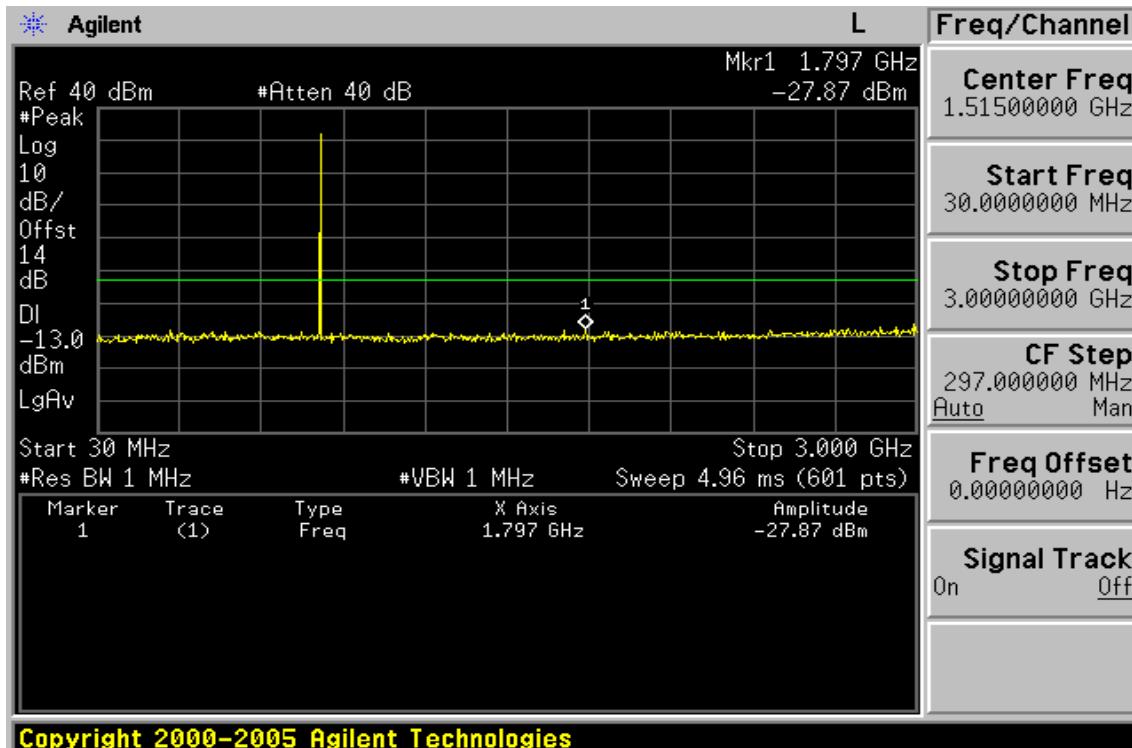
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## Out of Band emission at antenna terminals – EDGE 850 Channel Mid



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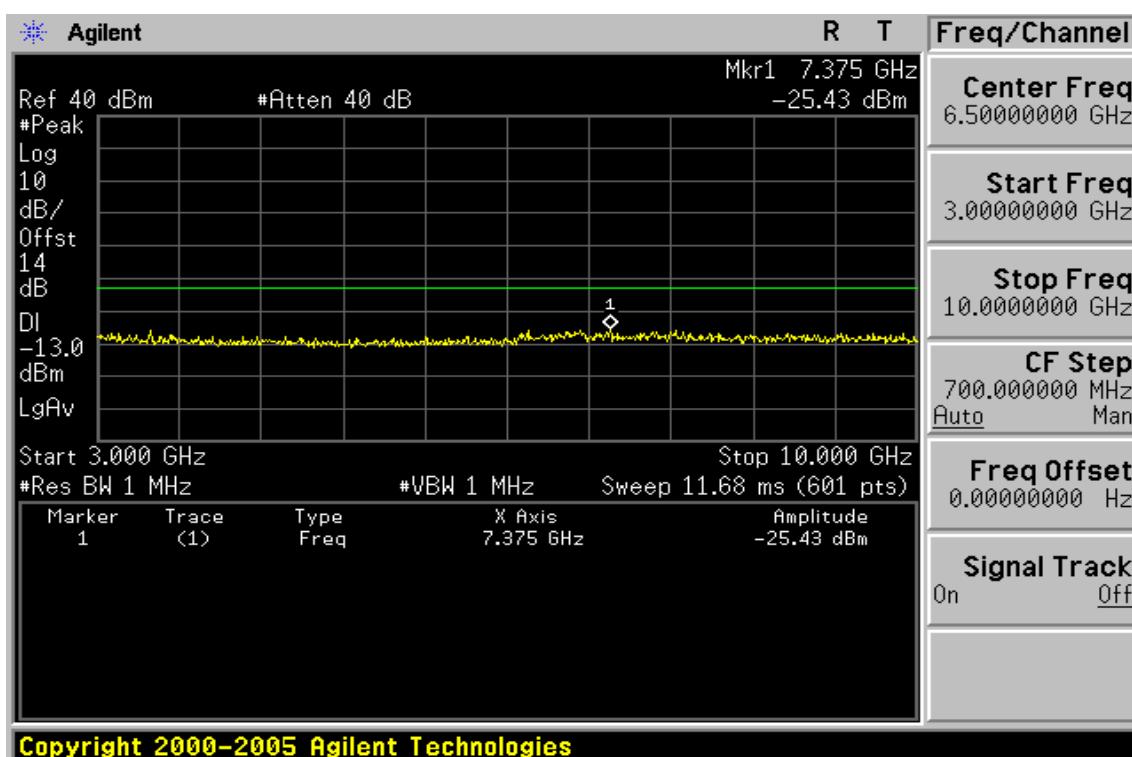
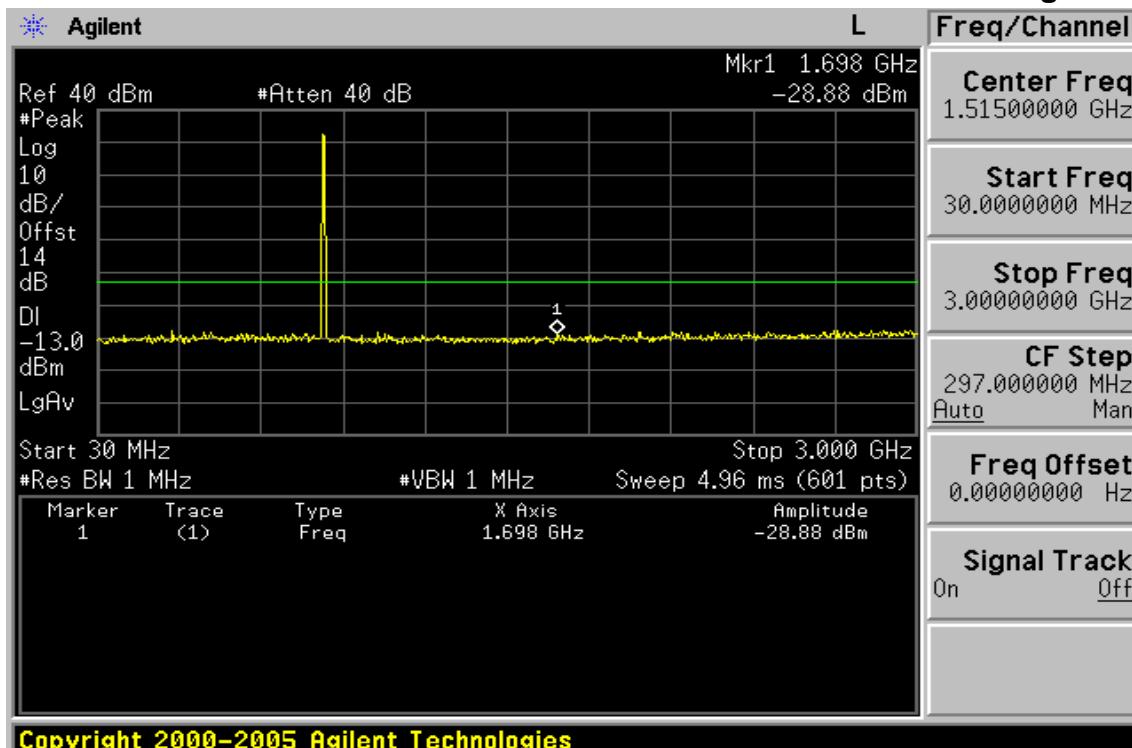
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## Out of Band emission at antenna terminals – EDGE 850 Channel Highest



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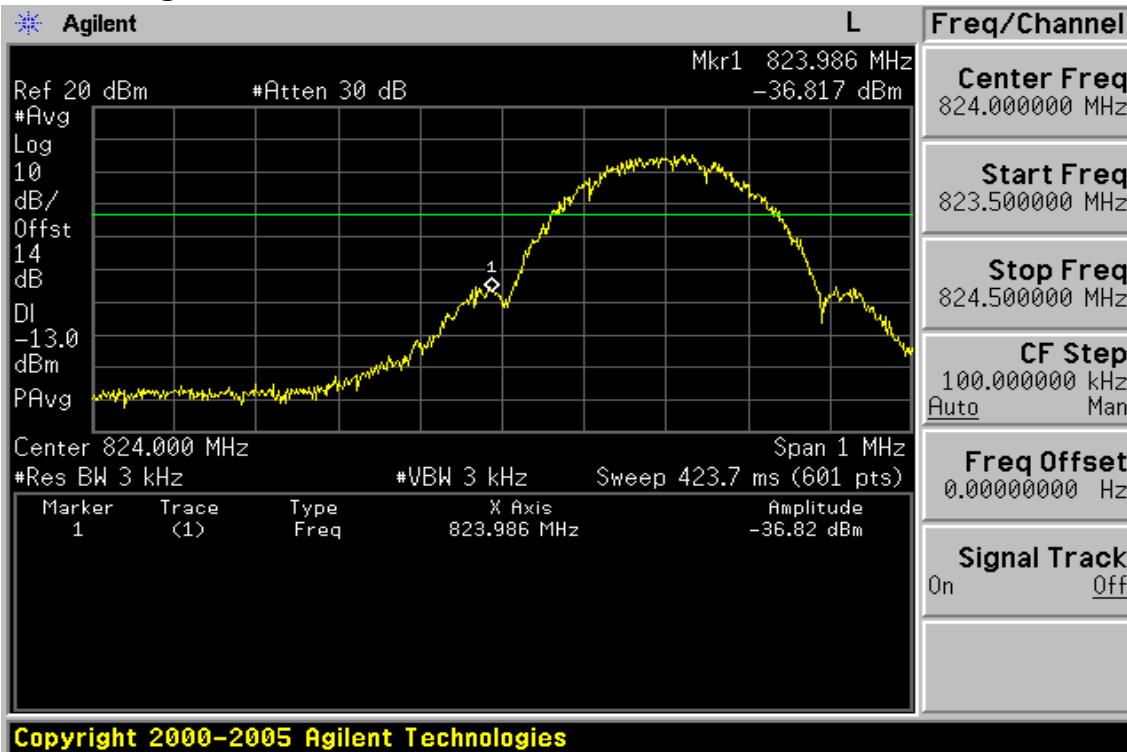
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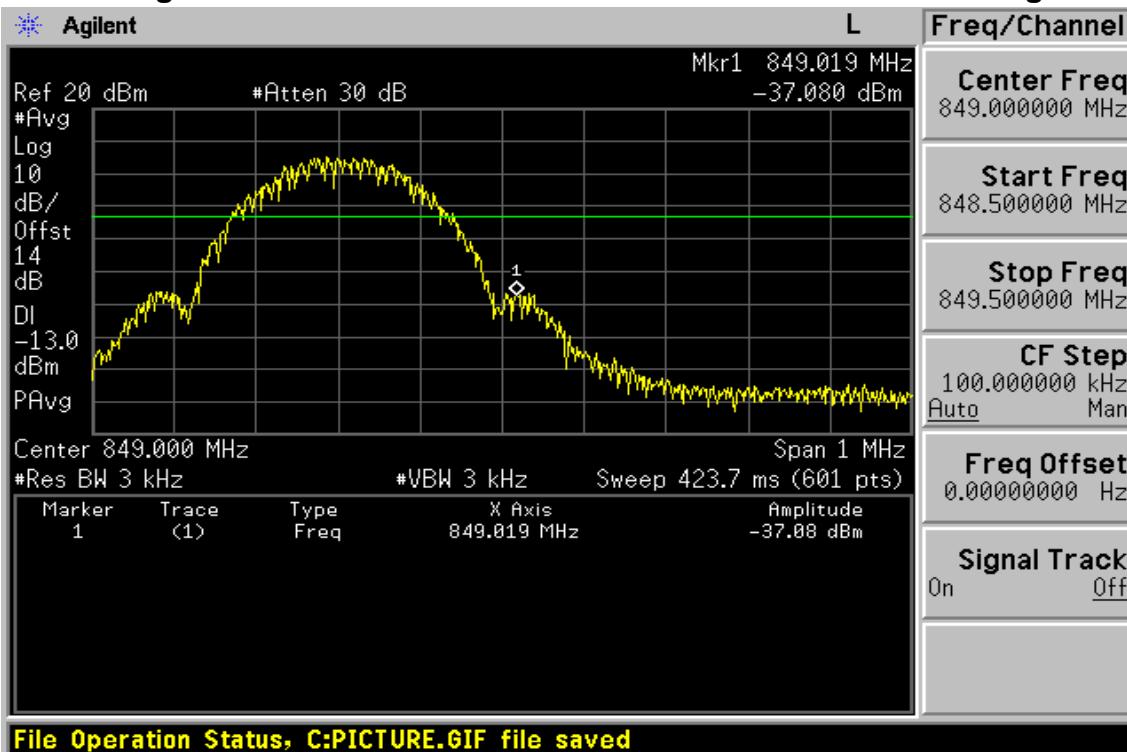
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## Band edge emission at antenna terminals – EDGE 850 Channel Lowest



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## Band edge emission at antenna terminals – EDGE 850 Channel Highest



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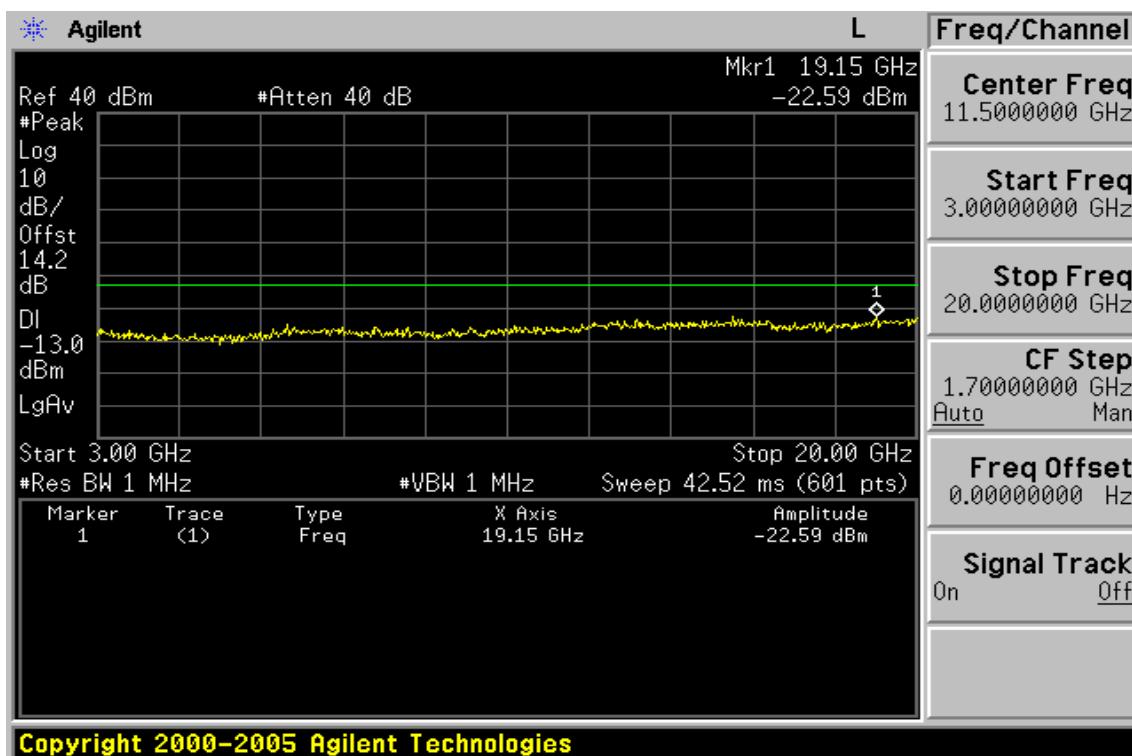
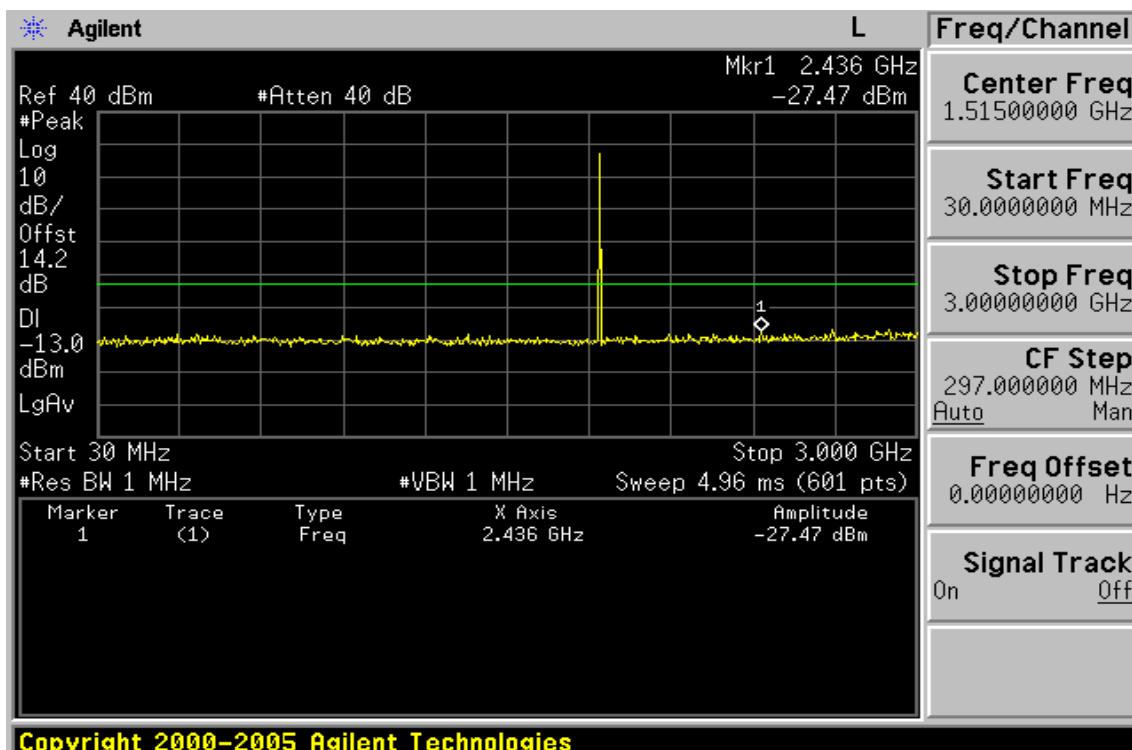
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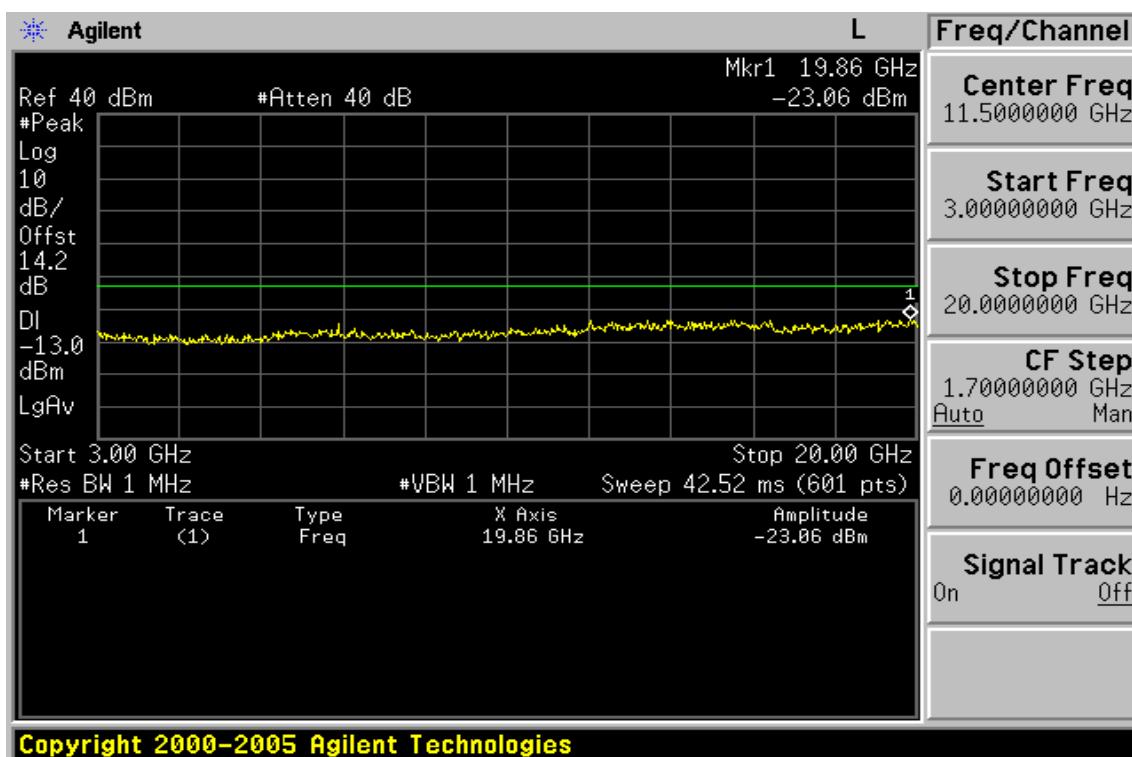
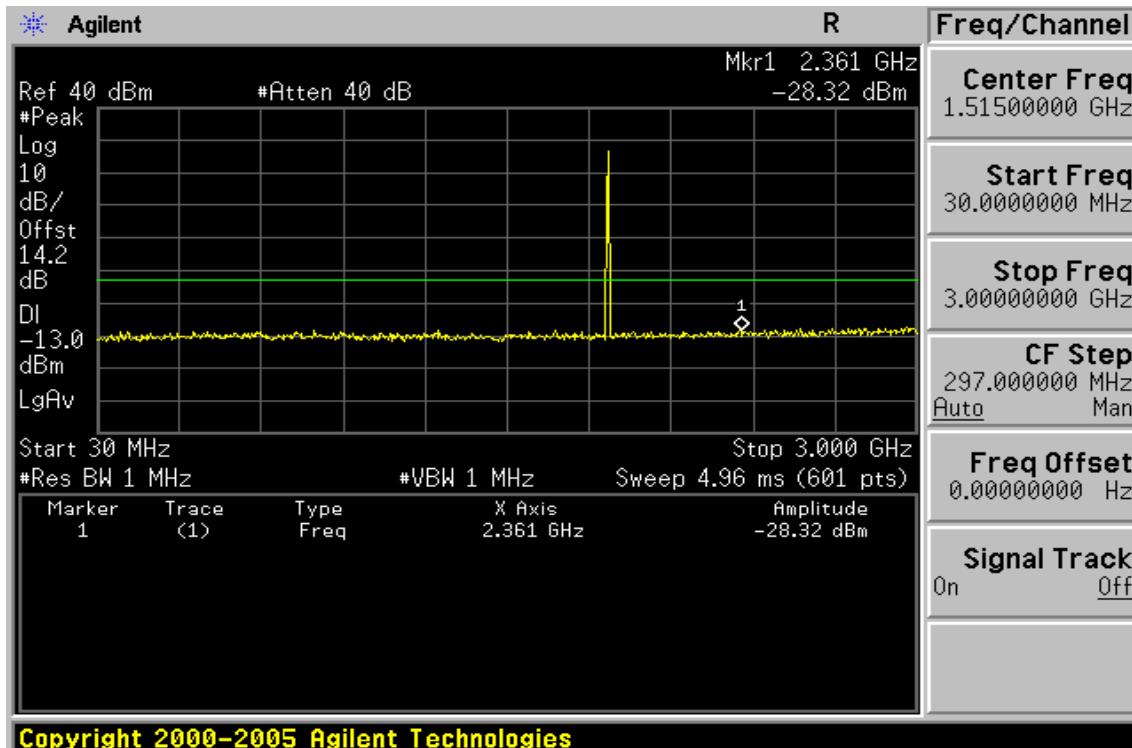
## Out of Band emission at antenna terminals – EDGE 1900 Channel Lowest



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**Out of Band emission at antenna terminals – EDGE 1900 Channel Mid**

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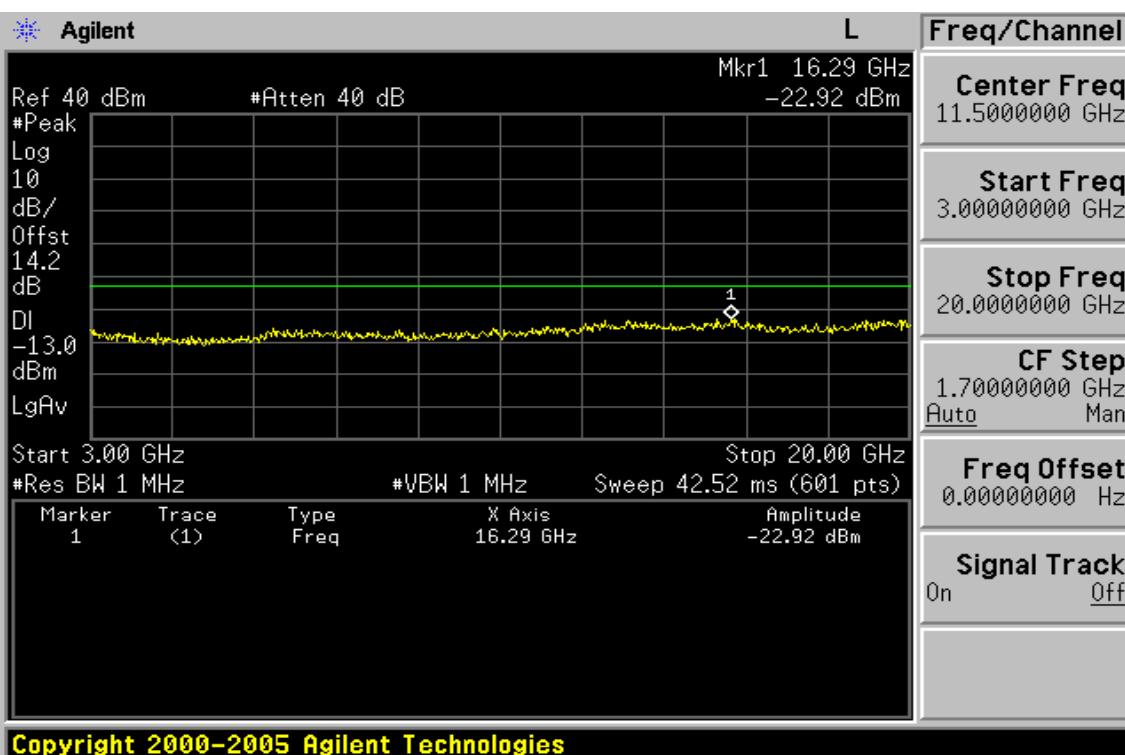
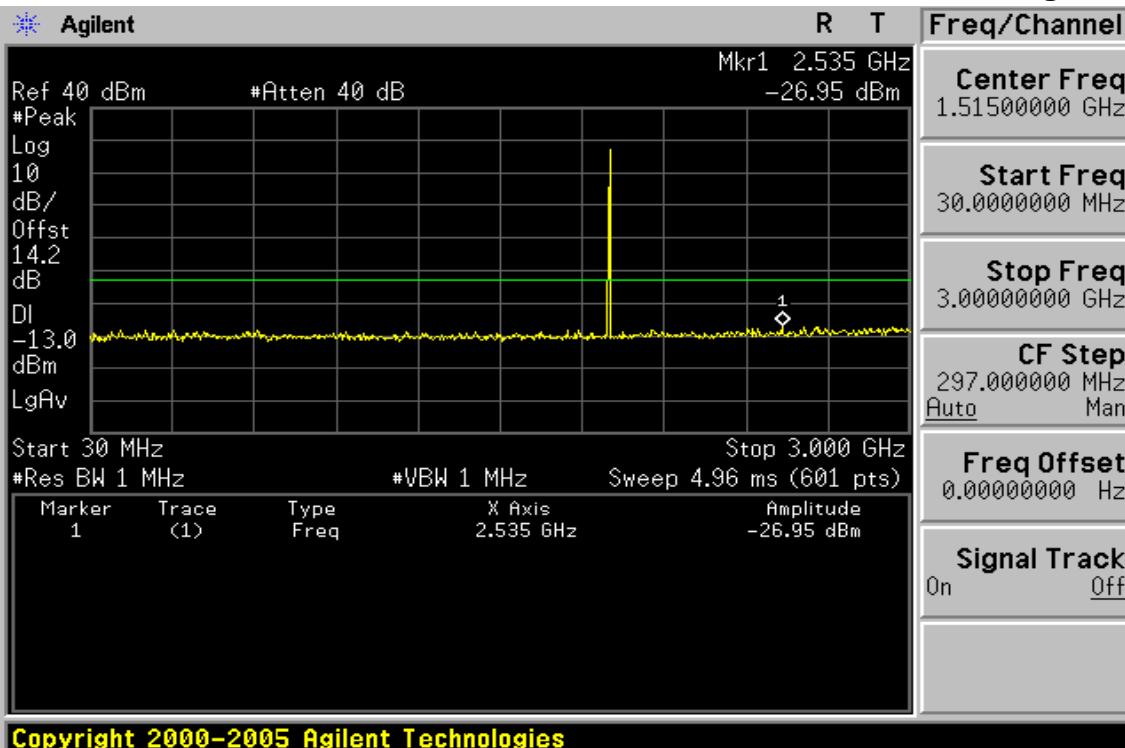
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## Out of Band emission at antenna terminals – EDGE 1900 Channel Highest

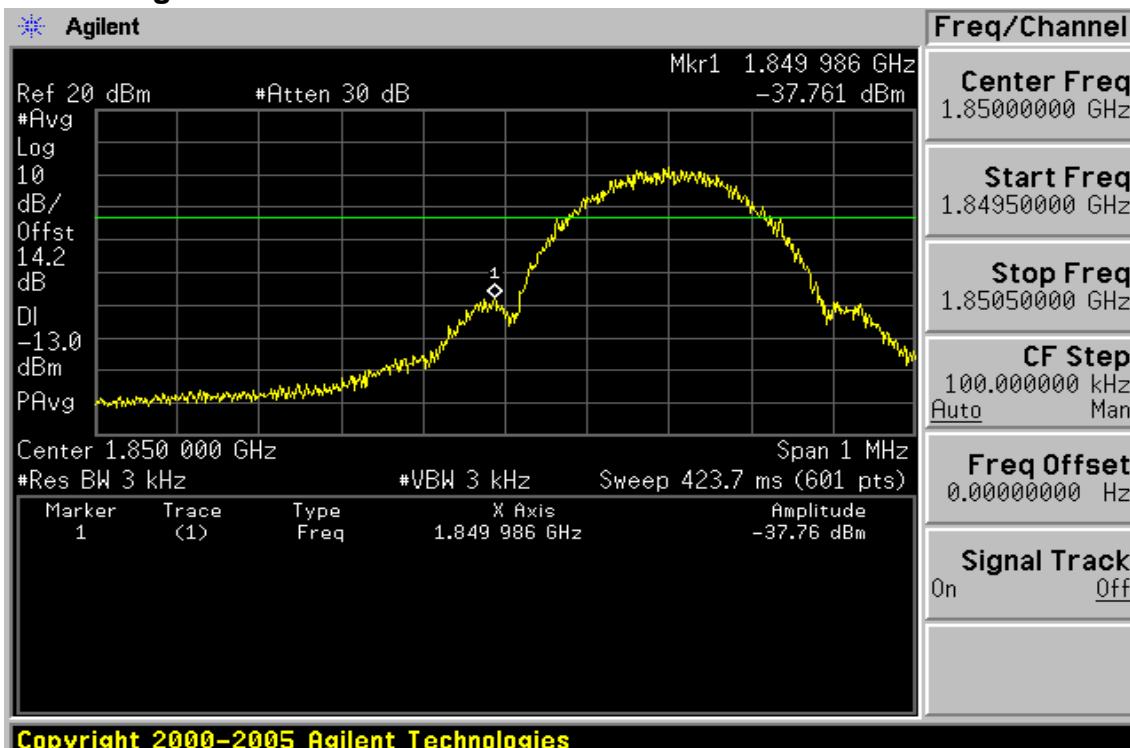


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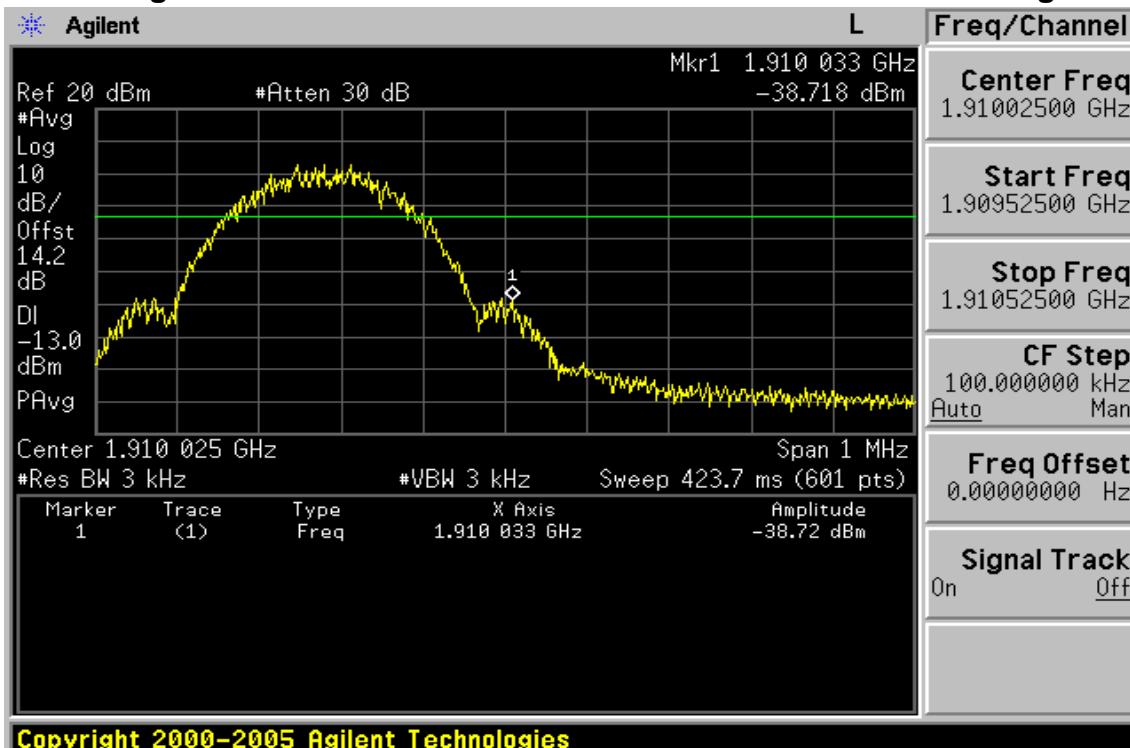
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## Band edge emission at antenna terminals – EDGE 1900 Channel Lowest



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## Band edge emission at antenna terminals – EDGE 1900 Channel Highest



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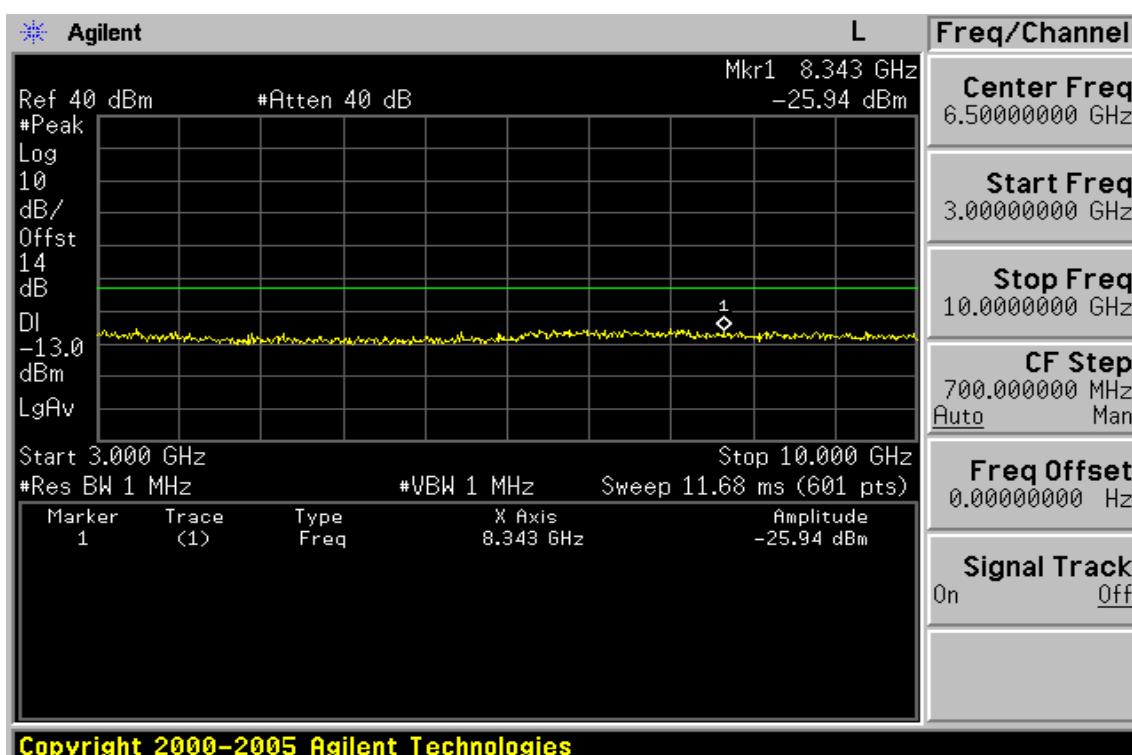
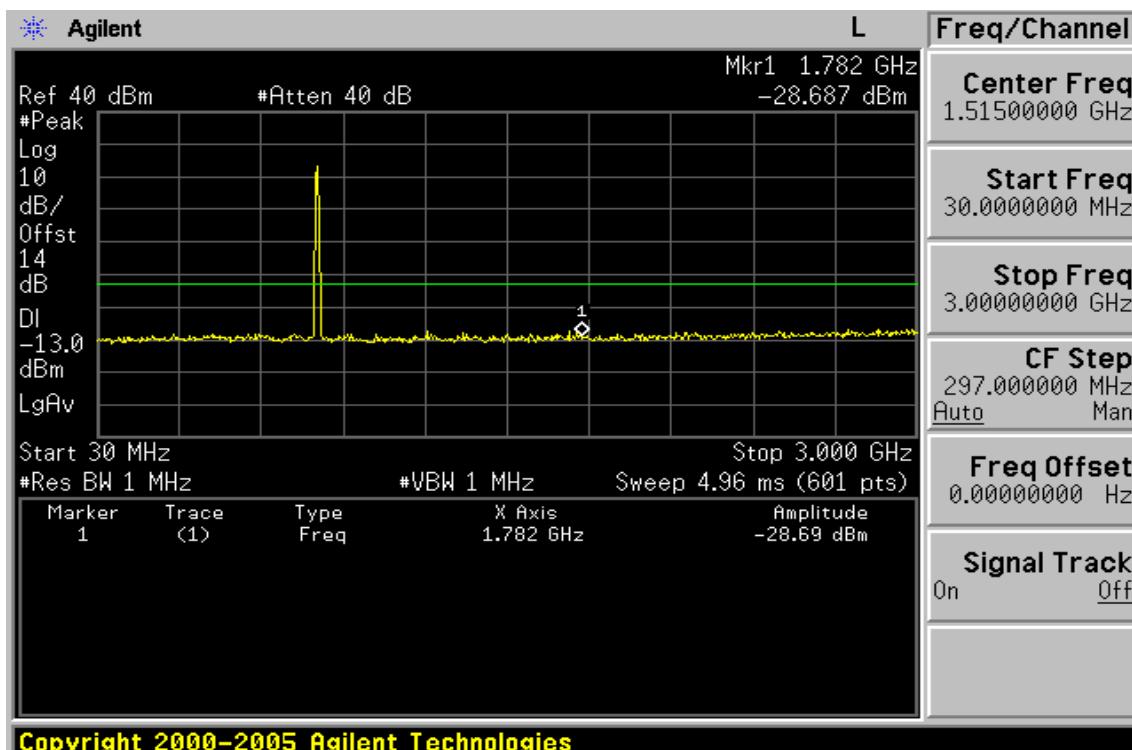
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## **Out of Band emission at antenna terminals – WCDMA V Channel Lowest**

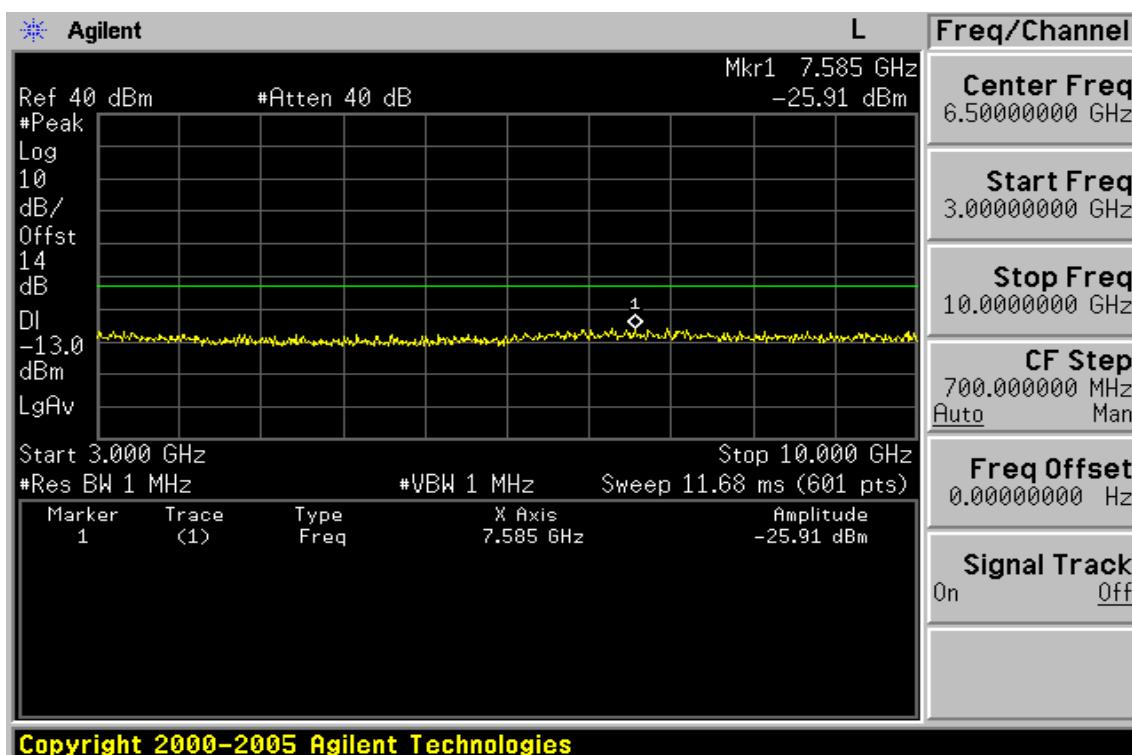
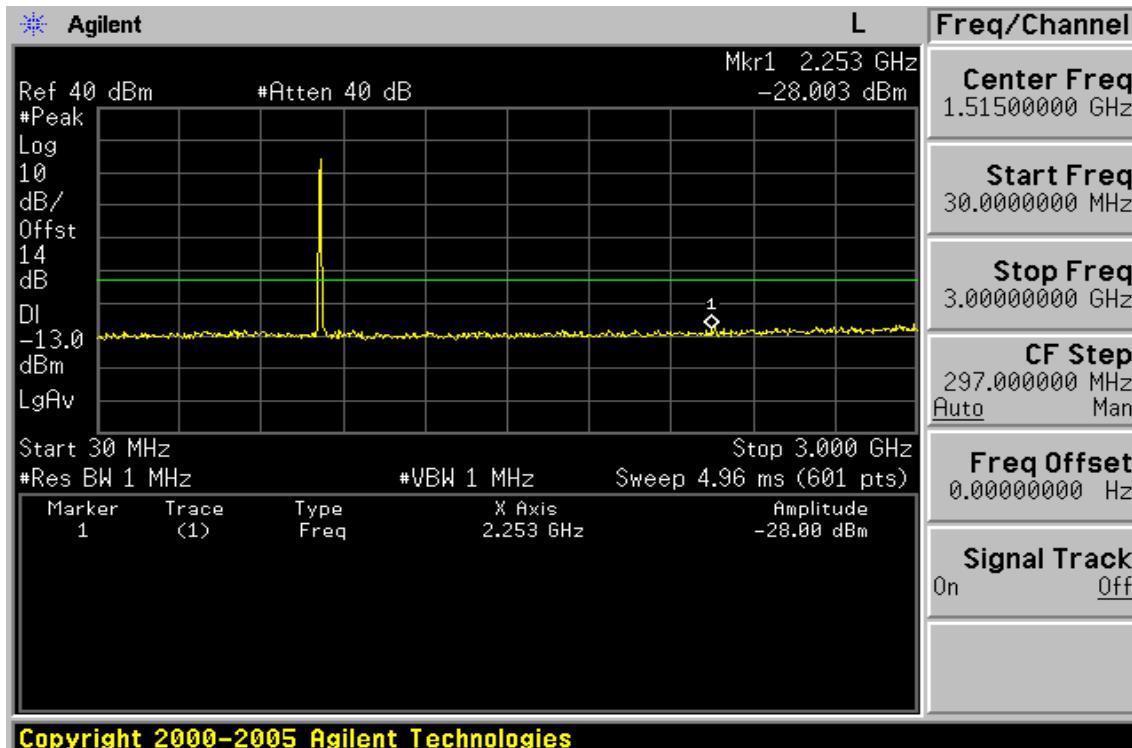


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## Out of Band emission at antenna terminals – WCDMA V Channel Mid



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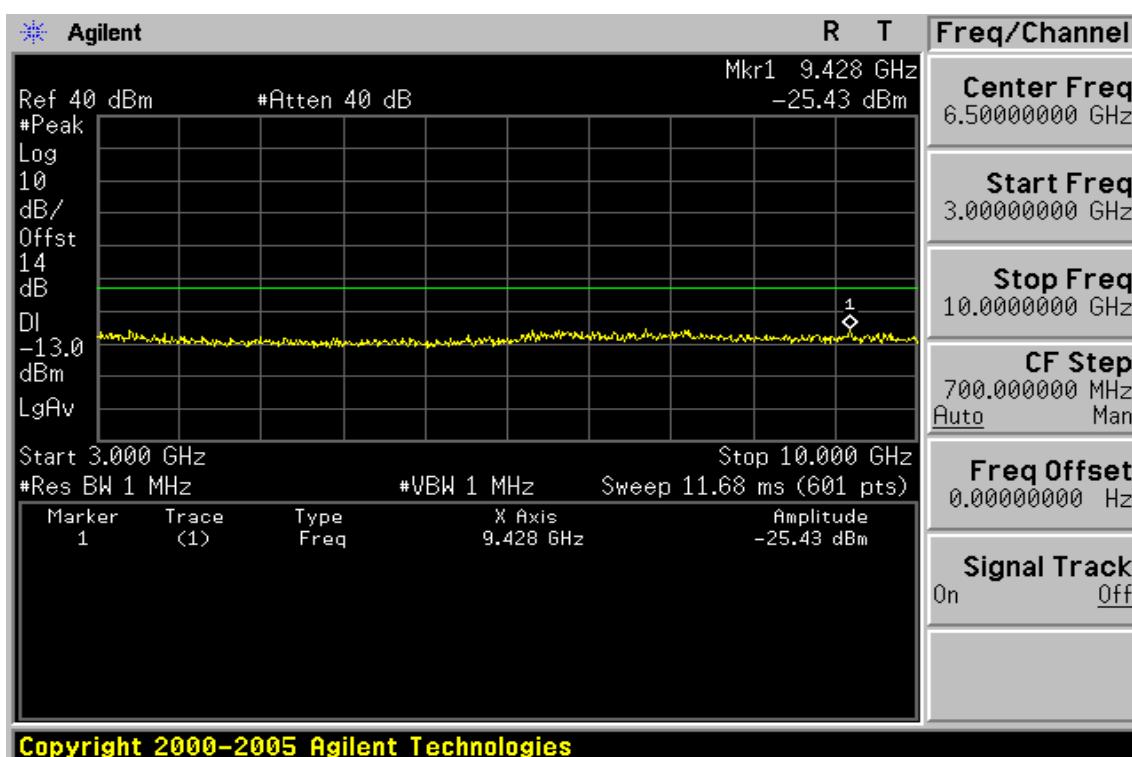
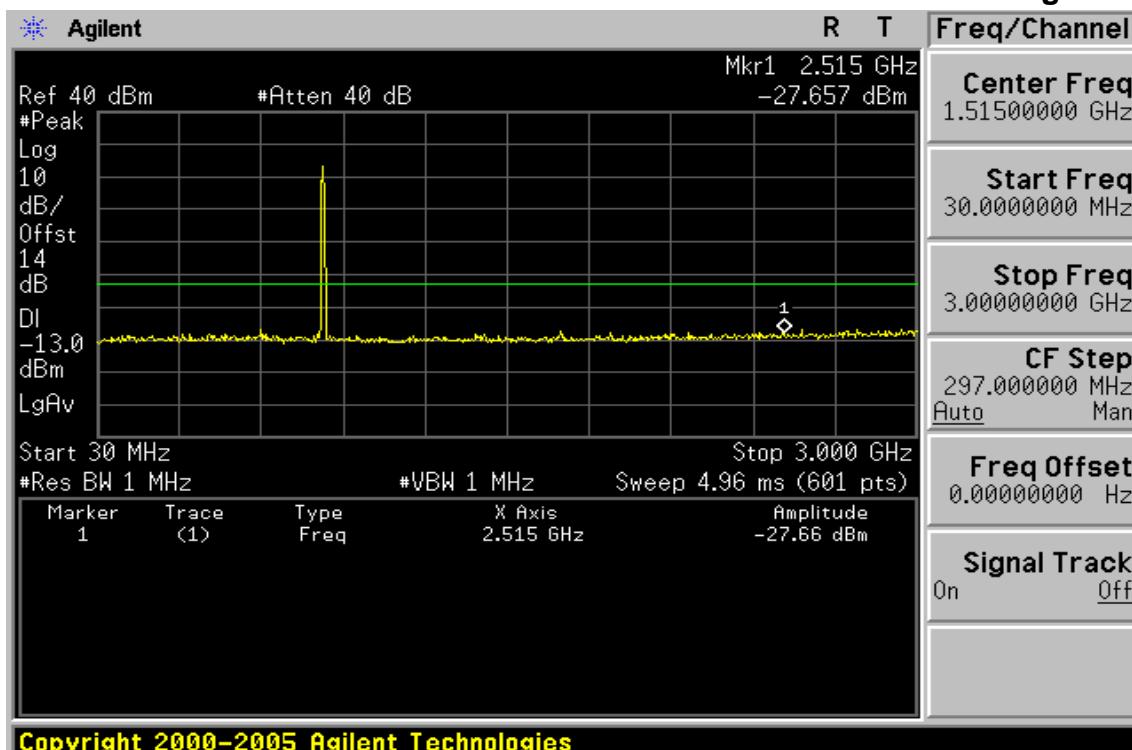
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## Out of Band emission at antenna terminals – WCDMA V Channel Highest



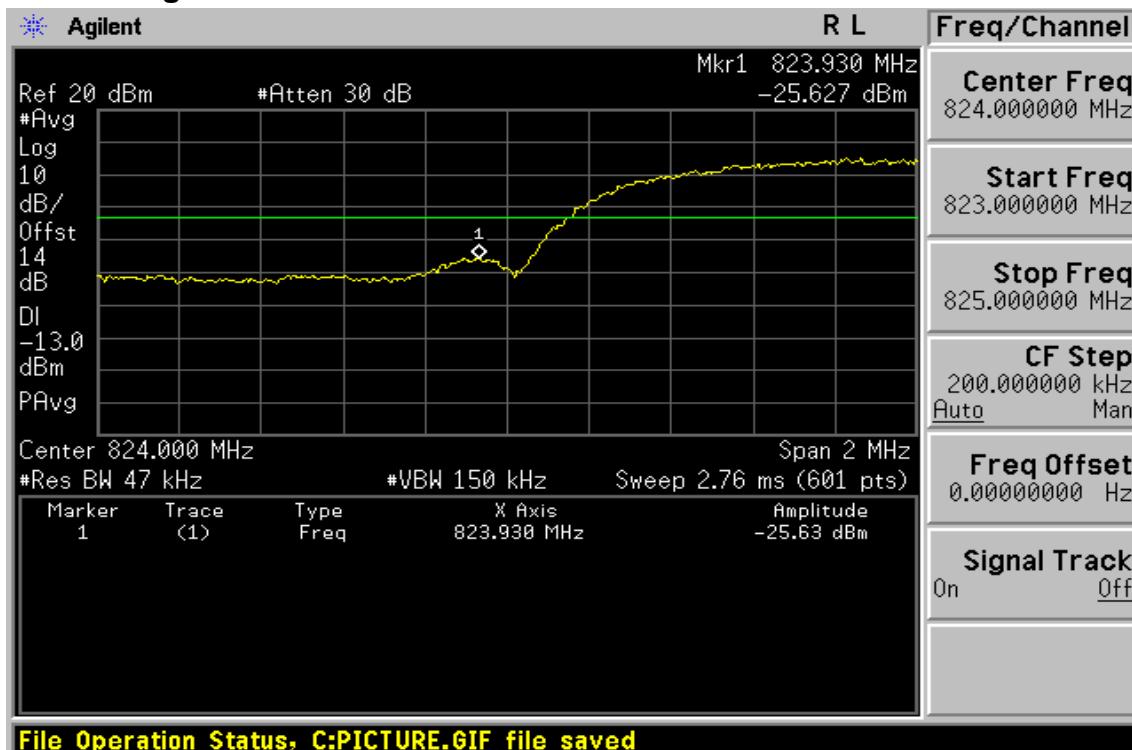
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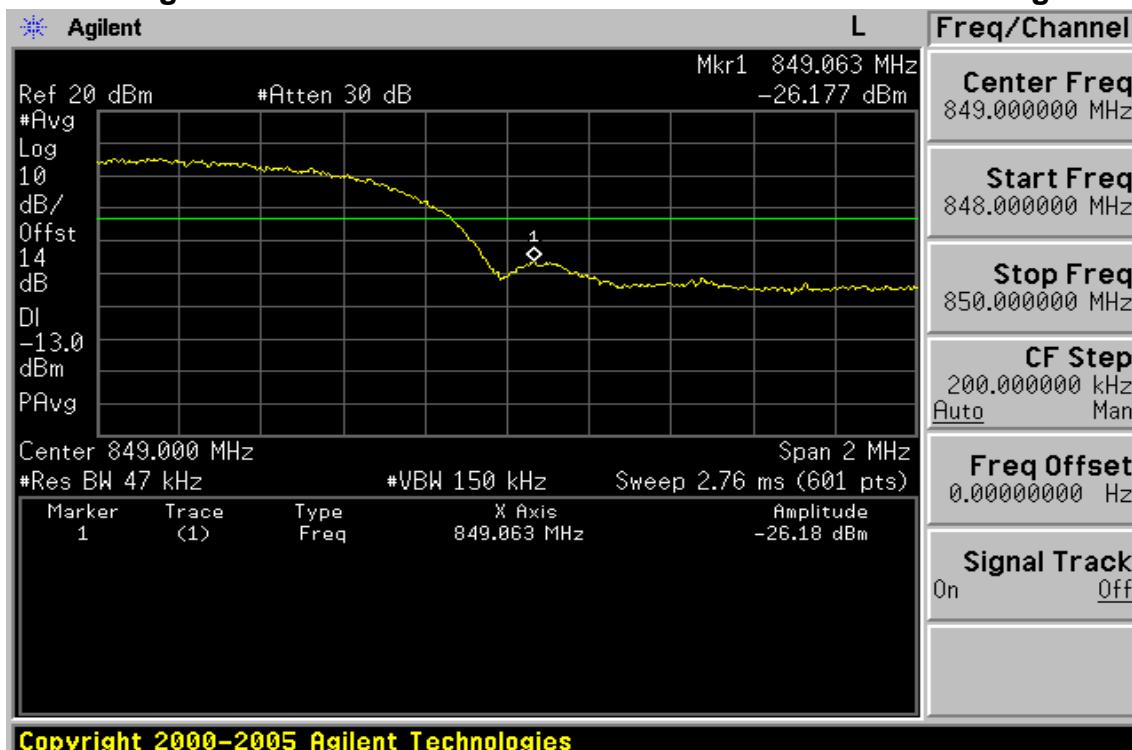
SGS Taiwan Ltd. | No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路134號

Band edge emission at antenna terminals – WCDMA V Channel Lowest



File Operation Status, C:PICTURE.GIF file saved

## Band edge emission at antenna terminals – WCDMA V Channel Highest



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## 10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

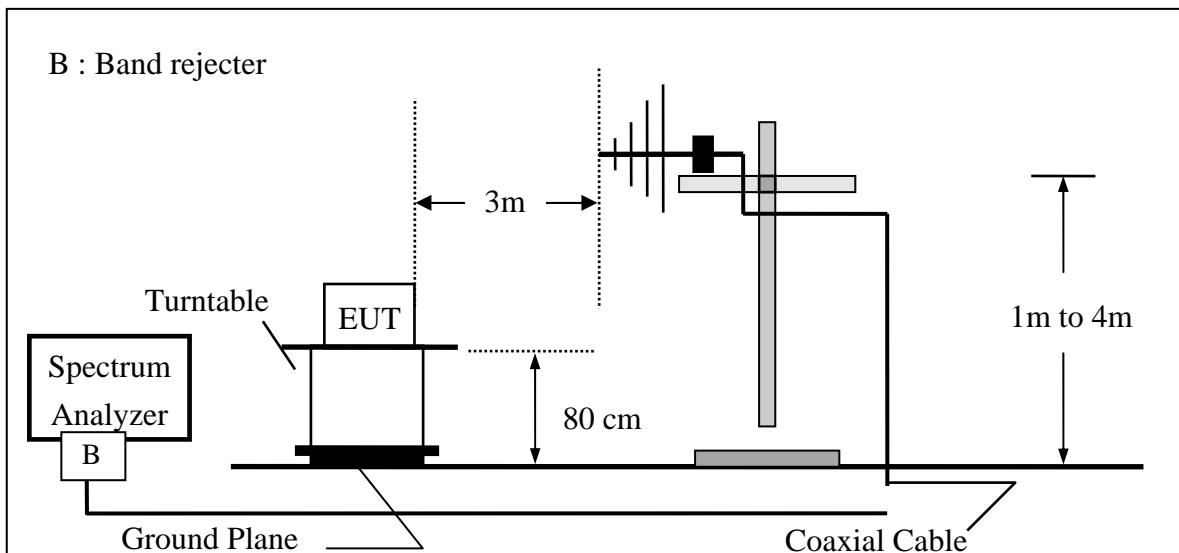
### 10.1. Standard Applicable

According to FCC §2.1053,

FCC §22.917(a) , §24.238(a) , §27.53(g)(h) the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than  $43 + 10 \log$  (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

### 10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz

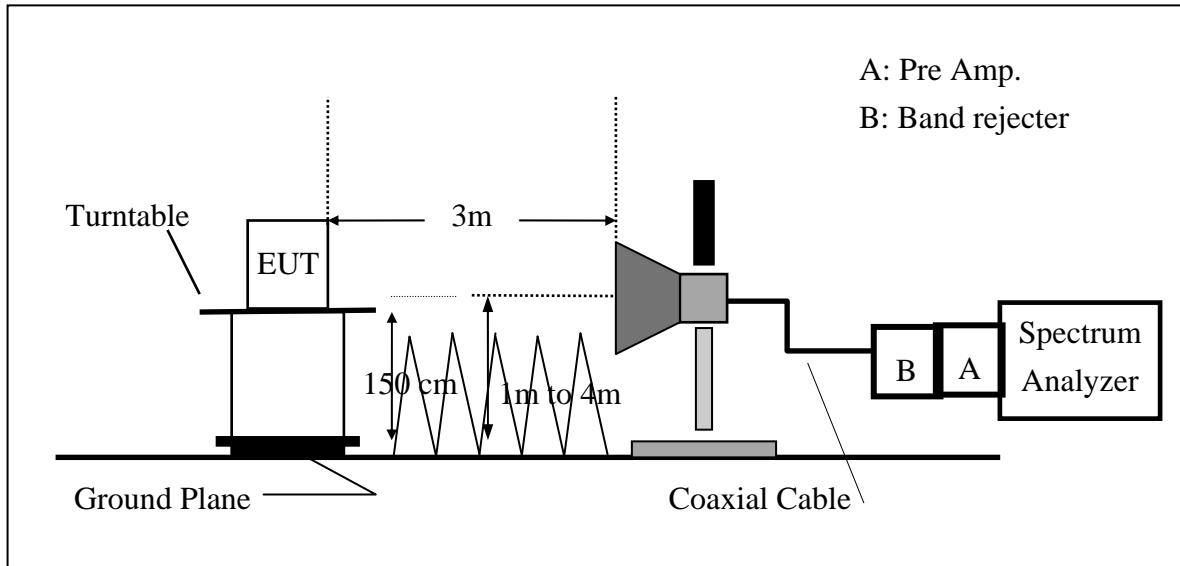


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## Radiated Emission Test Set-UP Frequency Over 1 GHz



### 10.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$$\text{ERP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBd)} - \text{Cable Loss (dB)}$$

$$\text{EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$$

$$\text{EIRP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBi)} + \text{Cable Loss(dB)}$$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.  
“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.  
“---” : denotes Noise Floor.

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#### 10.4. Measurement Equipment Used:

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	12/22/2014	12/21/2015
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/23/2014	12/22/2015
Bilog Antenna	SCHWAZBECK	VULB9160	3158	10/31/2014	10/30/2015
Horn antenna	ETS.LINDGREN	3117	123995	05/05/2015	05/04/2016
Horn antenna	ETS.LINDGREN	3117	123991	12/19/2014	12/18/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	12/25/2014	12/24/2015
Horn Antenna	Schwarzbeck	BBHA9170	185	07/25/2015	07/24/2016
Network Analyze	Anritsu	MS4644A	1216312	05/23/2015	05/22/2016
Signal Generator	Agilent	E4438C	MY45093613	07/31/2015	07/30/2016
Pre-Amplifier	Agilent	8447D	1937A02834	01/02/2015	01/01/2016
Pre-Amplifier	Agilent	8449B	3008A00578	01/02/2015	01/01/2016
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	004	01/02/2015	01/01/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	HUBER+SUHNER	966_Tx	10m	01/02/2015	01/01/2016
Low Loss Cable	HUBER+SUHNER	966_Rx	3m	01/02/2015	01/01/2016
Filter 800-1000	Micro-Tronics	EWT	M2	01/02/2015	01/01/2016
Filter 1800-2000	Micro-Tronics	EWT	M2	01/02/2015	01/01/2016
Filter 1700-1800	Micro-Tronics	BRC15751	001	01/02/2015	01/01/2016
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	01/02/2015	01/01/2016
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2015	01/01/2016
3m Site NSA	SGS	966 chamber	N/A	07/01/2015	06/30/2016

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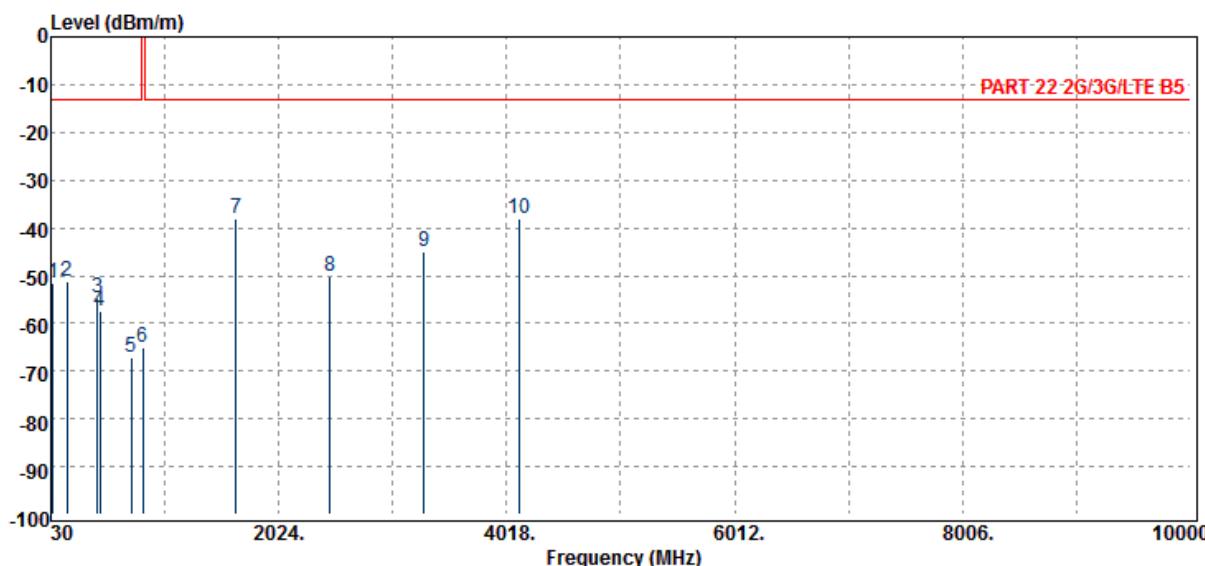
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## 10.5. Measurement Result:

## Radiated Spurious Emission Measurement Result: GPRS 850 Mode

ARFCN	:CH 128	Test Date	:2015-09-30
Operation Band	:GPRS 850	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:824.2 MHz	Engineer	:Curry
Operation Mode	:TX LOW		
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:VERTICAL



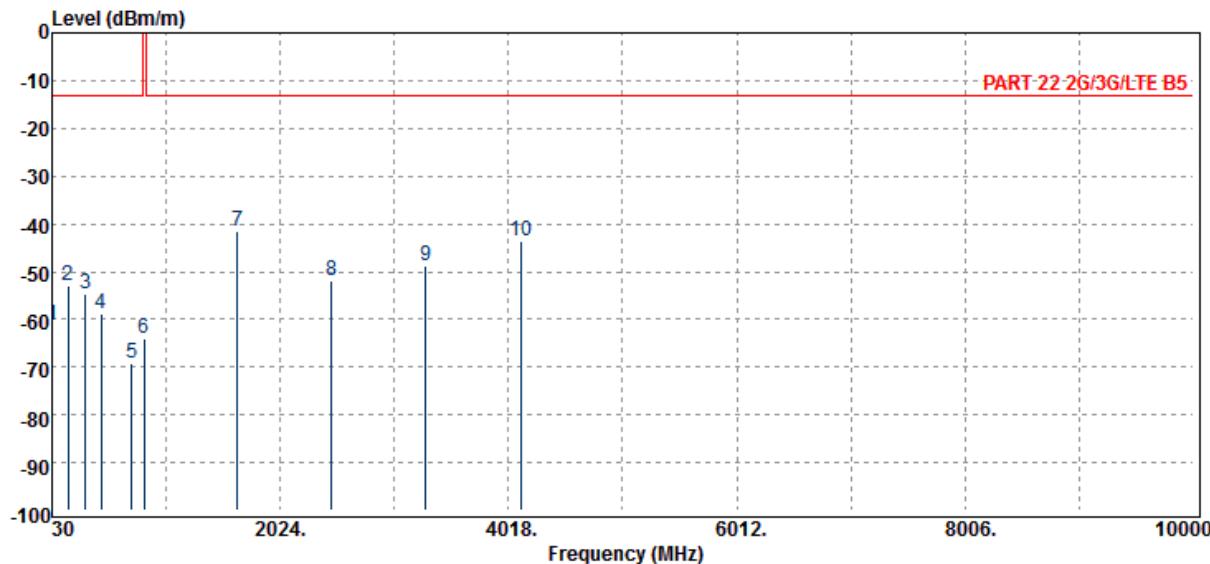
Freq.	Note	ERP	SG		Antenna	Cable	Limit	Margin
			Output Level					
MHz	F/H/E/S	dBm	dBm	dBd	dB	dBm	dB	
46.49	S	-51.51	-38.56	-12.07	-0.88	-13.00	-38.51	
168.71	S	-51.31	-49.03	-0.80	-1.48	-13.00	-38.31	
439.34	S	-54.51	-55.88	3.40	-2.03	-13.00	-41.51	
460.68	S	-57.52	-58.86	3.44	-2.10	-13.00	-44.52	
730.34	S	-67.25	-67.92	3.32	-2.65	-13.00	-54.25	
837.04	S	-64.93	-65.41	3.46	-2.98	38.45	-103.38	
1648.40	H	-38.19	-37.04	3.05	-4.21	-13.00	-25.19	
2472.60	H	-50.34	-48.61	3.59	-5.32	-13.00	-37.34	
3296.80	H	-44.89	-44.12	5.57	-6.34	-13.00	-31.89	
4121.00	H	-38.22	-37.27	6.55	-7.50	-13.00	-25.22	

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ARFCN :CH 128  
 Operation Band :GPRS 850  
 Fundamental Frequency :824.2 MHz  
 Operation Mode :TX LOW  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



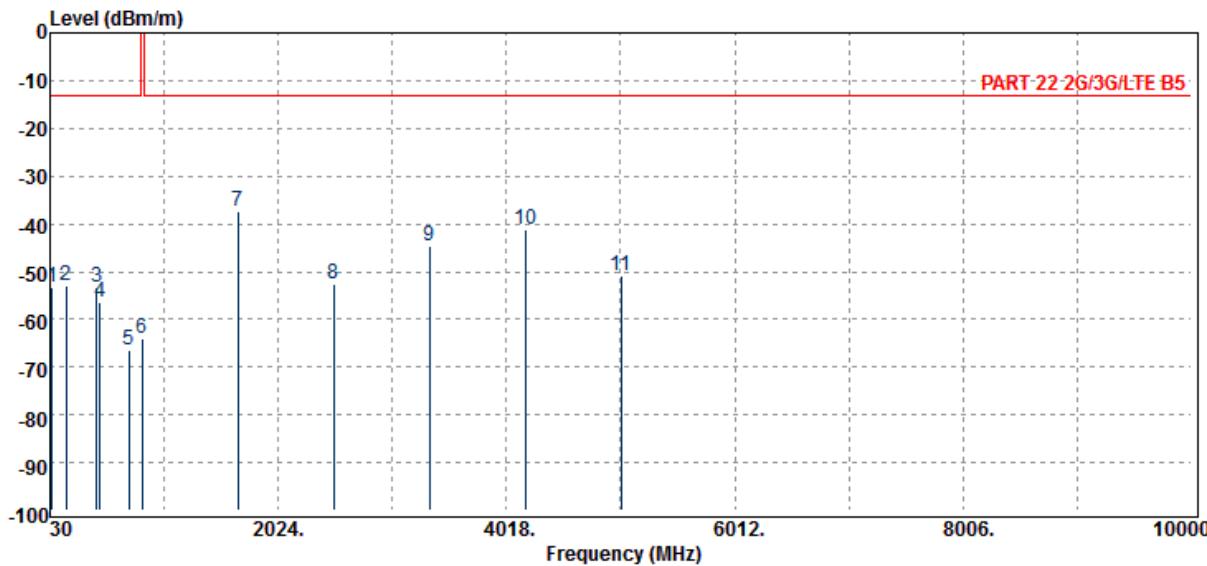
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
31.94	S	-61.31	-46.19	-14.37	-0.75	-13.00	-48.31
167.74	S	-52.82	-50.48	-0.87	-1.47	-13.00	-39.82
319.06	S	-54.66	-56.48	3.68	-1.86	-13.00	-41.66
461.65	S	-58.80	-60.15	3.44	-2.10	-13.00	-45.80
726.46	S	-69.22	-69.91	3.33	-2.64	-13.00	-56.22
837.04	S	-64.13	-64.62	3.46	-2.98	38.45	-102.58
1648.40	H	-41.46	-40.30	3.05	-4.21	-13.00	-28.46
2472.60	H	-52.00	-50.27	3.59	-5.32	-13.00	-39.00
3296.80	H	-48.62	-47.85	5.57	-6.34	-13.00	-35.62
4121.00	H	-43.69	-42.75	6.55	-7.50	-13.00	-30.69

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ARFCN :CH 190      Test Date :2015-09-30  
 Operation Band :GPRS 850      Temp./Humi. :22 deg\_C / 62 RH  
 Fundamental Frequency :836.6 MHz      Engineer :Curry  
 Operation Mode :TX MID  
 EUT Pol. :E2 Plan      Measurement Antenna Pol. :VERTICAL



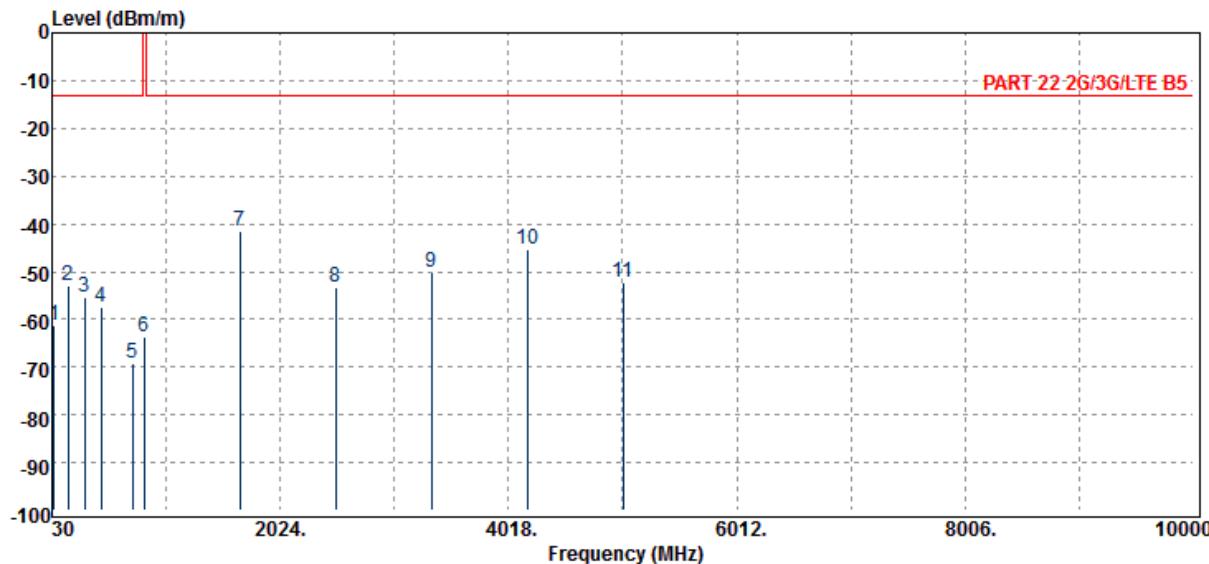
Freq. MHz	Note F/H/E/S	ERP dBm	SG Output Level dBm		Antenna Gain dBd	Cable Loss dB	Limit dBm	Margin dB
			Output Level dBm	SG Output Level dBm				
44.55	S	-53.24	-39.99	-12.39	-0.87	-13.00	-40.24	
167.74	S	-52.86	-50.52	-0.87	-1.47	-13.00	-39.86	
435.46	S	-53.21	-54.61	3.42	-2.02	-13.00	-40.21	
469.41	S	-56.40	-57.78	3.51	-2.12	-13.00	-43.40	
720.64	S	-66.44	-67.15	3.34	-2.63	-13.00	-53.44	
837.04	S	-63.97	-64.45	3.46	-2.98	38.45	-102.42	
1673.20	H	-37.50	-36.25	3.01	-4.26	-13.00	-24.50	
2509.80	H	-52.65	-50.97	3.67	-5.35	-13.00	-39.65	
3346.40	H	-44.47	-43.93	5.71	-6.25	-13.00	-31.47	
4183.00	H	-41.19	-40.12	6.60	-7.66	-13.00	-28.19	
5019.60	H	-50.98	-50.21	7.66	-8.43	-13.00	-37.98	

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ARFCN :CH 190  
 Operation Band :GPRS 850  
 Fundamental Frequency :836.6 MHz  
 Operation Mode :TX MID  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



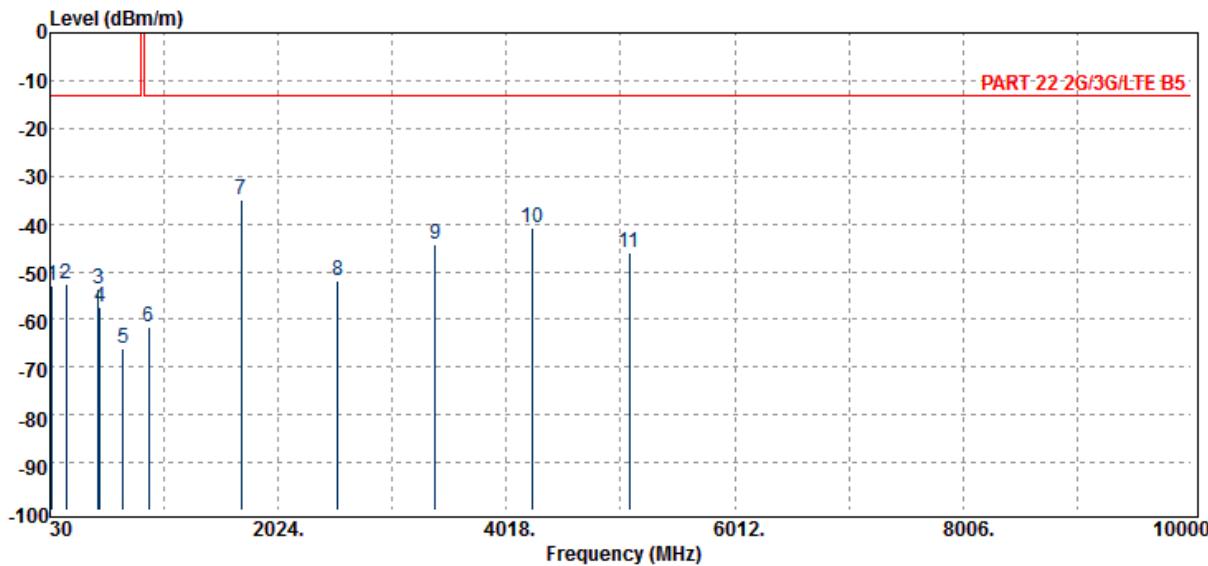
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
46.49	S	-61.18	-48.22	-12.07	-0.88	-13.00	-48.18
167.74	S	-52.96	-50.61	-0.87	-1.47	-13.00	-39.96
313.24	S	-55.52	-57.35	3.66	-1.84	-13.00	-42.52
461.65	S	-57.35	-58.70	3.44	-2.10	-13.00	-44.35
736.16	S	-69.33	-69.97	3.31	-2.66	-13.00	-56.33
837.04	S	-63.50	-63.99	3.46	-2.98	38.45	-101.95
1673.20	H	-41.53	-40.28	3.01	-4.26	-13.00	-28.53
2509.80	H	-53.17	-51.49	3.67	-5.35	-13.00	-40.17
3346.40	H	-50.15	-49.62	5.71	-6.25	-13.00	-37.15
4183.00	H	-45.43	-44.37	6.60	-7.66	-13.00	-32.43
5019.60	H	-52.17	-51.40	7.66	-8.43	-13.00	-39.17

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ARFCN :CH 251  
 Operation Band :GPRS 850  
 Fundamental Frequency :848.8 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :VERTICAL



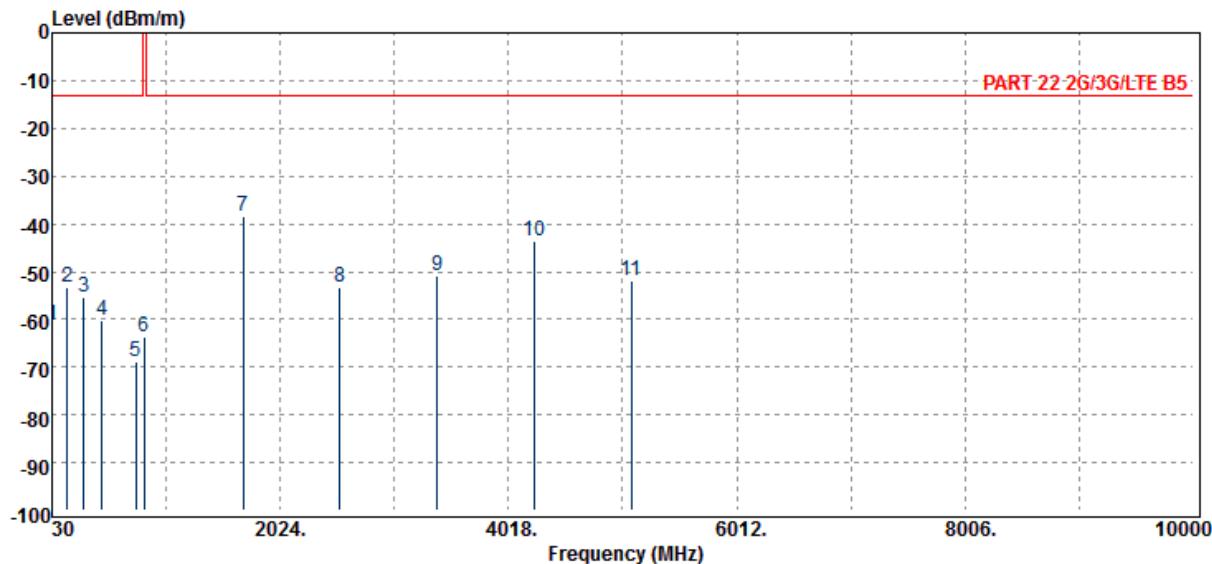
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
47.46	S	-53.00	-40.22	-11.89	-0.89	-13.00	-40.00
167.74	S	-52.46	-50.12	-0.87	-1.47	-13.00	-39.46
449.04	S	-53.56	-54.85	3.35	-2.06	-13.00	-40.56
464.56	S	-57.59	-58.95	3.47	-2.11	-13.00	-44.59
667.29	S	-66.06	-66.97	3.55	-2.64	-13.00	-53.06
891.36	S	-61.63	-61.81	3.30	-3.12	-13.00	-48.63
1697.60	H	-35.10	-33.79	2.96	-4.28	-13.00	-22.10
2546.40	H	-51.88	-50.22	3.75	-5.41	-13.00	-38.88
3395.20	H	-44.42	-43.80	5.85	-6.47	-13.00	-31.42
4244.00	H	-40.82	-39.75	6.65	-7.73	-13.00	-27.82
5090.60	H	-46.00	-45.23	7.71	-8.48	-13.00	-33.00

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ARFCN :CH 251  
 Operation Band :GPRS 850  
 Fundamental Frequency :848.8 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP dBm	SG Output Level dBm		Antenna Gain dBd	Cable Loss dB	Limit dBm	Margin dB
			Output Level dBm	SG Output Level dBm				
31.94	S	-61.20	-46.07	-14.37	-0.75	-13.00	-48.20	
166.77	S	-53.34	-50.93	-0.94	-1.47	-13.00	-40.34	
311.30	S	-55.46	-57.29	3.66	-1.83	-13.00	-42.46	
466.50	S	-60.29	-61.66	3.49	-2.11	-13.00	-47.29	
760.41	S	-68.99	-69.58	3.32	-2.72	-13.00	-55.99	
837.04	S	-63.61	-64.10	3.46	-2.98	38.45	-102.06	
1697.60	H	-38.56	-37.25	2.96	-4.28	-13.00	-25.56	
2546.40	H	-53.25	-51.59	3.75	-5.41	-13.00	-40.25	
3395.20	H	-50.85	-50.23	5.85	-6.47	-13.00	-37.85	
4244.00	H	-43.51	-42.44	6.65	-7.73	-13.00	-30.51	
5090.60	H	-51.87	-51.10	7.71	-8.48	-13.00	-38.87	

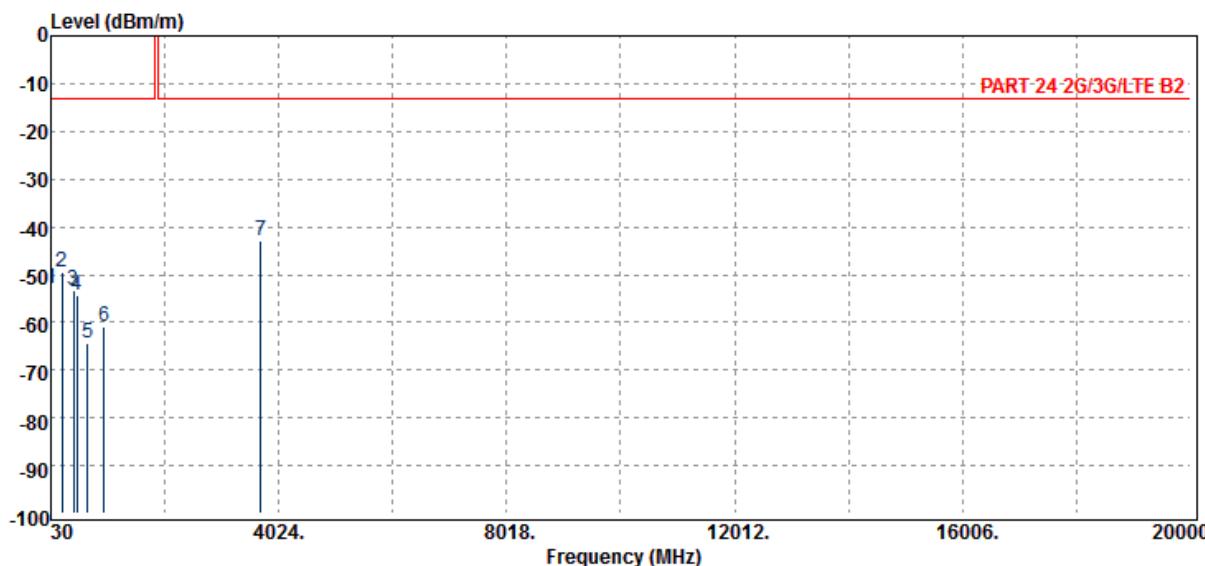
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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### Radiated Spurious Emission Measurement Result: GSM 1900 Mode

ARFCN :CH 512      Test Date :2015-09-30  
 Operation Band :GPRS 1900      Temp./Humi. :22 deg\_C / 62 RH  
 Fundamental Frequency :1850.2 MHz      Engineer :Curry  
 Operation Mode :TX LOW  
 EUT Pol. :E2 Plan      Measurement Antenna Pol. :VERTICAL



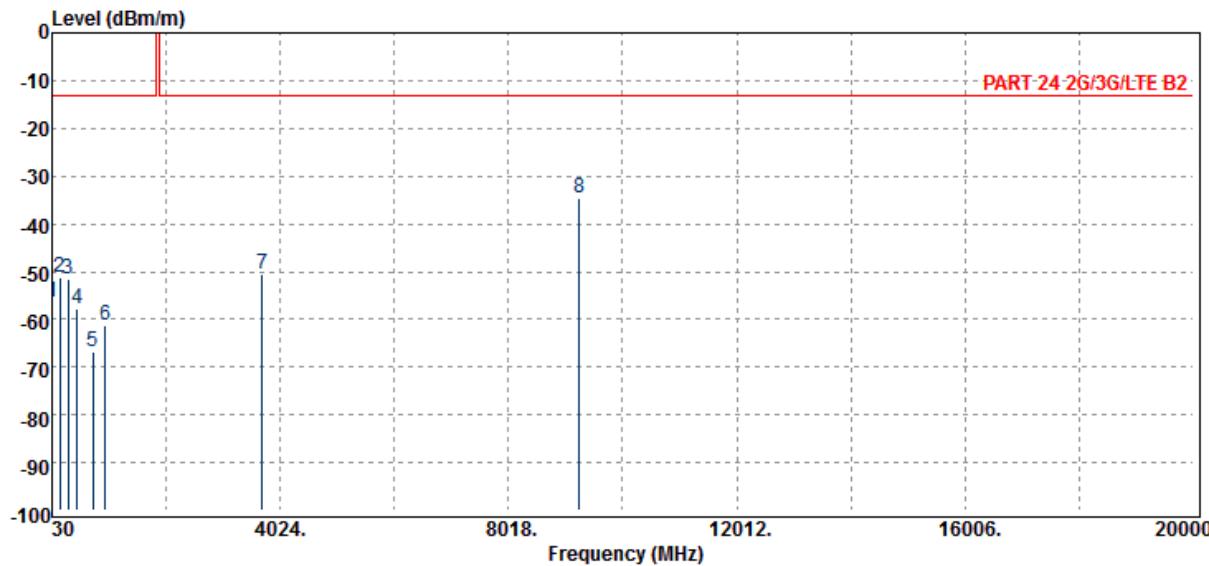
Freq. MHz	Note F/H/E/S	EIRP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-52.85	-40.11	-11.98	-0.76	-13.00	-39.85
225.94	S	-49.35	-53.25	5.47	-1.57	-13.00	-36.35
425.76	S	-53.28	-56.91	5.62	-1.99	-13.00	-40.28
482.99	S	-54.36	-57.93	5.77	-2.20	-13.00	-41.36
667.29	S	-64.21	-67.27	5.70	-2.64	-13.00	-51.21
959.26	S	-61.00	-62.55	4.76	-3.21	-13.00	-48.00
3700.40	H	-43.03	-44.57	8.43	-6.88	-13.00	-30.03

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ARFCN :CH 512  
 Operation Band :GPRS 1900  
 Fundamental Frequency :1850.2 MHz  
 Operation Mode :TX LOW  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



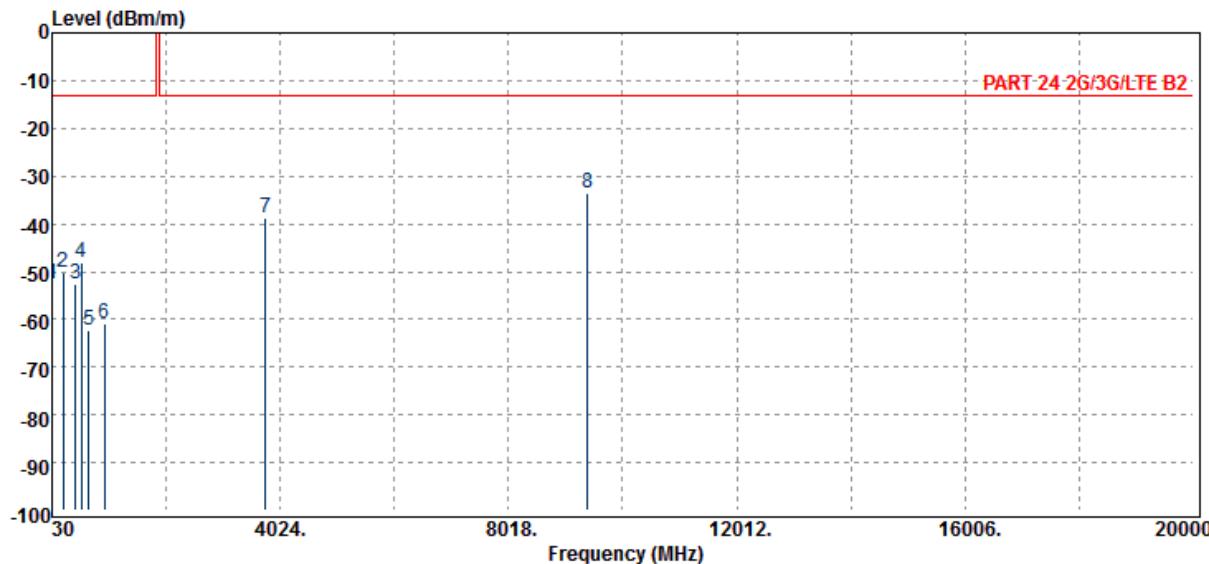
Freq. MHz	Note F/H/E/S	EIRP dBm	SG Output Level dBm		Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
			SG Output Level dBm	Antenna Gain dBi				
32.91	S	-56.54	-43.79	-11.98	-0.76	-13.00	-43.54	
167.74	S	-51.13	-50.94	1.28	-1.47	-13.00	-38.13	
311.30	S	-51.46	-55.44	5.81	-1.83	-13.00	-38.46	
463.59	S	-57.67	-61.18	5.61	-2.10	-13.00	-44.67	
738.10	S	-66.69	-69.48	5.45	-2.67	-13.00	-53.69	
959.26	S	-61.40	-62.96	4.76	-3.21	-13.00	-48.40	
3700.40	H	-50.69	-52.24	8.43	-6.88	-13.00	-37.69	
9251.00	H	-34.46	-36.30	12.75	-10.91	-13.00	-21.46	

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ARFCN :CH 661  
 Operation Band :GPRS 1900  
 Fundamental Frequency :1880.0 MHz  
 Operation Mode :TX MID  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :VERTICAL



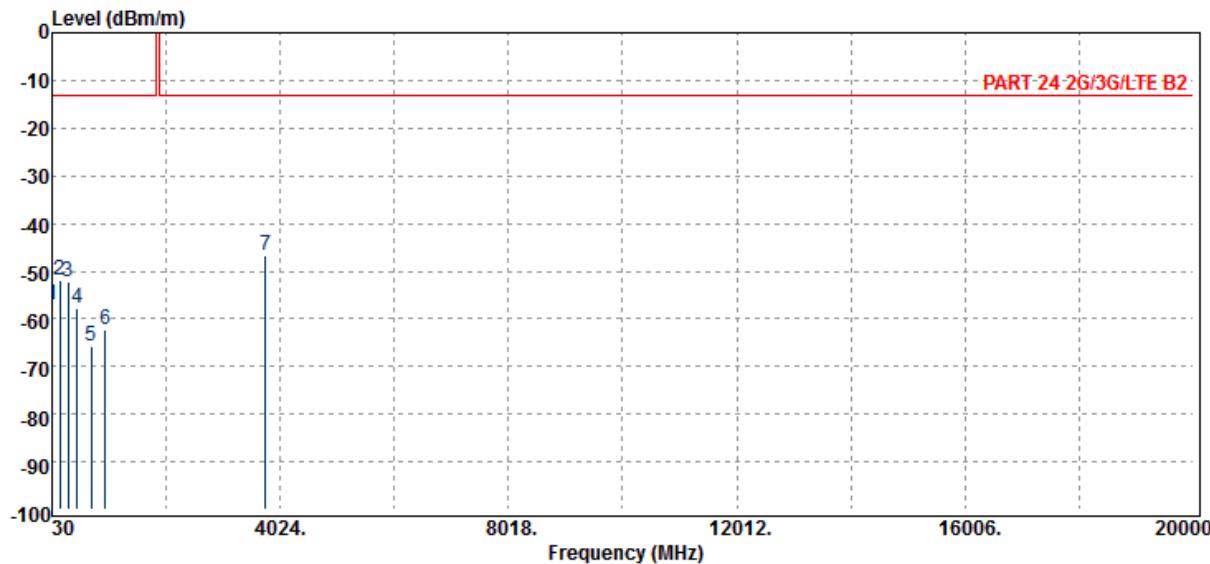
Freq. MHz	Note F/H/E/S	EIRP dBm	SG Output Level dBm		Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
			Output Level dBm	SG Output Level dBm				
32.91	S	-52.47	-39.72	-11.98	-0.76	-13.00	-39.47	
224.00	S	-50.07	-53.97	5.47	-1.57	-13.00	-37.07	
439.34	S	-52.53	-56.04	5.55	-2.03	-13.00	-39.53	
536.34	S	-48.26	-51.54	5.78	-2.50	-13.00	-35.26	
667.29	S	-62.33	-65.39	5.70	-2.64	-13.00	-49.33	
954.41	S	-60.79	-62.67	5.09	-3.21	-13.00	-47.79	
3760.00	H	-38.88	-40.32	8.46	-7.02	-13.00	-25.88	
9400.00	H	-33.46	-35.18	12.72	-11.00	-13.00	-20.46	

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ARFCN	:CH 661	Test Date	:2015-09-30
Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1880.0 MHz	Engineer	:Curry
Operation Mode	:TX MID		
EUT Pol.	:E2 Plan	Measurement Antenna Pol.	:HORIZONTAL



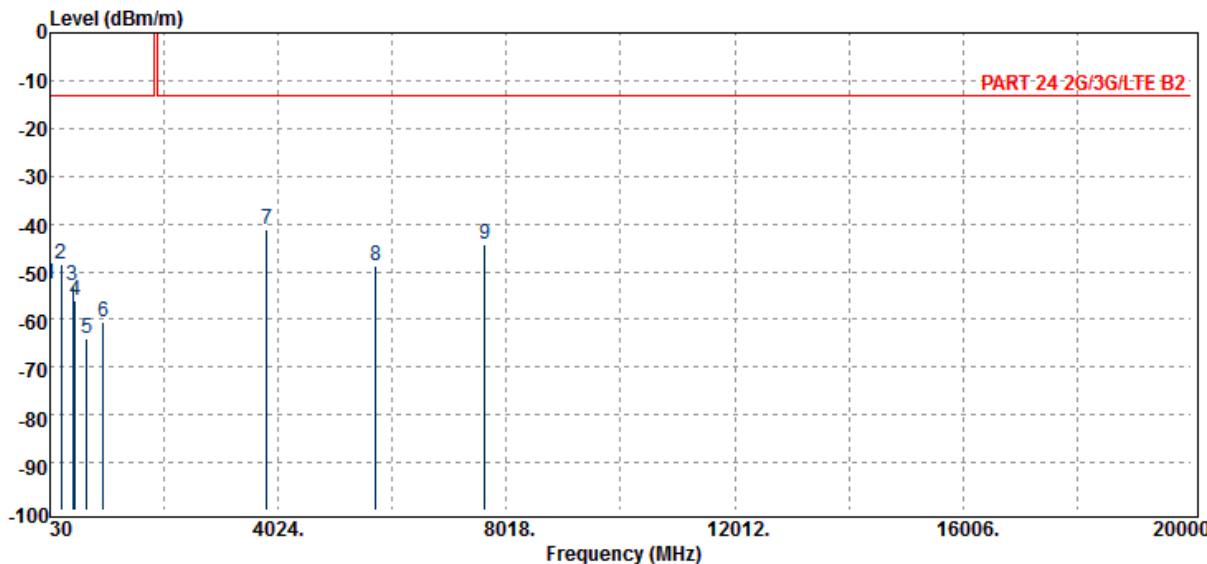
Freq. MHz	Note F/H/E/S	EIRP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBi	Loss dB	dBm	dB
32.91	S	-56.93	-44.19	-11.98	-0.76	-13.00	-43.93
168.71	S	-51.86	-51.73	1.35	-1.48	-13.00	-38.86
311.30	S	-52.24	-56.21	5.81	-1.83	-13.00	-39.24
464.56	S	-57.79	-61.30	5.62	-2.11	-13.00	-44.79
720.64	S	-65.71	-68.58	5.49	-2.63	-13.00	-52.71
959.26	S	-62.43	-63.98	4.76	-3.21	-13.00	-49.43
3760.00	H	-46.82	-48.26	8.46	-7.02	-13.00	-33.82

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ARFCN :CH 810  
 Operation Band :GPRS 1900  
 Fundamental Frequency :1909.8 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :VERTICAL



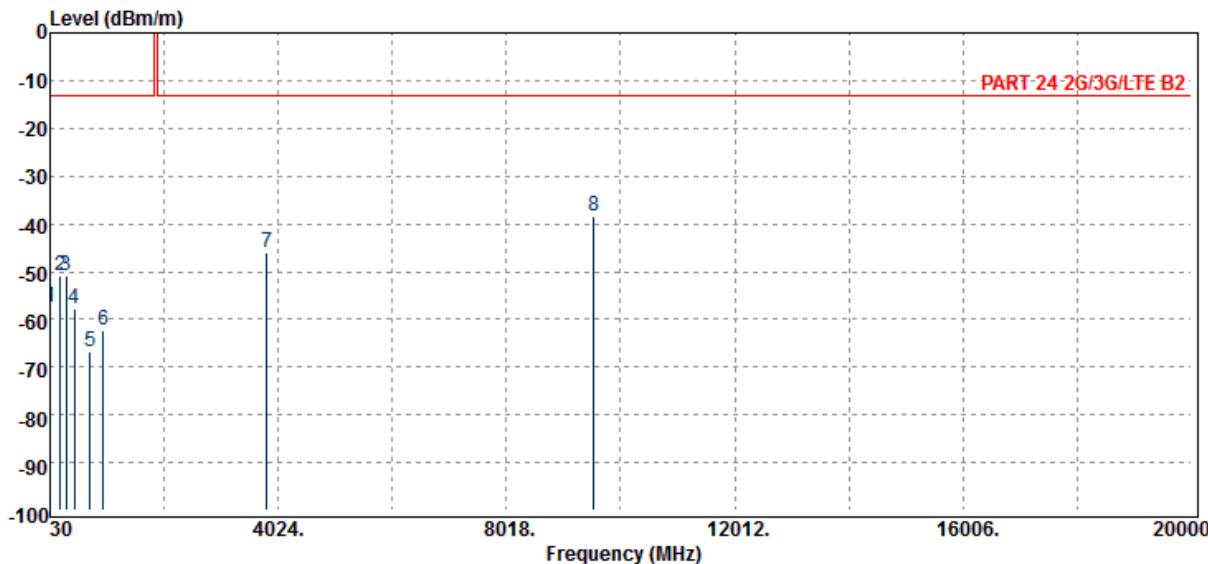
Freq. MHz	Note F/H/E/S	EIRP dBm	SG Output Level dBm		Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
			Output Level dBm	SG Output Level dBm				
32.91	S	-52.45	-39.71	-39.71	-11.98	-0.76	-13.00	-39.45
225.94	S	-48.38	-52.28	-52.28	5.47	-1.57	-13.00	-35.38
434.49	S	-53.05	-56.61	-56.61	5.58	-2.02	-13.00	-40.05
463.59	S	-56.07	-59.58	-59.58	5.61	-2.10	-13.00	-43.07
667.29	S	-64.13	-67.18	-67.18	5.70	-2.64	-13.00	-51.13
959.26	S	-60.47	-62.03	-62.03	4.76	-3.21	-13.00	-47.47
3819.60	H	-41.16	-42.60	-42.60	8.50	-7.05	-13.00	-28.16
5729.40	H	-48.69	-50.17	-50.17	10.12	-8.64	-13.00	-35.69
7639.20	H	-44.33	-46.35	-46.35	11.81	-9.79	-13.00	-31.33

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ARFCN :CH 810  
 Operation Band :GPRS 1900  
 Fundamental Frequency :1909.8 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	EIRP dBm	SG Output Level dBm		Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
			SG Output Level dBm	Antenna Gain dBi				
32.91	S	-57.35	-44.61	-11.98	-0.76	-13.00	-44.35	
209.45	S	-50.84	-55.14	5.85	-1.55	-13.00	-37.84	
313.24	S	-50.90	-54.88	5.81	-1.84	-13.00	-37.90	
461.65	S	-57.69	-61.18	5.59	-2.10	-13.00	-44.69	
731.31	S	-66.84	-69.66	5.47	-2.65	-13.00	-53.84	
959.26	S	-62.36	-63.92	4.76	-3.21	-13.00	-49.36	
3819.60	H	-46.15	-47.60	8.50	-7.05	-13.00	-33.15	
9549.00	H	-38.40	-40.02	12.69	-11.08	-13.00	-25.40	

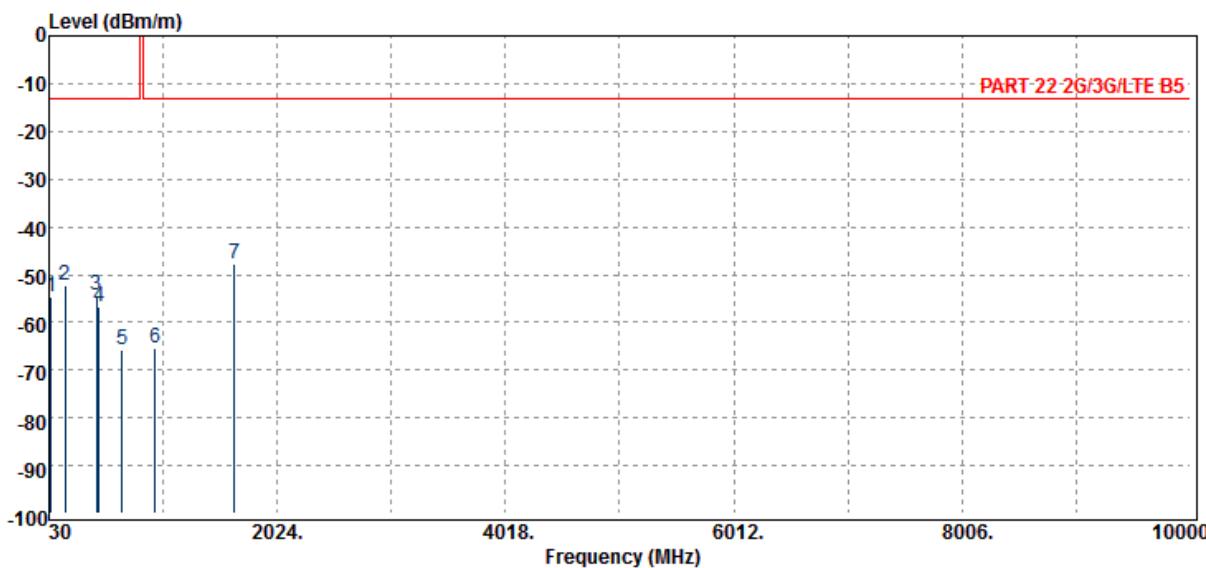
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**Radiated Spurious Emission Measurement Result: HSDPA V Mode**

ARFCN :CH 4132 Test Date :2015-09-30  
Operation Band :HSDPA B5 Temp./Humi. :22 deg\_C / 62 RH  
Fundamental Frequency :826.4 MHz Engineer :Curry  
Operation Mode :TX LOW  
EUT Pol. :E2 Plan Measurement Antenna Pol. :VERTICAL



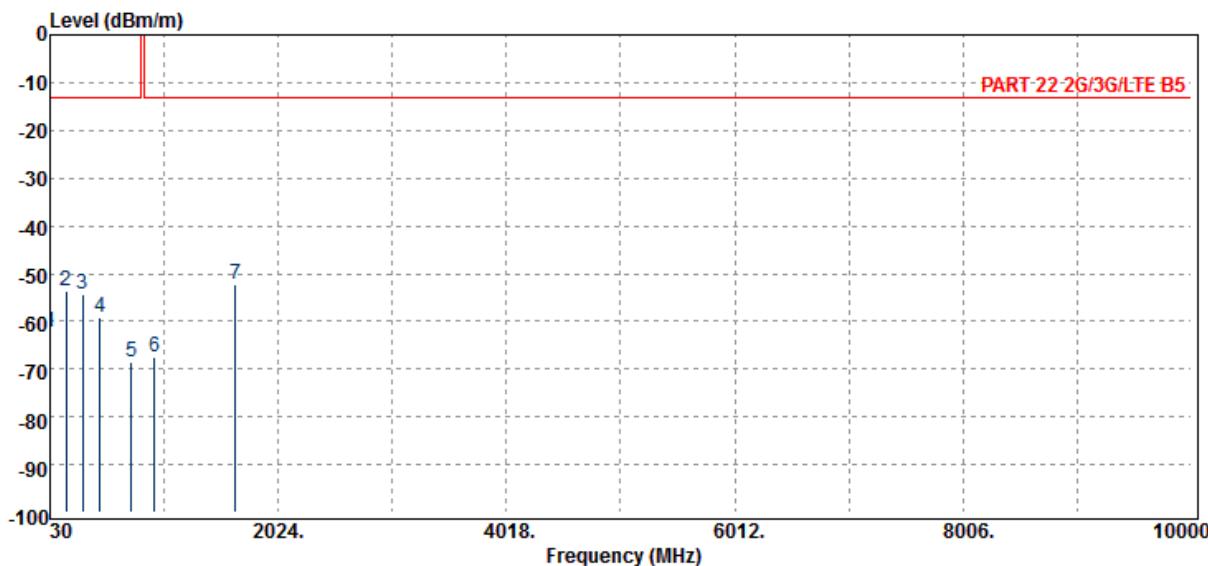
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
47.46	S	-54.53	-41.75	-11.89	-0.89	-13.00	-41.53
168.71	S	-52.24	-49.96	-0.80	-1.48	-13.00	-39.24
444.19	S	-54.43	-55.76	3.37	-2.05	-13.00	-41.43
469.41	S	-56.60	-57.99	3.51	-2.12	-13.00	-43.60
667.29	S	-65.89	-66.80	3.55	-2.64	-13.00	-52.89
954.41	S	-65.49	-65.22	2.94	-3.21	-13.00	-52.49
1652.80	H	-47.66	-46.49	3.05	-4.22	-13.00	-34.66

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ARFCN :CH 4132  
 Operation Band :HSDPA B5  
 Fundamental Frequency :826.4 MHz  
 Operation Mode :TX LOW  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



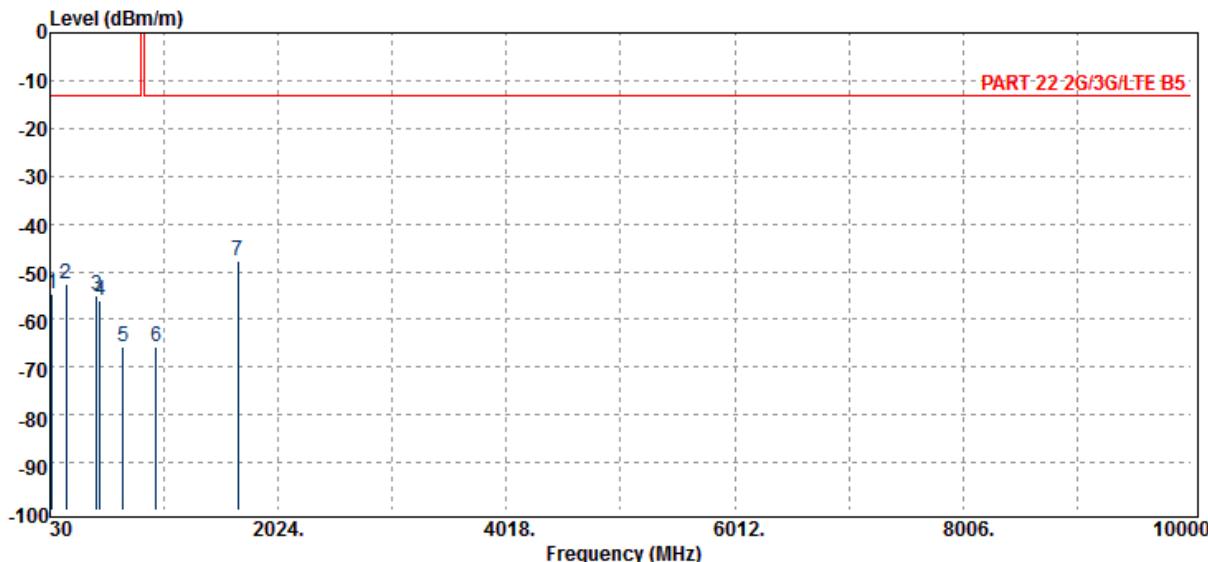
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
32.91	S	-62.35	-47.46	-14.13	-0.76	-13.00	-49.35
167.74	S	-53.57	-51.22	-0.87	-1.47	-13.00	-40.57
313.24	S	-54.34	-56.16	3.66	-1.84	-13.00	-41.34
463.59	S	-59.22	-60.57	3.46	-2.10	-13.00	-46.22
740.04	S	-68.48	-69.11	3.30	-2.67	-13.00	-55.48
944.71	S	-67.37	-67.41	3.24	-3.20	-13.00	-54.37
1652.80	H	-52.23	-51.05	3.05	-4.22	-13.00	-39.23

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ARFCN :CH 4183  
 Operation Band :HSDPA B5  
 Fundamental Frequency :836.6 MHz  
 Operation Mode :TX MID  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :VERTICAL



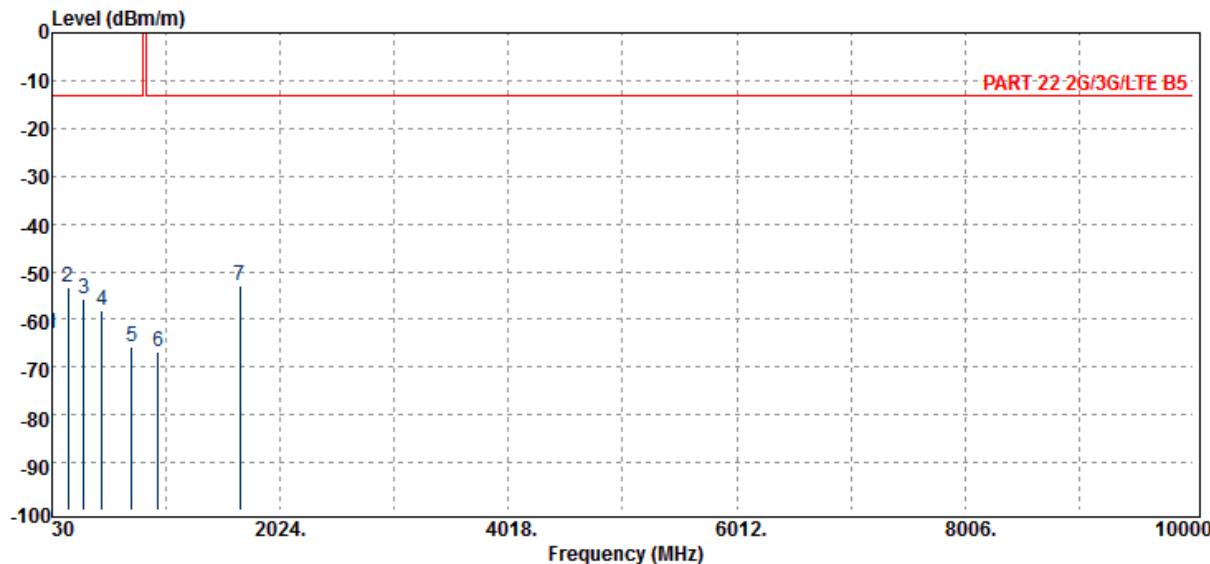
Freq. MHz	Note F/H/E/S	ERP dBm	SG Output Level dBm		Antenna Gain dBd	Cable Loss dB	Limit dBm	Margin dB
			Output Level dBm	SG Output Level dBm				
47.46	S	-54.81	-42.03	-11.89	-0.89	-13.00	-41.81	
167.74	S	-52.70	-50.36	-0.87	-1.47	-13.00	-39.70	
440.31	S	-55.00	-56.36	3.40	-2.04	-13.00	-42.00	
463.59	S	-56.04	-57.39	3.46	-2.10	-13.00	-43.04	
667.29	S	-65.88	-66.79	3.55	-2.64	-13.00	-52.88	
954.41	S	-65.70	-65.43	2.94	-3.21	-13.00	-52.70	
1673.20	H	-47.84	-46.59	3.01	-4.26	-13.00	-34.84	

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ARFCN :CH 4183  
 Operation Band :HSDPA B5  
 Fundamental Frequency :836.6 MHz  
 Operation Mode :TX MID  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



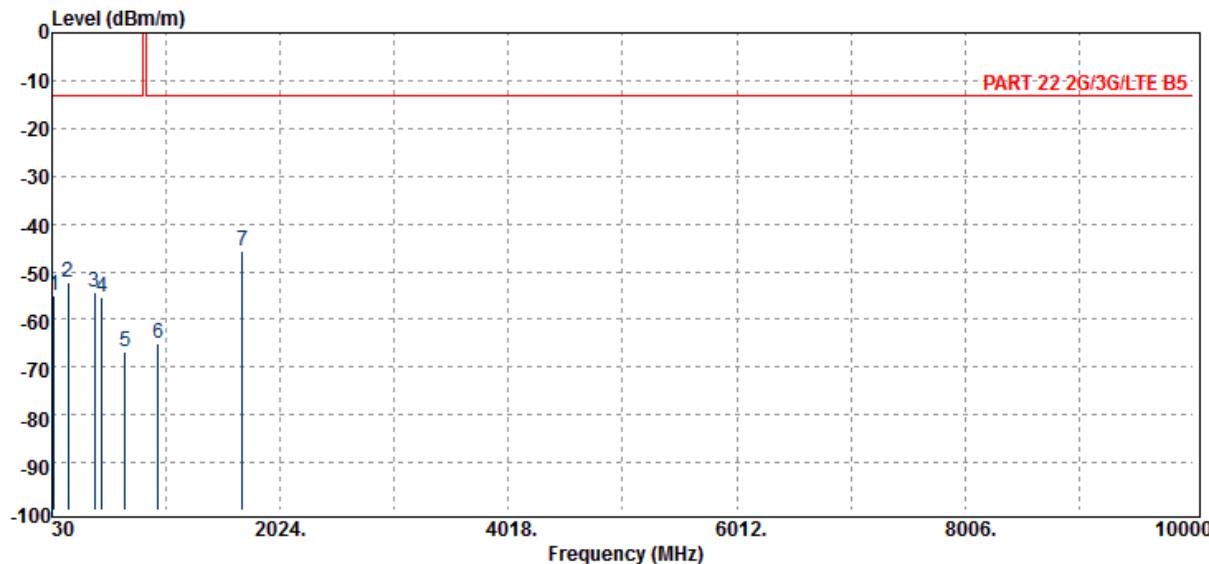
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
31.94	S	-62.91	-47.79	-14.37	-0.75	-13.00	-49.91
168.71	S	-53.29	-51.01	-0.80	-1.48	-13.00	-40.29
306.45	S	-55.84	-57.67	3.64	-1.81	-13.00	-42.84
464.56	S	-58.16	-59.52	3.47	-2.11	-13.00	-45.16
728.40	S	-65.68	-66.36	3.32	-2.64	-13.00	-52.68
953.44	S	-66.75	-66.55	3.00	-3.21	-13.00	-53.75
1673.20	H	-53.08	-51.83	3.01	-4.26	-13.00	-40.08

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ARFCN :CH 4233  
 Operation Band :HSDPA B5  
 Fundamental Frequency :846.6 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :VERTICAL



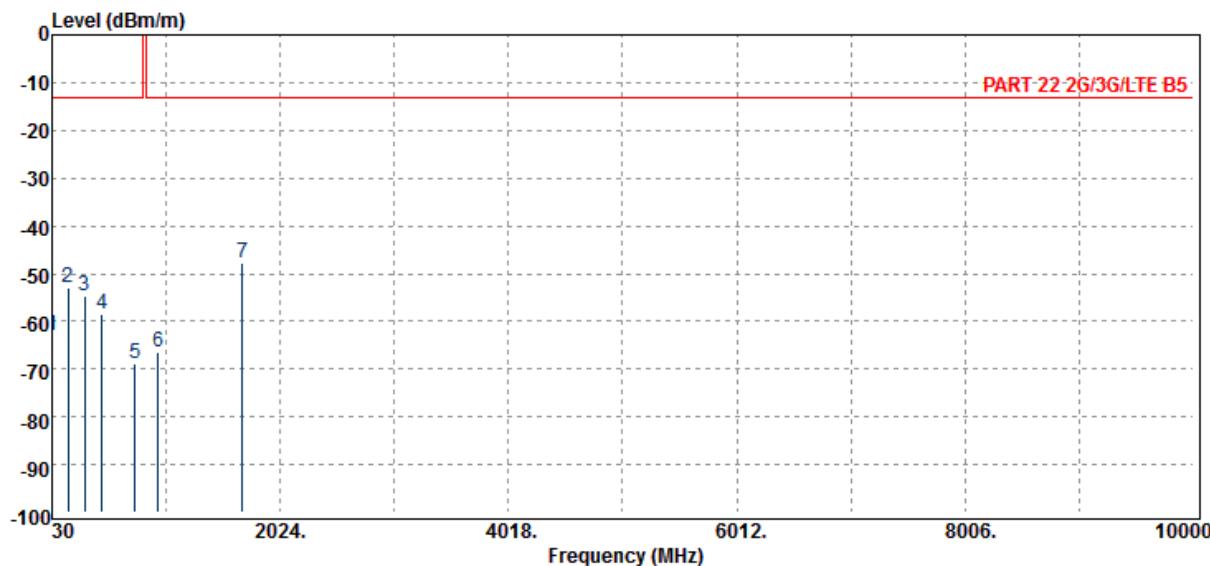
Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
47.46	S	-55.17	-42.39	-11.89	-0.89	-13.00	-42.17
167.74	S	-52.32	-49.97	-0.87	-1.47	-13.00	-39.32
400.54	S	-54.33	-56.00	3.62	-1.95	-13.00	-41.33
466.50	S	-55.49	-56.86	3.49	-2.11	-13.00	-42.49
667.29	S	-66.93	-67.84	3.55	-2.64	-13.00	-53.93
954.41	S	-65.10	-64.83	2.94	-3.21	-13.00	-52.10
1693.20	H	-45.68	-44.38	2.97	-4.27	-13.00	-32.68

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ARFCN :CH 4233  
 Operation Band :HSDPA B5  
 Fundamental Frequency :846.6 MHz  
 Operation Mode :TX HIGH  
 EUT Pol. :E2 Plan  
 Test Date :2015-09-30  
 Temp./Humi. :22 deg\_C / 62 RH  
 Engineer :Curry  
 Measurement Antenna Pol. :HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Margin
			Output Level dBm	Gain dBd	Loss dB	dBm	dB
31.94	S	-63.00	-47.88	-14.37	-0.75	-13.00	-50.00
168.71	S	-52.95	-50.67	-0.80	-1.48	-13.00	-39.95
318.09	S	-54.81	-56.63	3.68	-1.85	-13.00	-41.81
466.50	S	-58.58	-59.95	3.49	-2.11	-13.00	-45.58
757.50	S	-68.85	-69.44	3.31	-2.71	-13.00	-55.85
958.29	S	-66.43	-65.90	2.68	-3.21	-13.00	-53.43
1693.20	H	-47.92	-46.61	2.97	-4.27	-13.00	-34.92

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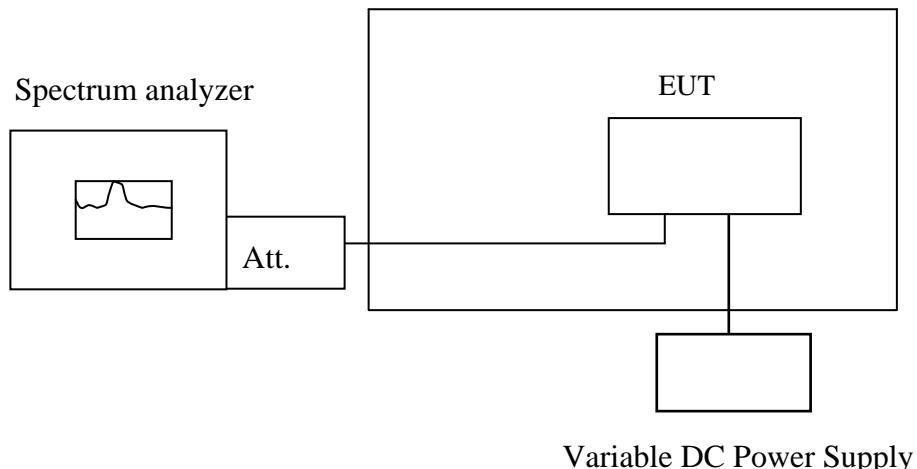
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## 11. FREQUENCY STABILITY MEASUREMENT Standard Applicable:

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

### 11.1 Test Set-up:

Temperature Chamber



**Note:** Measurement setup for testing on Antenna connector

### 11.2. Measurement Procedure:

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

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

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### 11.3. Measurement Equipment Used:

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
Temperature Chamber	TERCHY	MHG-120LF	911009	05/06/2015	05/05/2016
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016
DC Power Supply	Agilent	E3640A	MY52410006	11/10/2014	11/09/2015

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## 11.4. Measurement Result:

### FREQUENCY ERROR vs. VOLTAGE

Reference Frequency: GPRS 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.5	20	836600006	3	2091
5.0	20	836600003	0	2091
4.5	20	836599999	-4	2091
3.9 (End point)	20	836599996	-7	2091

### FREQUENCY ERROR vs. TEMPERATURE

Reference Frequency: GPRS 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.0	50	836600011	8	2091
5.0	40	836600010	7	2091
5.0	30	836600007	4	2091
5.0	20	836600003	0	2091
5.0	10	836599997	-6	2091
5.0	0	836599995	-8	2091
5.0	-10	836599993	-10	2091
5.0	-20	836599992	-11	2091
5.0	-30	836599990	-13	2091

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## FREQUENCY ERROR vs. VOLTAGE

Reference Frequency: GPRS 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.5	20	1880000006	5	4700
5.0	20	1880000001	0	4700
4.5	20	1879999998	-3	4700
3.9 (End point)	20	1879999997	-4	4700

## FREQUENCY ERROR vs. TEMPERATURE

Reference Frequency: GPRS 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.0	50	1880000009	8	4700
5.0	40	1880000006	5	4700
5.0	30	1880000004	3	4700
5.0	20	1880000001	0	4700
5.0	10	1879999997	-4	4700
5.0	0	1879999995	-6	4700
5.0	-10	1879999994	-7	4700
5.0	-20	1879999992	-9	4700
5.0	-30	1879999989	-12	4700

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**FREQUENCY ERROR vs. VOLTAGE**

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.5	20	836600007	2	2091
5.0	20	836600005	0	2091
4.5	20	836599997	-8	2091
3.9 (End point)	20	836599993	-12	2091

**FREQUENCY ERROR vs. TEMPERATURE**

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature ( )	(MHz)		
5.0	50	836600013	8	2091
5.0	40	836600010	5	2091
5.0	30	836600008	3	2091
5.0	20	836600005	0	2091
5.0	10	836600003	-2	2091
5.0	0	836600001	-4	2091
5.0	-10	836599998	-7	2091
5.0	-20	836599997	-8	2091
5.0	-30	836599995	-10	2091

**Note: The battery is rated 5V dc.**

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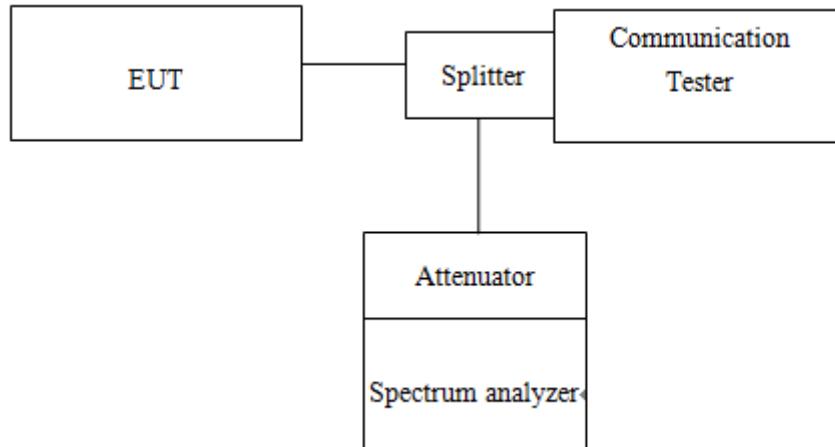
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## 12. PEAK TO AVERAGE RATIO

### 12.1. Standard Applicable

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

### 12.2. Test SET-UP



### 12.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

### 12.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	01/29/2015	01/28/2016
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2015	02/10/2016
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	10/08/2014	10/09/2015
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2015	01/01/2016
Attenuator	Mini-Circuit	BW-S10W2+	002	01/02/2015	01/01/2016
Splitter	Agilent	11636B	N/A	01/02/2015	01/01/2016
DC Power Supply	Agilent	E3640A	MY52410006	11/10/2014	11/09/2015

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## 12.5. Measurement Result

### Tabular Results:

Frequency (MHz)	CH	Peak-to-Average Ratio (dB)	
		GPRS	EDGE
824.20	128	12.39	12.86
836.60	190	10.89	12.18
848.80	251	12.49	12.63

Frequency (MHz)	CH	Peak-to-Average Ratio (dB)	
		GPRS	EDGE
1850.20	512	9.11	10.35
1880.00	661	10.68	10.16
1909.80	810	9.78	12.37

Frequency (MHz)	CH	Peak-to-Average Ratio (dB)		
		WCDMA V	HSDPA V	HSUPA V
826.40	4132	3.55	4.09	4.01
836.60	4183	3.85	3.87	4.74
846.60	4233	3.48	3.91	4.12

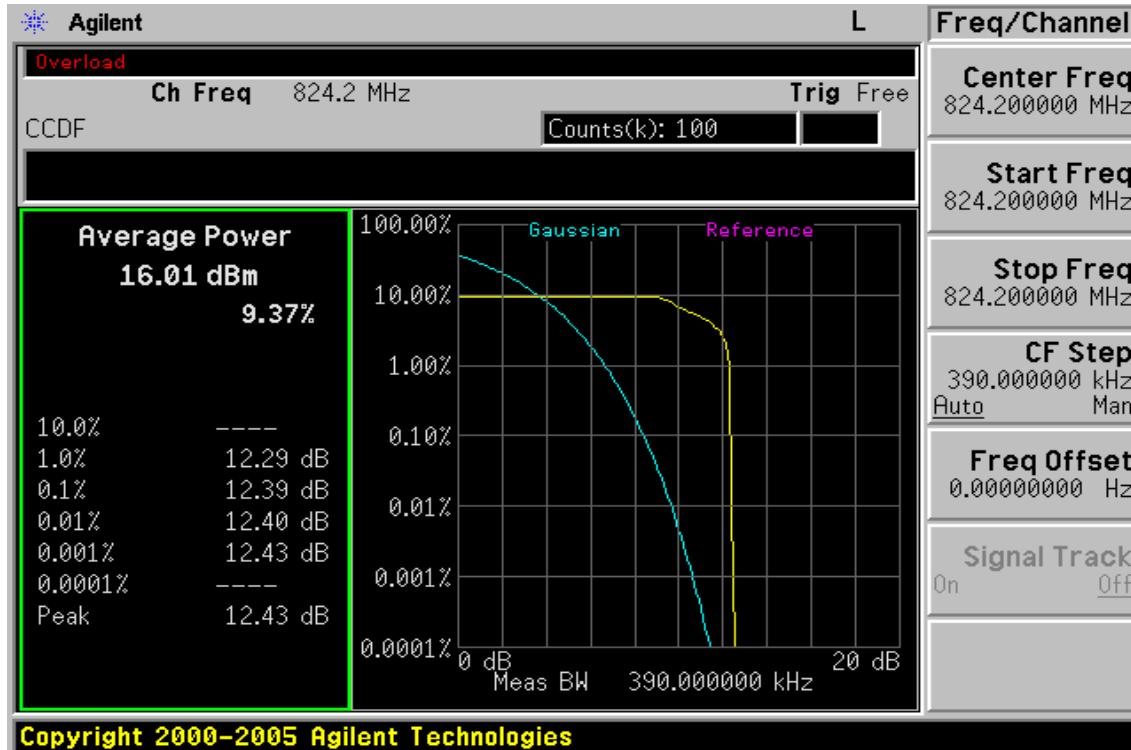
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## Measurement Results:

### GPRS 850 Channel Low



### GPRS 850 Channel Mid



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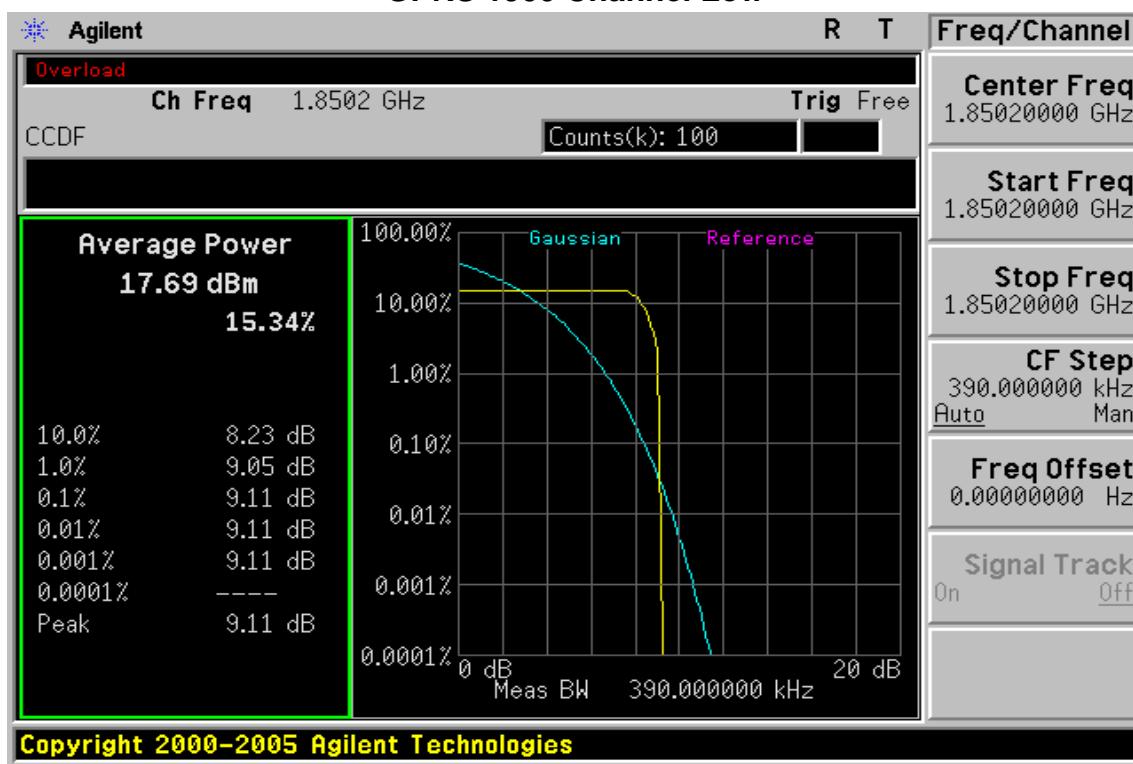
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## GPRS 850 Channel High



## GPRS 1900 Channel Low



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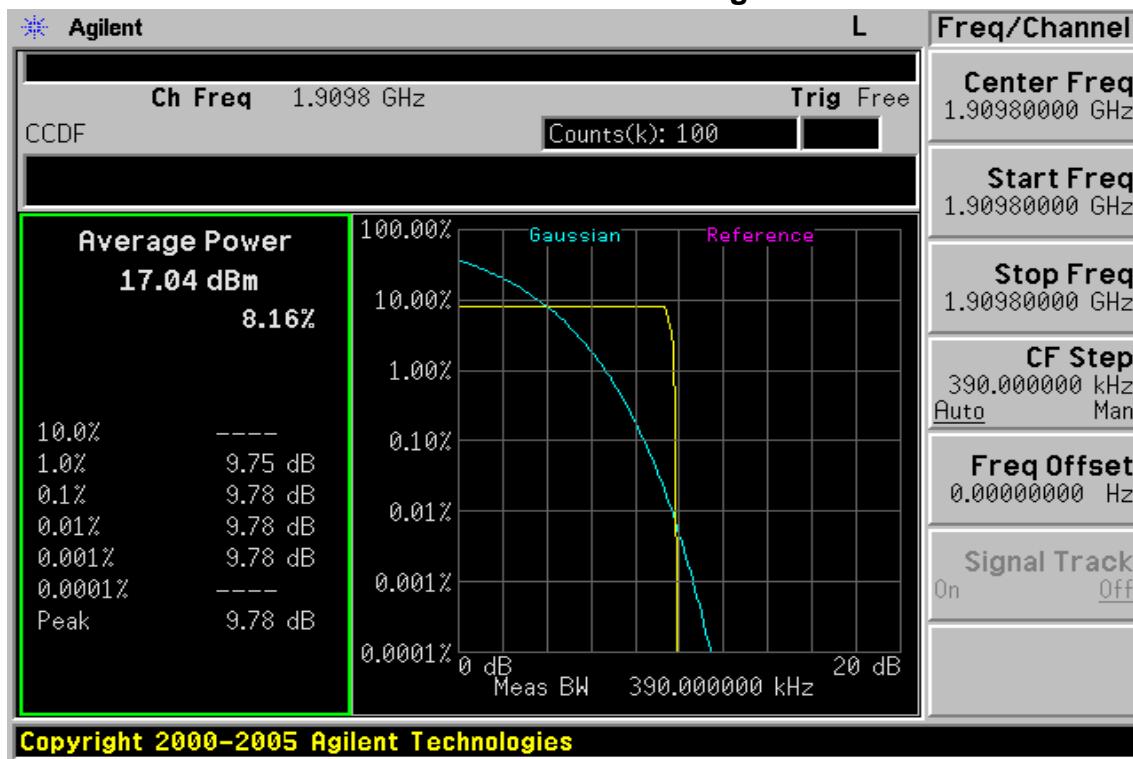
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## GPRS 1900 Channel Mid



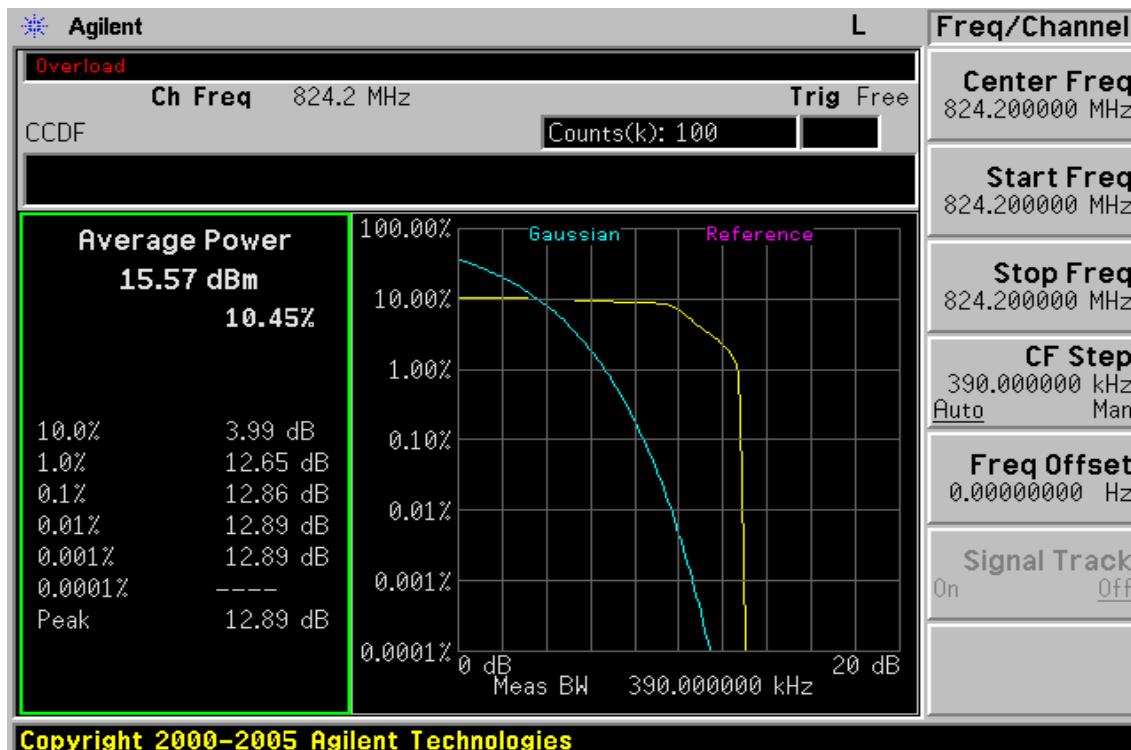
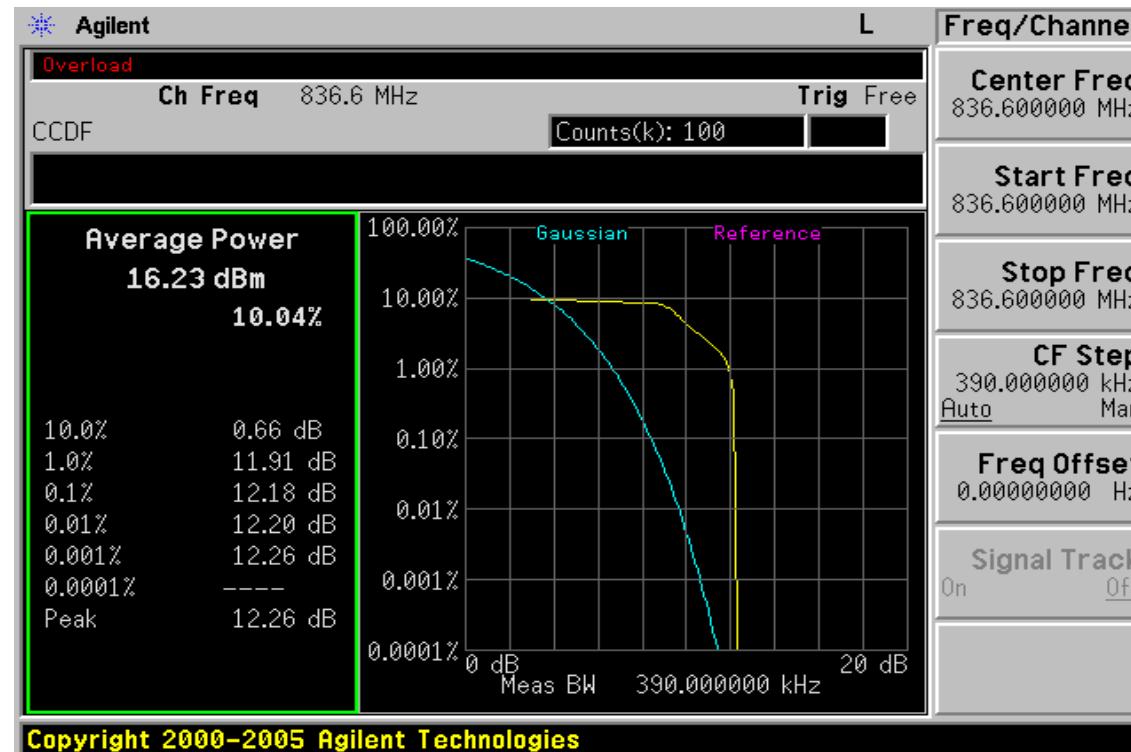
## GPRS 1900 Channel High



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**EDGE 850 Channel Low****EDGE 850 Channel Mid**

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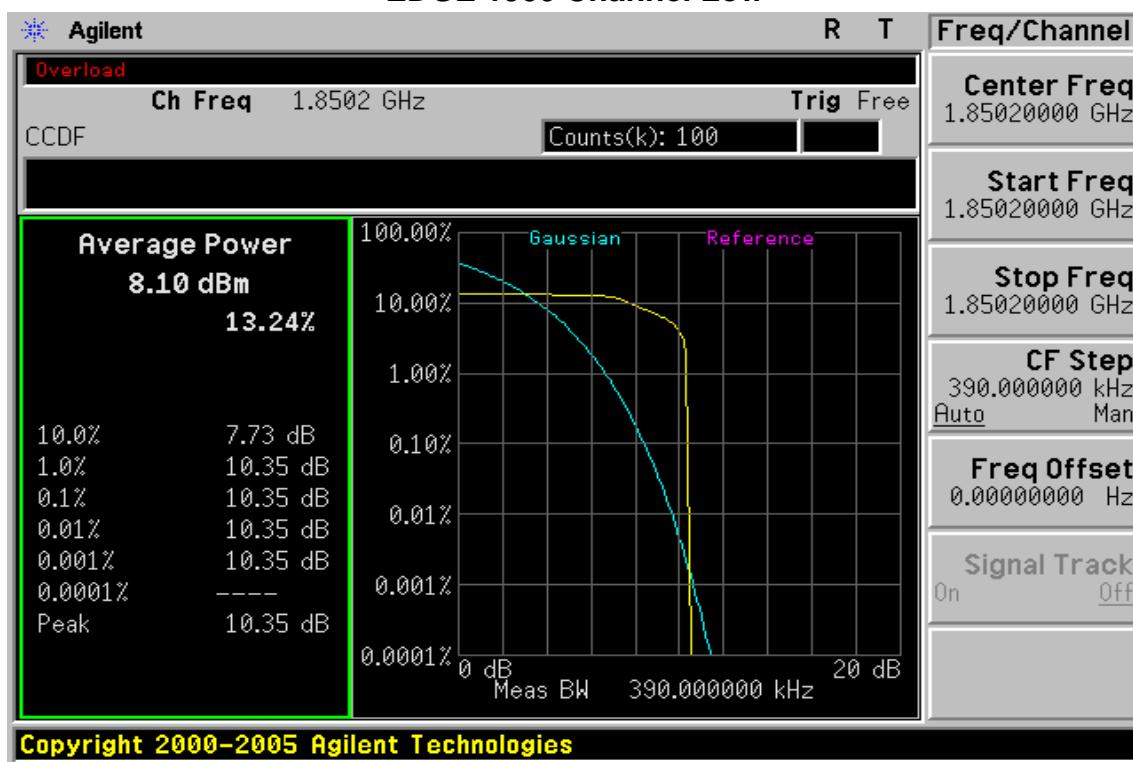
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## EDGE 850 Channel High



## EDGE 1900 Channel Low



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**EDGE 1900 Channel Mid****EDGE 1900 Channel High**

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## WCDMA Band V Channel Low



## WCDMA Band V Channel Mid



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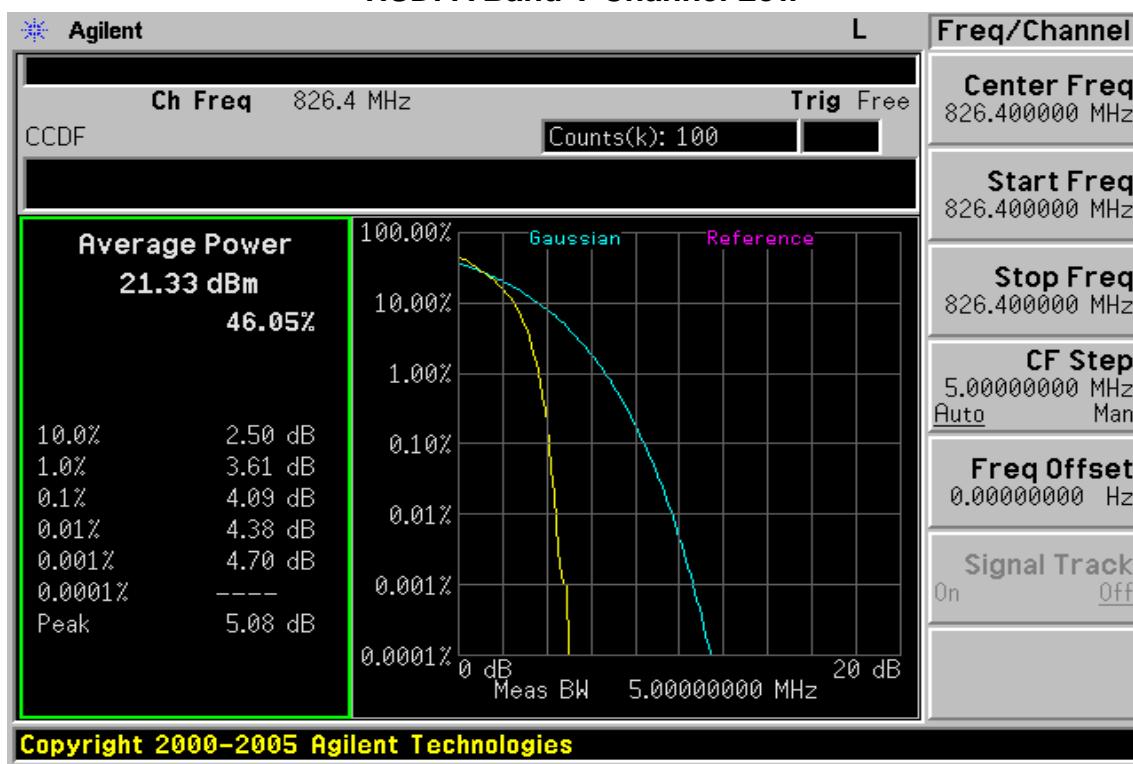
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## WCDMA Band V Channel High



## HSDPA Band V Channel Low



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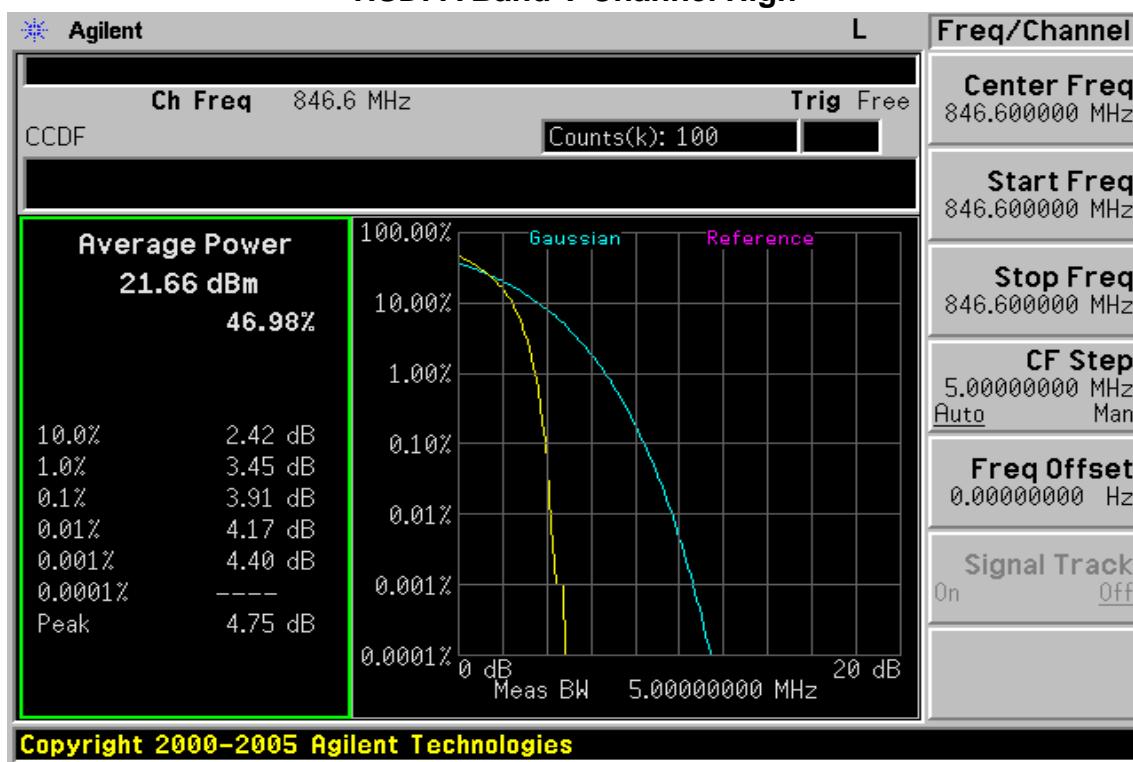
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## HSDPA Band V Channel Mid



## HSDPA Band V Channel High



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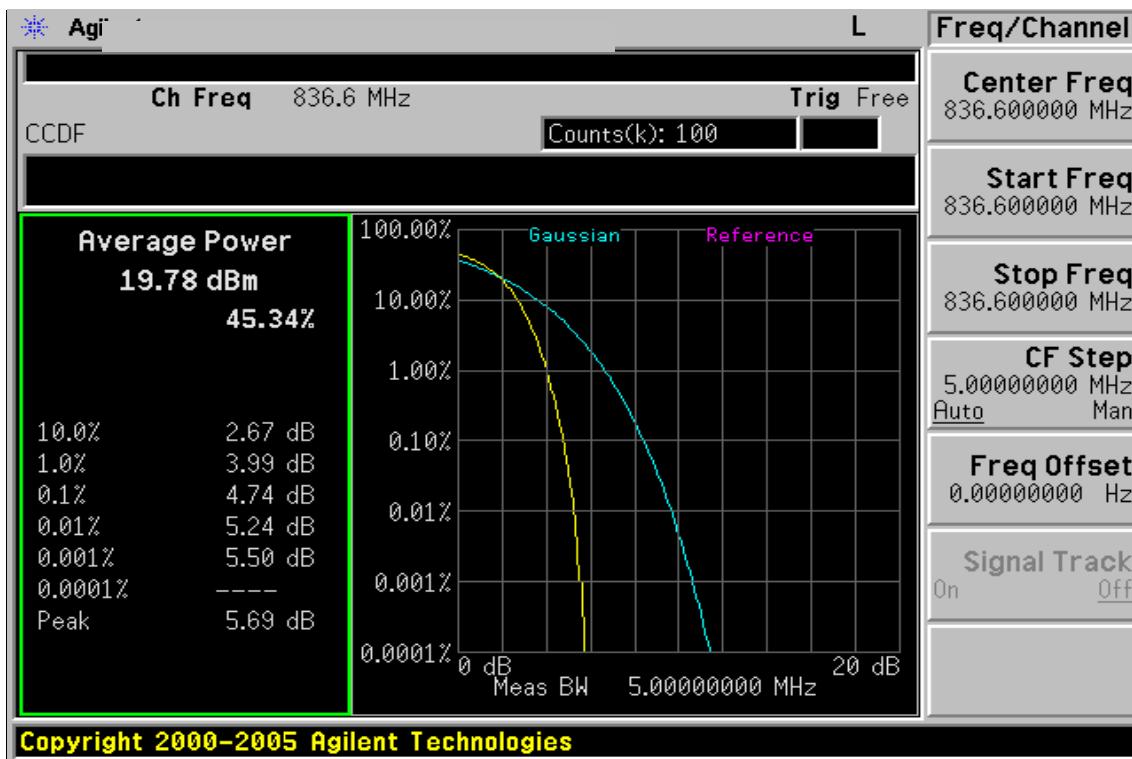
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## HSUPA Band V Channel Low



## HSUPA Band V Channel Mid



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**HSUPA Band V Channel High**

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