

# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

**Product Name:** RQ5-E01

**Brand Name:** TOSHIBA

**Model Name:** RQ5-E01

**Marketing Name:** K01

**Model Different:** N/A

**FCC ID:** SP2-RQ5-E01

**Report No.:** EH/2010/20006

**Issue Date:** Feb. 24, 2010

**FCC Rule Part:** 2 , 22H & 24E

**Prepared for:** Toshiba Information Systems (UK) Ltd, Mo-  
bile Communications Division  
Delta House, The crescent Southwood Busi-  
ness Park, Farnborough, GU14 0NL, UK

**Prepared by:** SGS Taiwan Ltd.  
Electronics & Communication Laboratory  
No. 134, Wu Kung Rd., Wuku Industrial  
Zone, Taipei County, Taiwan.

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**VERIFICATION OF COMPLIANCE**

**Applicant:** Toshiba Information Systems (UK) Ltd, Mobile Communications  
Division  
Delta House, The crescent Southwood Business Park, Farnborough,  
GU14 0NL, UK

**Product Name:** RQ5-E01

**Brand Name:** Toshiba

**Model No.:** RQ5-E01

**Marketing Name:** K01

**Model Difference:** N/A

**FCC ID:** SP2-RQ5-E01

**File Number:** EH/2010/20006

**Date of test:** Feb. 03, 2010 ~ Feb. 22, 2010

**Date of EUT Received:** Feb. 03, 2010

**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 of FCC Rule FCC PART 22 subpart H, PART 24 subpart E.

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

**Test By:****Date:**

Feb. 24, 2010

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*Sky Wang / Asst. Supervisor***Prepared By:****Date:**

Feb. 24, 2010

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*Alex Hsieh / Sr. Engineer***Approved By:****Date:**

Feb. 24, 2010

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*Vincent Su / Manager*

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## Version

Version No.	Date	Description
00	Feb. 24, 2010	Initial creation of document

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## 1. GENERAL PRODUCT INFORMATION

### General:

Product Name	RQ5-E01	
Brand Name	Toshiba	
Model Name	RQ5-E01	
Marketing Name:	K01	
Model Difference	N/A	
Data Cable (USB)	Two provides, Model: HPC1508-010010, HPC1519-010010, Supplier: Hoshiden	
Simple Hands-free (SHF)	Model: HDH0669-010221(EARPHONE) , KRJ0003-010020 (MIC), Supplier: Hoshiden	
Power Supply	3.7 Vdc re-chargeable battery or 5Vdc by AC/DC power adapter	
	Battery:	Model No.: TS-BTR008, Supplier: Sanyo GS
	Adapter:	Model: TS-ACC001-EU, TS-ACC001-UK Supplier: BYD Company Limited

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## GSM / WCDMA:

Cellular Phone Standards Frequency Range and Power	Operating Frequency		Rated Power
	GSM/GPRS/EDGE 850, Class 12	824.2 MHz– 848.8MHz	33 dBm
	GSM/GPRS/EDGE 900, Class 12	880.0MHz – 914.8MHz	33 dBm
	GSM/GPRS/EDGE 1800, Class 12	1710.2MHz-1784.8MHz	30 dBm
	GSM/GPRS/EDGE 1900, Class 12	1850.2MHz – 1909.8MHz	30 dBm
	EDGE 850 Class 12	824.2 MHz– 848.8MHz	27 dBm
	EDGE 900 Class 12	880.0MHz – 914.8MHz	27 dBm
	EDGE 1800 Class 12	1710.2MHz-1784.8MHz	26 dBm
	EDGE 1900 Class 12	1850.2MHz – 1909.8MHz	26 dBm
	WCDMA/HSUPA/HSDPA Band I	1920MHz – 1980MHz	24 dBm
	WCDMA/HSUPA/HSDPA Band VIII	815MHz – 880MHz	24dBm
Type of Emission	GSM/GPRS 850: 246KGXW,GSM/GPRS 1900: 246GXW EDGE 850: 245KG7W,EDGE 1900: 248KG7W		
Hardware Version:	CS1		
Software Version:	N/A		
IMEI:	358918030001599		

**Final Amplifier Voltage and Current Information:**

Test Mode	DC voltage (V)	DC current (mA)
GSM 850	5 Vdc	420
DCS 1900	5 Vdc	560
EDGE 850	5 Vdc	340
EDGE 1900	5 Vdc	290

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## WLAN:

Frequency Range & Channel number:	802.11 b/g: 2412 – 2462 MHz
Rated Power:	802.11 b: 16.93 dBm (Peak), 802.11 b: 14.66 dBm (Average) 802.11 g: 16.14 dBm (Peak)
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transmission Rate:	802.11 b: 1/2/5.5/11 Mbps; 802.11 g: 6/9/12/18/24/36/48/54 Mbps
Antenna Designation:	PIFA Antenna / Gain: 0.7 dBi

The EUT is compliance with IEEE 802.11 b/g Standard.

## Bluetooth:

Bluetooth Version:	<input type="checkbox"/> V1.1 (GFSK) <input type="checkbox"/> V1.2 (GFSK) <input type="checkbox"/> V2.0 (GFSK) <input checked="" type="checkbox"/> V2.0 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK) <input type="checkbox"/> V2.1 + EDR (GFSK + $\pi/4$ DQPSK + 8DPSK)
Channel number:	79 channels
Modulation type:	GFSK + $\pi/4$ DQPSK + 8DPSK
Transmit Power:	2.43 dBm
Frequency Range:	2.402GHz – 2.480GHz
Dwell Time:	$\leq 0.4s$
Operating Mode:	Point-to-Point
Antenna Designation:	PIFA Antenna / Gain: 0.7 dBi

The EUT is compliance with Bluetooth 2.0 + EDR Standard.

This test report applies for GSM/GPRS/EDGE 850/1900.

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### 1.1. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **SP2-RQ5-E01** filing to comply with Section Part 22 subpart H, Part 24 subpart E of the FCC CFR 47 Rules.

### 1.2. Test Methodology

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4 (2003) and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

### 1.3. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-1

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

### 1.4. Special Accessories

Not available for this EUT intended for grant.

### 1.5. Equipment Modifications

Not available for this EUT intended for grant.

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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 engineering mode to fix the Tx frequency which was for the purpose of the measurements.

### 2.3. Test Procedure

#### 2.3.1 AC Power Line Conducted Emissions

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 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.

#### 2.3.3 Radiated Emissions (ERP/EIRP):

According to measurement procured TIA/EIA 603C, issue 2 of RSS-Gen and TIA/EIA IS-98 for Mobile stations. The EUT is placed on a turn table which is 1.0 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 according to the requirements.

A standard antenna was used to replace the EUT and connect to the SG. Adjust the SG output level to reach the max emission level which were measured above.

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## 2.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010
Spectrum Analyzer	Agilent	E4440A	US41160416	01/23/2010	01/22/2012
Radio Communication Analyzer	R&S	CMU200	102189	05/13/208	05/13/2010
800 – 1000MHz Filter	Micro-Tronics	BRM13462	001	01/05/2010	01/04/2011
1800 – 2000MHz Filter	Micro-Tronics	BRM13463	001	01/05/2010	01/04/2011
Temperature Chamber	TERCHY	MHG-120LF	911009	04/14/2008	04/13/2010
Temperature Chamber	GIANT FORCE	GTH-150-40-CP-AR	MAA0512-018	02/05/2010	02/04/2012
DC Block	Agilent	BLK-18	155452	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S20W5	N/A	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S10W5	N/A	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S6W5	N/A	07/05/2009	07/04/2010
Splitter	Agilent	11636B	N/A	07/05/2009	07/04/2010
DC Power Supply	HP	6038A	2929A-07548	06/27/2009	06/26/2011
DC Power Supply	Chroma	41901	777188	04/17/2008	04/16/2010

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ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2010	02/11/2011
Bilog Antenna	SCHWAZBECK	VULB9160	3158	11/29/2009	11/28/2011
Dipole Antenna	SCHWAZBECK	VHAP	908/909	07/10/2008	07/09/2010
Dipole Antenna	SCHWAZBECK	UHAP	891/892	07/10/2008	07/09/2010
Hor.n antenna	SCHWAZBECK	BBHA 9120D	309	05/09/2008	05/10/2010
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	05/09/2008	05/08/2010
Signal Generator	R&S	SMR40	100210	01/22/2010	01/21/2012
Signal Generator	Agilent	E4438C	MY45093613	05/22/2009	05/21/2010
Pre-Amplifier	Agilent	8447D	1937A02834	11/30/2009	11/29/2010
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2010	01/04/2011
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2009	07/04/2010
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2009	07/04/2010
Radio Communication Analyzer	R&S	CMU200	102189	05/13/208	05/12/2010
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	SUCOFLEX 104PEA-10M	10m	01/05/2010	01/04/2011
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2010	01/04/2011
3m Site	SGS	966 chamber	N/A	11/08/2009	11/09/2010

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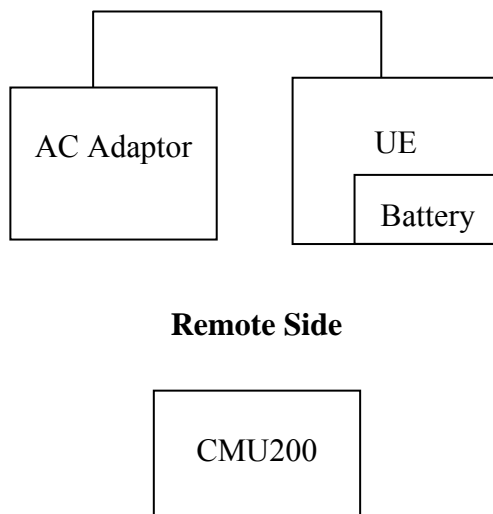
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## 2.5. Configuration of Tested System

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



**Table 2-1 Equipment Used in Tested System**

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) §22.913(a)(2) §24.232(c)	RF Conducted Power Output	Compliant
§2.1046(a) §22.913(a)(2) §24.232(c)	ERP/EIRP measurement	Compliant
§2.1049(h)	99% Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a)	Out of Band Emissions at Antenna Terminals	Compliant
§2.1053 §22.917(a) §24.238(a)	Field Strength of Spurious Radiation (TX)	Compliant
§2.1055(a)(1) §22.355 §24.235	Frequency Stability vs. Temperature	Compliant
§2.1055(d)(2) §22.355 §24.235	Frequency Stability vs. Voltage	Compliant

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#### 4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

EUT staying in continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing.

The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for GSM with power adaptor. The worst-case of H position for GSM 850 band and E2 position for PCS 1900 band were reported.

Max ERP/EIRP measurement result:

	dBm		W
GSM 850 Band	31.33	ERP	1.358
GSM 1900 Band	28.50	EIRP	0.708
EDGE 850 Band	27.92	ERP	0.619
EDGE 1900 Band	26.71	EIRP	0.469

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## 5. RF POWER OUTPUT MEASUREMENT / MAXIMUM POWER REDUCTION MEASUREMENT

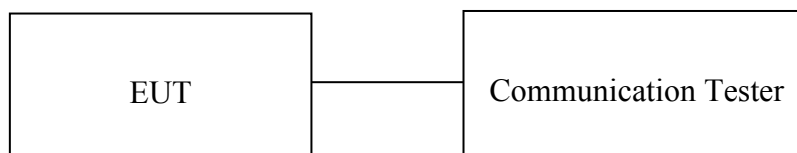
### 5.1. Standard Applicable:

According to FCC §2.1046.

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

FCC 24.232(d) Peak Power Measurement, FCC 24.232(d) Maximum Power Reduction.

### 5.2. Test Set-up:



*Note: Measurement setup for testing on Antenna connector*

### 5.3. Measurement Procedure:

The transmitter output was connected to a calibrated Communication Tester by a low loss RF cable. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the reading from tester.

### 5.4. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Communication Test	R&S	CMU200	102189	05/13/208	05/12/2010
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	02/13/2009	02/12/2010

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## 5.5. Measurement Result:

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
GSM 850	824.2	128	32.80	32.60
	836.6	190	32.80	32.70
	848.8	251	32.90	32.70

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Avg. Power (dBm)
GSM 1900	1850.2	512	29.70	29.60
	1880.0	661	29.40	29.30
	1909.8	810	29.40	29.30

EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)	Peak Power (1DN 3UP) (dBm)	Avg. Power (1DN 3UP) (dBm)	Peak Power (1DN 4UP) (dBm)	Avg. Power (1DN 4UP) (dBm)
GPRS 850 (Class 12)	824.2	128	32.80	32.70	32.80	32.70	32.80	32.70	32.80	32.70
	836.6	190	32.80	32.70	32.80	32.70	32.80	32.70	32.80	32.70
	848.8	251	32.90	32.80	32.90	32.70	32.90	32.70	32.90	32.70

EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)	Peak Power (1DN 3UP) (dBm)	Avg. Power (1DN 3UP) (dBm)	Peak Power (1DN 4UP) (dBm)	Avg. Power (1DN 4UP) (dBm)
GPRS 1900 (Class 12)	1850.2	512	29.70	29.60	29.70	29.60	29.70	29.60	29.70	29.60
	1880.0	661	29.40	29.30	29.40	29.30	29.40	29.30	29.40	29.30
	1909.8	810	29.40	29.20	29.40	29.20	29.40	29.20	29.40	29.20

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EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)	Peak Power (1DN 3UP) (dBm)	Avg. Power (1DN 3UP) (dBm)	Peak Power (1DN 4UP) (dBm)	Avg. Power (1DN 4UP) (dBm)
EDGE 850 (Class 12)	824.2	128	30.90	27.80	30.90	27.80	30.90	27.80	30.90	27.80
	836.6	190	30.90	27.80	30.90	27.80	30.90	27.80	30.90	27.80
	848.8	251	31.00	27.90	31.00	27.80	31.00	27.80	31.00	27.80

EUT Mode	Frequency (MHz)	CH	Peak Power (1DN 1UP) (dBm)	Avg. Power (1DN 1UP) (dBm)	Peak Power (1DN 2UP) (dBm)	Avg. Power (1DN 2UP) (dBm)	Peak Power (1DN 3UP) (dBm)	Avg. Power (1DN 3UP) (dBm)	Peak Power (1DN 4UP) (dBm)	Avg. Power (1DN 4UP) (dBm)
EDGE 1900 (Class 12)	1850.2	512	29.90	26.80	29.90	26.80	29.90	26.80	29.90	26.80
	1880.0	661	29.60	26.40	29.60	26.40	29.60	26.40	29.60	26.40
	1909.8	810	29.60	26.40	29.60	26.40	29.60	26.40	29.60	26.40

offset : 1dB

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**Maximum Power Reduction: PCS1900 band**

PCL	0	1	2	3	4	5	6	7	8
Output power (dBm)	29.3	28.2	26.2	24.2	22.2	20.2	18.2	16.2	14.2
PCL	9	10	11	12	13	14	15	16	17
Output power (dBm)	12.2	10.2	8.2	6.2	4.2	2.1	0.1		

**Maximum Power Reduction: EDGE 1900 band**

PCL	0	1	2	3	4	5	6	7	8
Output power (dBm)	26.5	26.5	26.5	26.5	26.5	26.5	24.5	22.4	20.5
PCL	9	10	11	12	13	14	15	16	17
Output power (dBm)	18.5	16.4	14.5	12.4	10.4	8.4	6.4	4.4	2.4
PCL	18								
Output power (dBm)	0.3								

Note: The EUT output power was controlled by simulator. Set Communication Tester CMU200 PCL as above, and get the RQ5-E01 output power reading.

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## 6. ERP, EIRP MEASUREMENT

### 6.1. Standard Applicable:

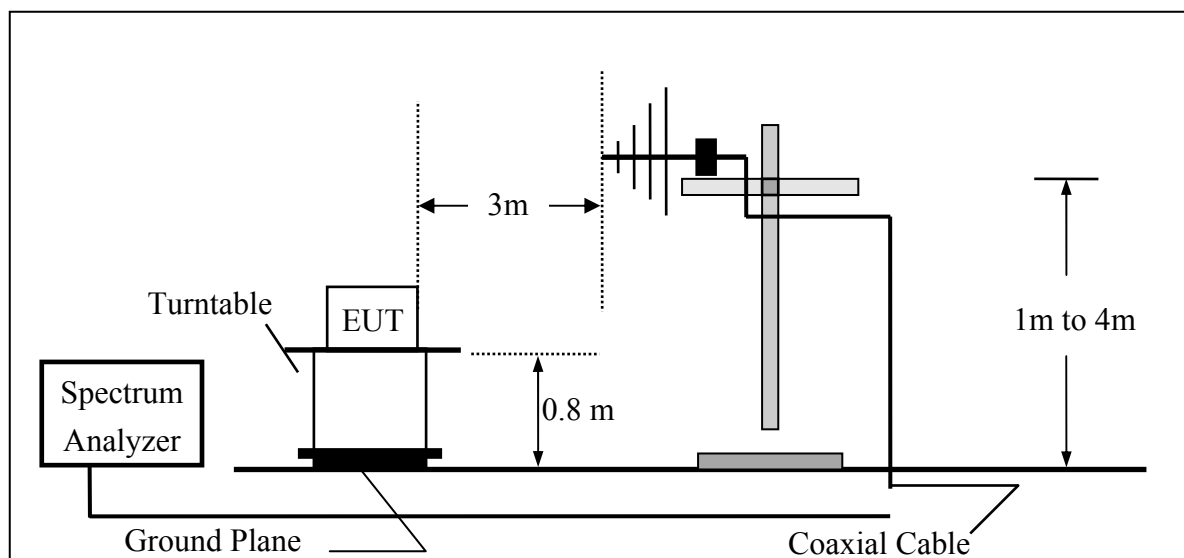
According to FCC §2.1046

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

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

### 6.2. Test SET-UP (Block Diagram of Configuration):

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



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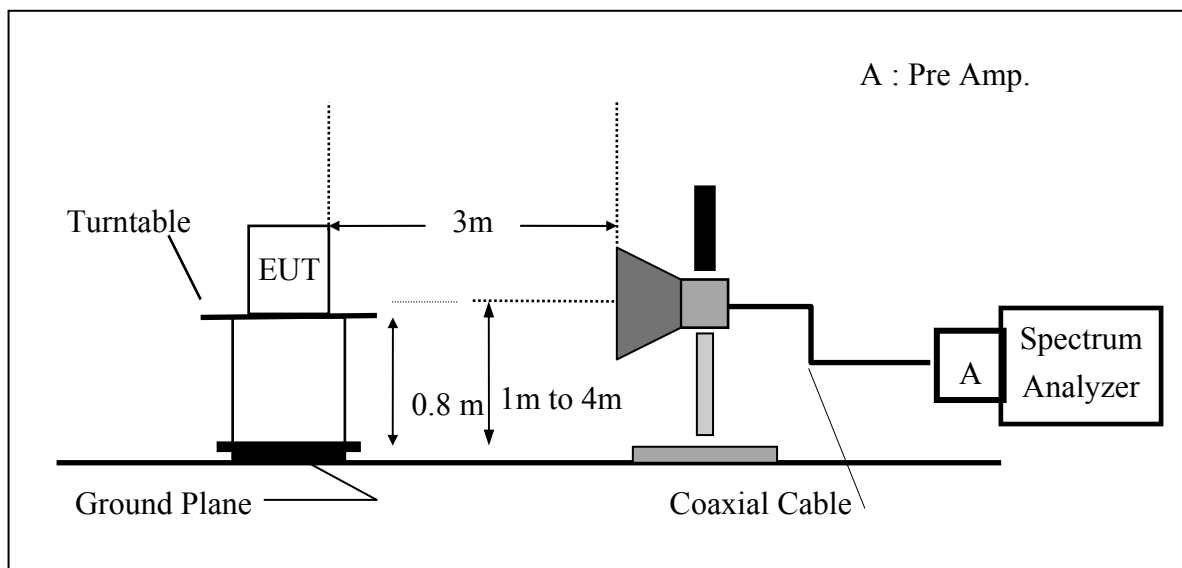
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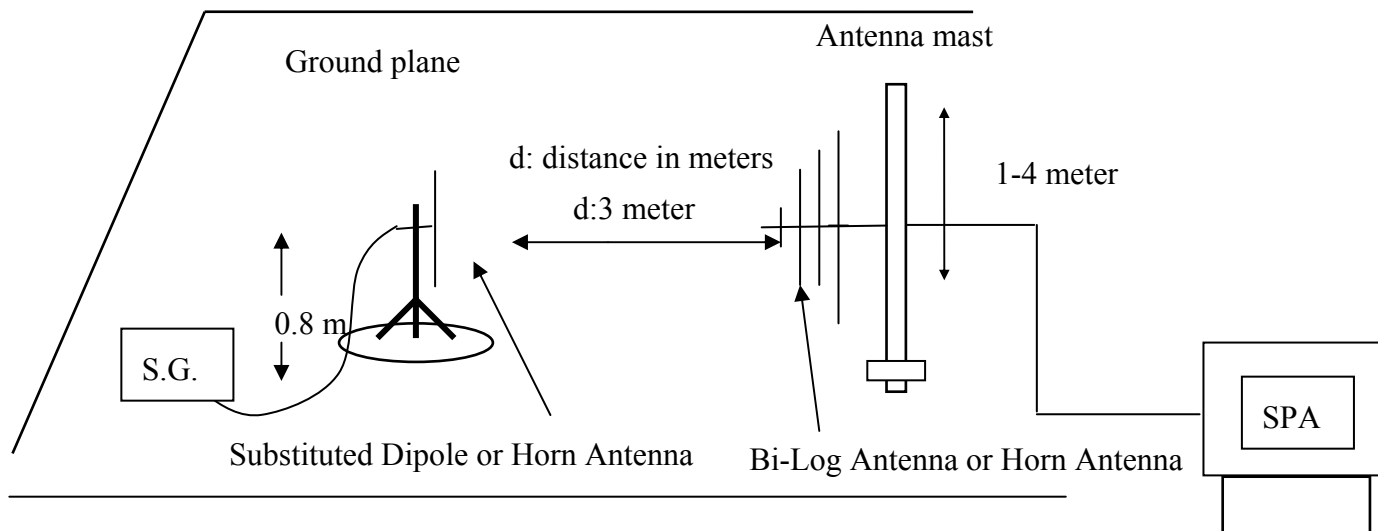
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## (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



## (C) Substituted Method Test Set-UP



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### 6.3. Measurement Procedure:

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.

During the measurement, the EUT was in 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.

ERP in frequency band 824.2 –848.80MHz were measured using a substitution method. The EUT was replaced by a dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1850 –1910MHz were measured using a substitution method. The EUT was replaced by a horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

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

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

### 6.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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## 6.5. Measurement Result:

EUT Mode	Frequency (MHz)	CH	EUT Pol.	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)
GSM 850	824.20	128	H	V	129.09	42.70	-7.87	3.62	31.20	38.45
				H	124.92	38.65	-7.87	3.62	27.15	38.45
			E1	V	119.47	33.08	-7.87	3.62	21.58	38.45
				H	127.57	41.30	-7.87	3.62	29.80	38.45
			E2	V	121.77	35.38	-7.87	3.62	23.88	38.45
				H	127.64	41.37	-7.87	3.62	29.87	38.45
	836.60	190	H	V	129.11	42.86	-7.88	3.65	<b>31.33</b>	38.45
				H	124.88	38.65	-7.88	3.65	27.12	38.45
			E1	V	121.15	34.90	-7.88	3.65	23.37	38.45
				H	127.42	41.19	-7.88	3.65	29.66	38.45
			E2	V	121.54	35.29	-7.88	3.65	23.76	38.45
				H	127.17	40.94	-7.88	3.65	29.41	38.45
	848.80	251	H	V	127.95	41.83	-7.88	3.68	30.27	38.45
				H	123.30	37.11	-7.88	3.68	25.55	38.45
			E1	V	120.85	34.73	-7.88	3.68	23.17	38.45
				H	125.71	39.52	-7.88	3.68	27.96	38.45
			E2	V	120.72	34.60	-7.88	3.68	23.04	38.45
				H	124.69	38.50	-7.88	3.68	26.94	38.45

### Remark :

(1) The RBW,VBW of SPA for frequency

RBW=300 KHz, VBW=1MHz,

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## Measurement Result:

EUT Mode	Frequency (MHz)	CH	EUT Pol.	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)
PCS 1900	1850.20	512	H	V	122.72	18.33	9.90	5.56	22.67	33.00
				H	126.46	22.28	9.90	5.56	26.62	33.00
			E1	V	128.07	23.68	9.90	5.56	28.02	33.00
				H	126.49	22.31	9.90	5.56	26.65	33.00
			E2	V	123.98	19.59	9.90	5.56	23.93	33.00
				H	127.14	22.96	9.90	5.84	27.02	33.00
	1880.00	661	H	V	123.15	18.79	9.99	5.61	23.17	33.00
				H	126.30	22.16	9.99	5.61	26.53	33.00
			E1	V	126.95	22.59	9.99	5.61	26.97	33.00
				H	125.36	21.22	9.99	5.61	25.59	33.00
			E2	V	122.61	18.25	9.99	5.61	22.63	33.00
				H	128.18	24.04	9.99	5.61	28.41	33.00
	1909.80	810	H	V	124.20	19.87	10.08	5.66	24.29	33.00
				H	127.42	23.31	10.08	5.66	27.73	33.00
			E1	V	127.63	23.30	10.08	5.66	27.72	33.00
				H	125.69	21.58	10.08	5.66	26.00	33.00
			E2	V	121.80	17.47	10.08	5.66	21.89	33.00
				H	128.19	24.08	10.08	5.66	<b>28.50</b>	33.00

## Remark :

(1) The RBW,VBW of SPA for frequency

RBW=300 KHz, VBW=1MHz,

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## Measurement Result:

EUT Mode	Frequency (MHz)	CH	EUT Pol.	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)
EDGE 850	824.20	128	H	V	124.81	38.42	-7.87	3.62	26.92	38.45
				H	115.45	29.18	-7.87	3.62	17.68	38.45
			E1	V	113.74	27.35	-7.87	3.62	15.85	38.45
				H	125.23	38.96	-7.87	3.62	27.46	38.45
			E2	V	115.18	28.79	-7.87	3.62	17.29	38.45
				H	121.61	35.34	-7.87	3.62	23.84	38.45
	836.60	190	H	V	123.58	37.33	-7.88	3.65	25.80	38.45
				H	115.92	29.69	-7.88	3.65	18.16	38.45
			E1	V	116.14	29.89	-7.88	3.65	18.36	38.45
				H	125.68	39.45	-7.88	3.65	<b>27.92</b>	38.45
			E2	V	115.88	29.63	-7.88	3.65	18.10	38.45
				H	121.81	35.58	-7.88	3.65	24.05	38.45
	848.80	251	H	V	124.41	38.29	-7.88	3.68	26.73	38.45
				H	114.23	28.04	-7.88	3.68	16.48	38.45
			E1	V	116.47	30.35	-7.88	3.68	18.79	38.45
				H	124.40	38.21	-7.88	3.68	26.65	38.45
			E2	V	115.21	29.09	-7.88	3.68	17.53	38.45
				H	121.02	34.83	-7.88	3.68	23.27	38.45

## Remark :

(1) The RBW,VBW of SPA for frequency

RBW=300 KHz, VBW=1MHz,

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## Measurement Result:

EUT Mode	Frequency (MHz)	CH	EUT Pol.	Antenna Pol.	SPA Reading (dBuV)	S.G. Output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	EIRP (dBm)	Limit (dBm)
EDGE 1900	1850.20	512	H	V	123.81	19.42	9.90	5.56	23.76	33.00
				H	124.94	20.76	9.90	5.56	25.10	33.00
			E1	V	124.12	19.73	9.90	5.56	24.07	33.00
				H	121.56	17.38	9.90	5.56	21.72	33.00
			E2	V	123.01	18.62	9.90	5.56	22.96	33.00
				H	126.20	22.02	9.90	5.84	26.08	33.00
	1880.00	661	H	V	123.05	18.69	9.99	5.61	23.07	33.00
				H	125.26	21.12	9.99	5.61	25.49	33.00
			E1	V	123.92	19.56	9.99	5.61	23.94	33.00
				H	122.49	18.35	9.99	5.61	22.72	33.00
			E2	V	120.33	15.97	9.99	5.61	20.35	33.00
				H	126.35	22.21	9.99	5.61	26.58	33.00
	1909.80	810	H	V	121.84	17.51	10.08	5.66	21.93	33.00
				H	125.52	21.41	10.08	5.66	25.83	33.00
			E1	V	125.44	21.11	10.08	5.66	25.53	33.00
				H	124.76	20.65	10.08	5.66	25.07	33.00
			E2	V	118.57	14.24	10.08	5.66	18.66	33.00
				H	126.40	22.29	10.08	5.66	<b>26.71</b>	33.00

## Remark :

(1) The RBW,VBW of SPA for frequency

RBW=300 KHz, VBW=1MHz,

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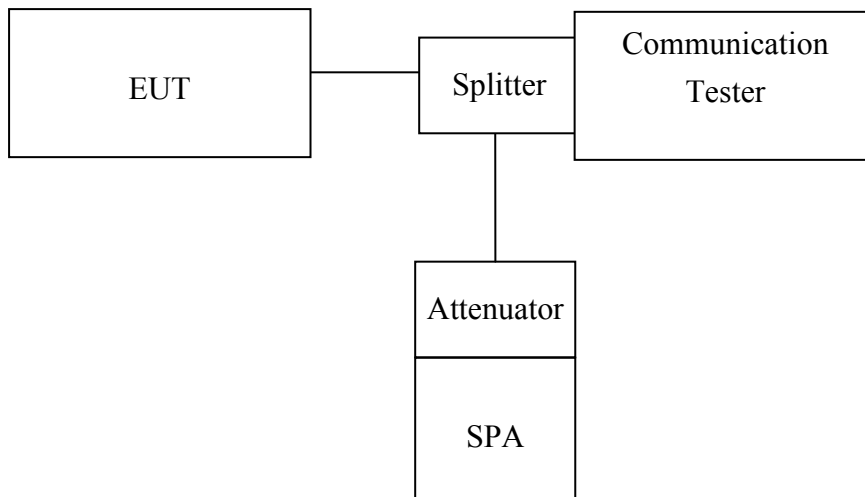
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## 7. 99% OCCUPIED BANDWIDTH MEASUREMENT

### 7.1. Standard Applicable:

According to §FCC 2.1049.

### 7.2. Test Set-up:



*Note: Measurement setup for testing on Antenna connector*

### 7.3. Measurement Procedure:

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW (10/30KHz) was set to about 1% of emission BW, VBW= 3 times RBW(30/100KHz), -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

### 7.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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## 7.5. Measurement Result:

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (MHz)
GSM 850	824.20	128	0.2459
	836.60	190	0.2426
	848.80	251	0.2426

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (MHz)
PCS 1900	1850.20	512	0.2437
	1880.00	661	0.2453
	1909.80	810	0.2459

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (MHz)
EDGE 850	824.20	128	0.2453
	836.60	190	0.2431
	848.80	251	0.2447

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (MHz)
EDGE 1900	1850.20	512	0.2463
	1880.00	661	0.2444
	1909.80	810	0.2477

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Figure 7-1: GSM Channel Low

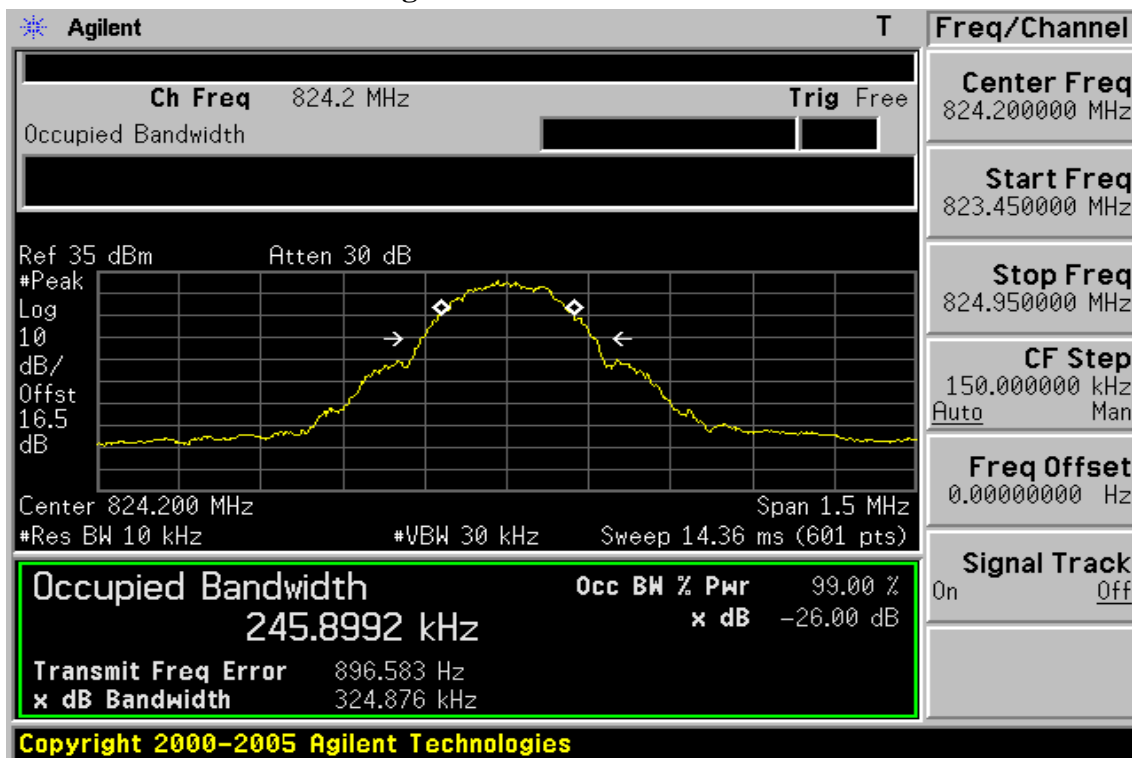
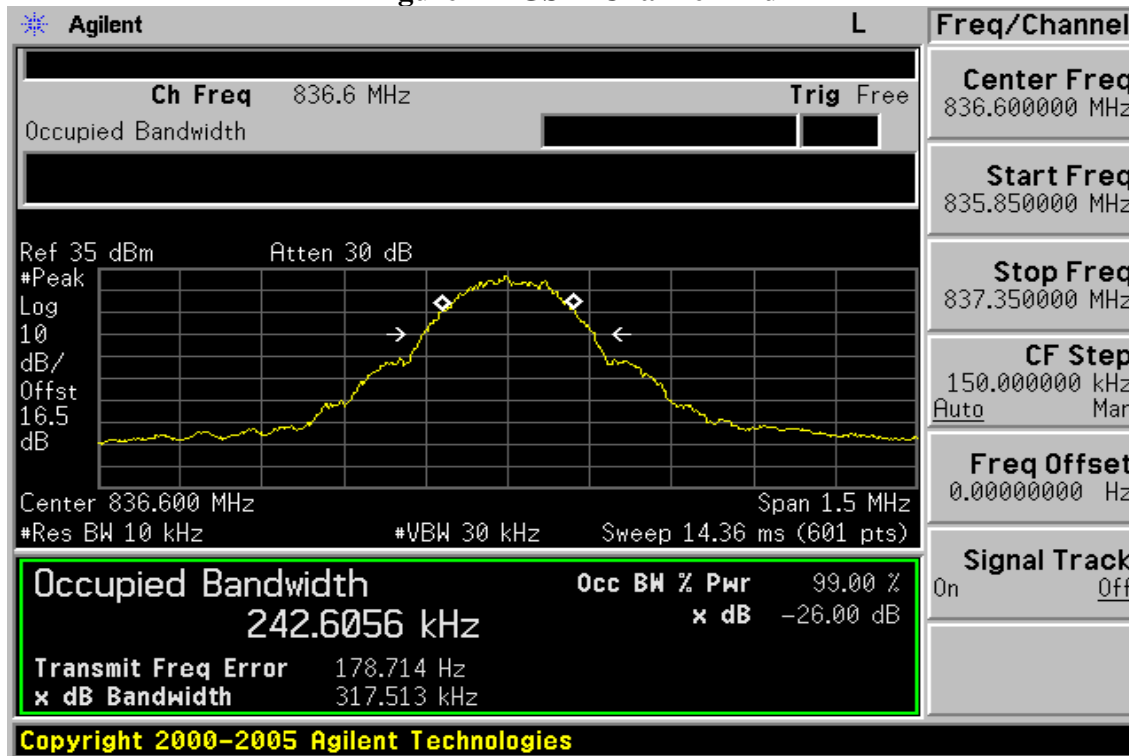


Figure 7-2 GSM Channel Mid



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Figure 7-3: GSM Channel High

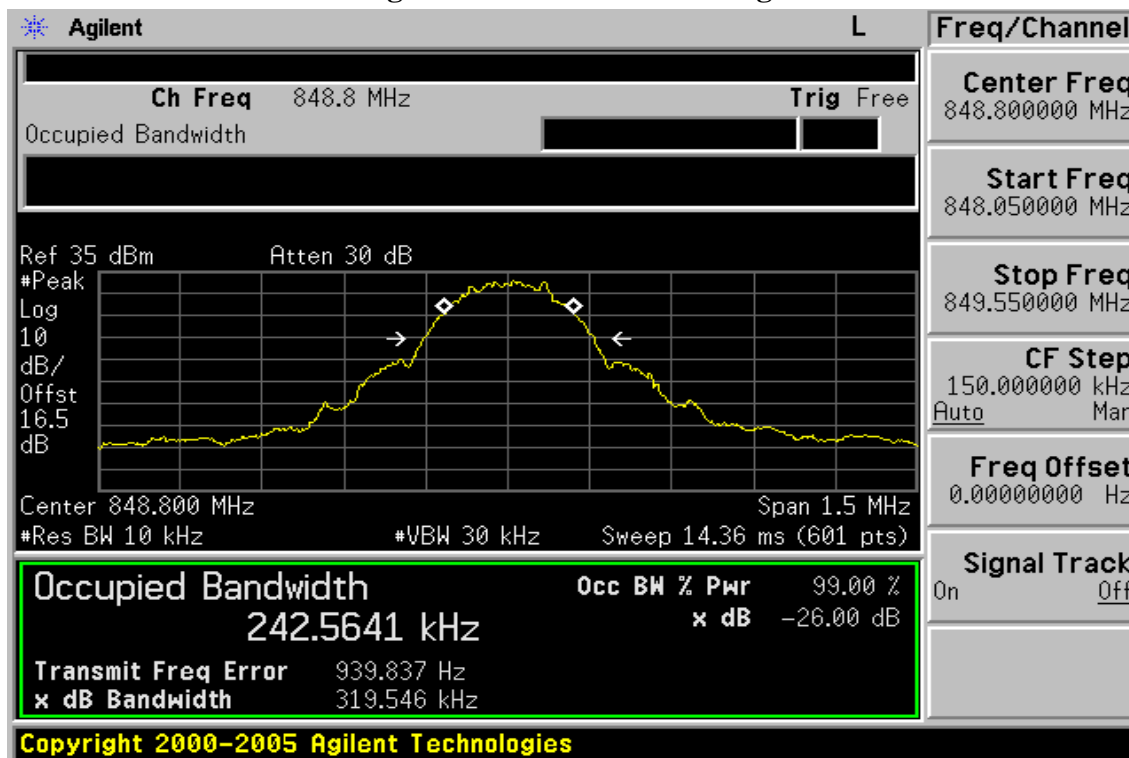
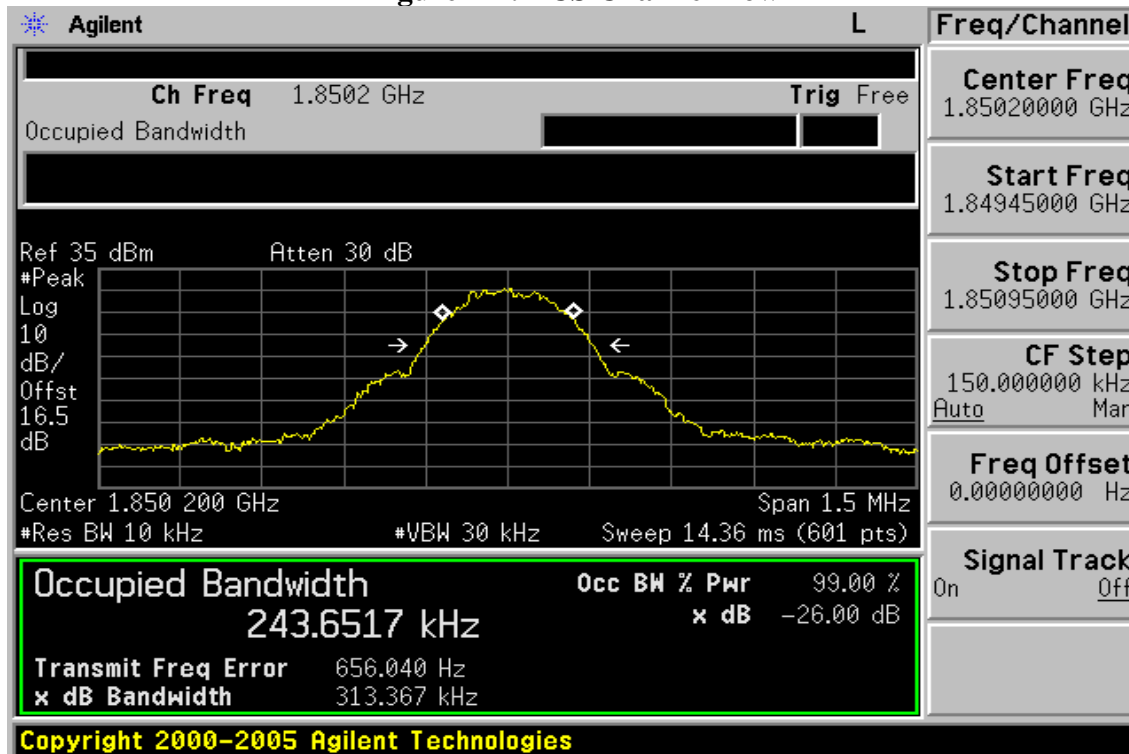


Figure 7-4: PCS Channel Low



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Figure 7-5 PCS Channel Mid

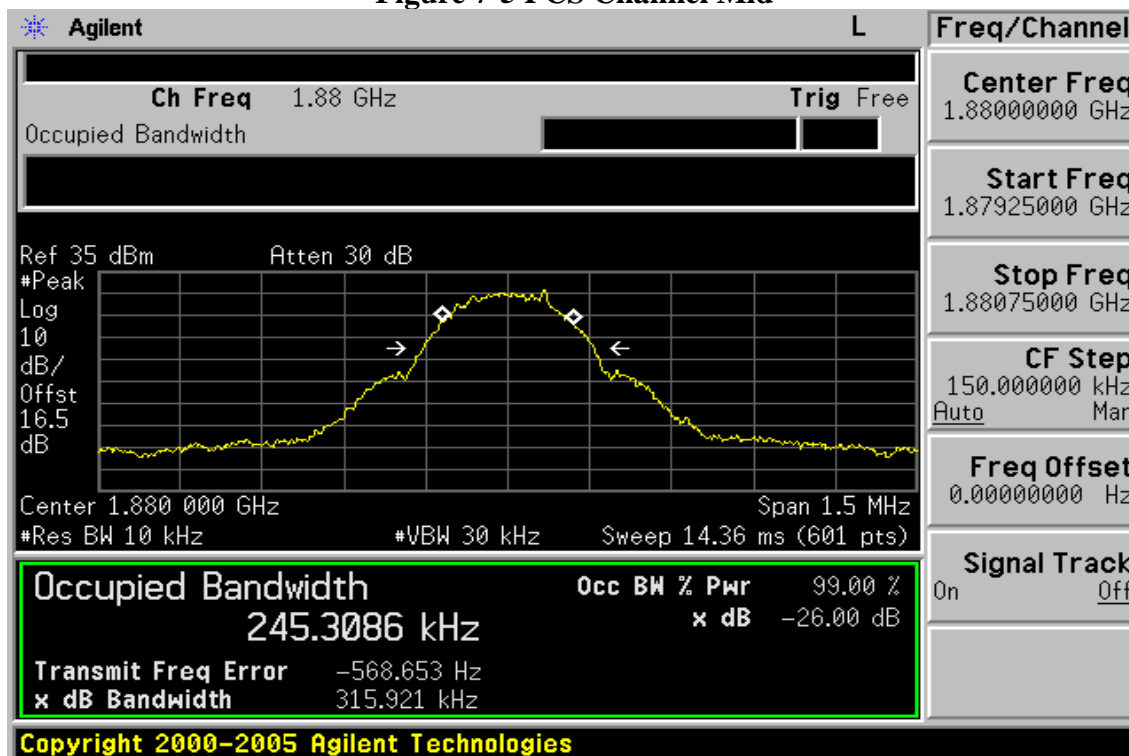
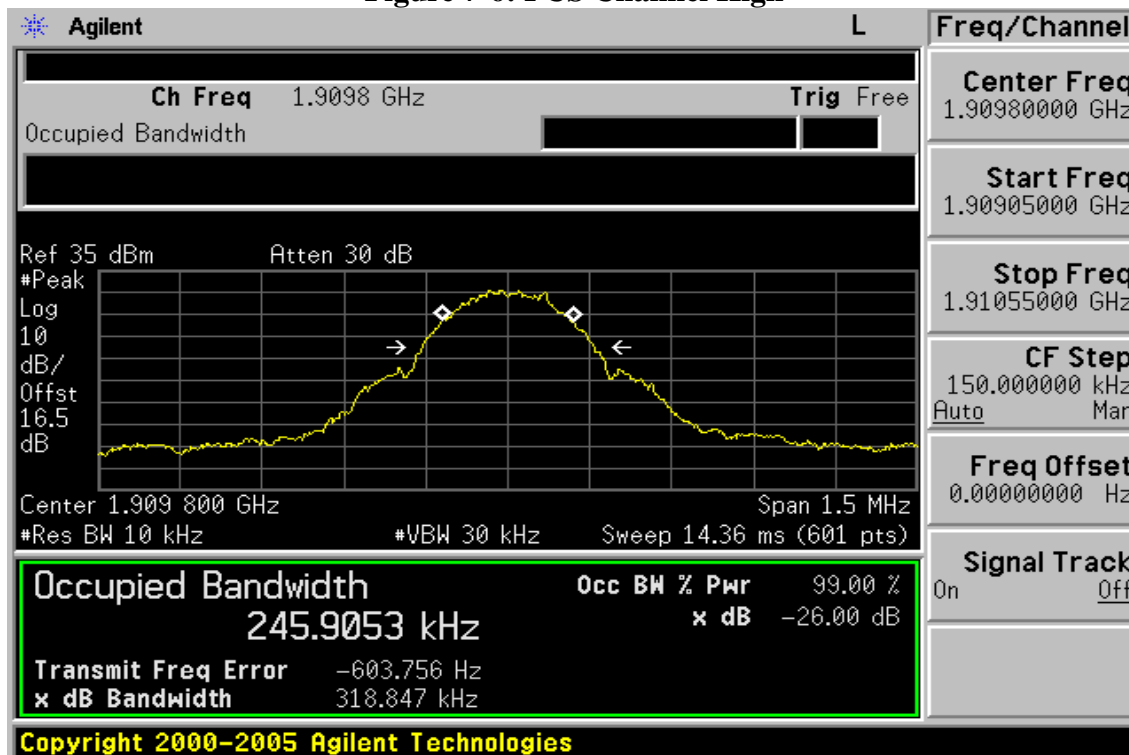


Figure 7-6: PCS Channel High



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Figure 7-7: EDGE 850 Channel Low

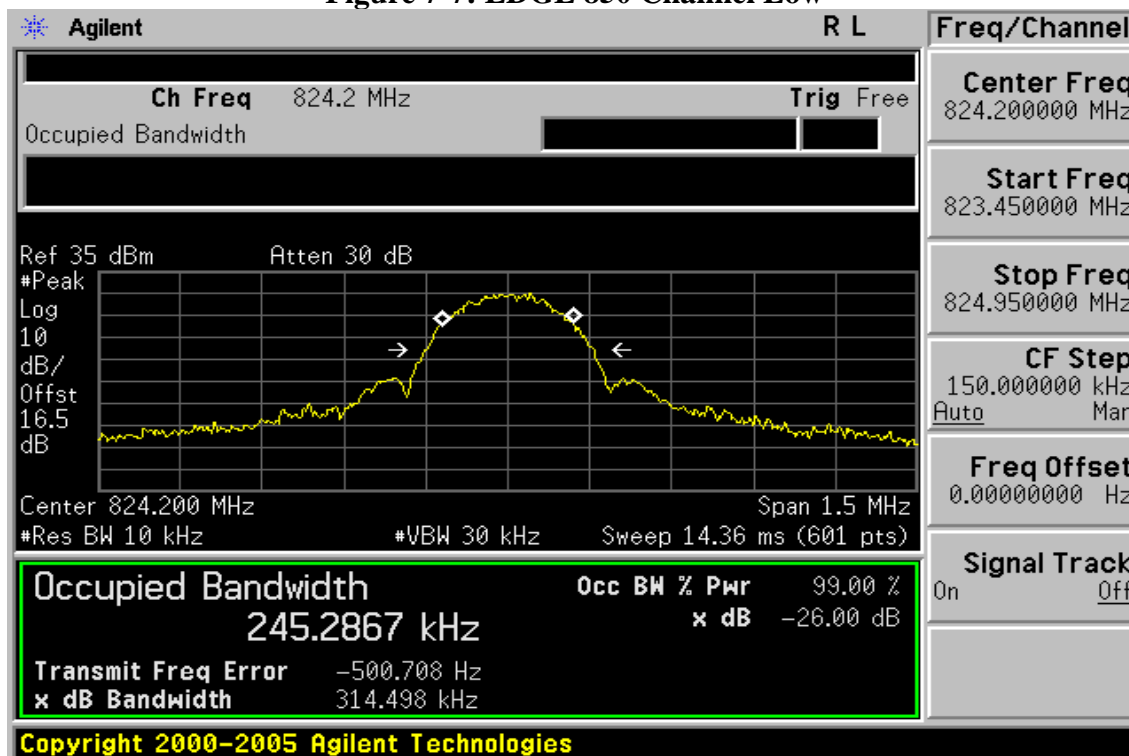
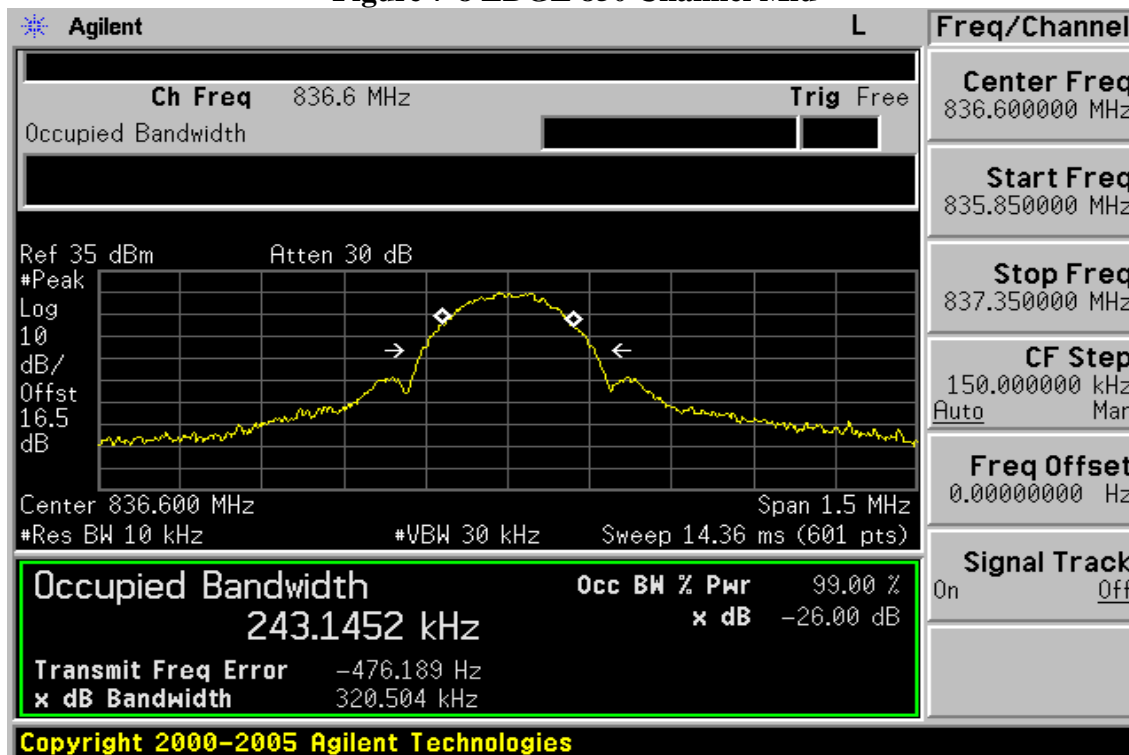


Figure 7-8 EDGE 850 Channel Mid



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Figure 7-9: EDGE 850 Channel High

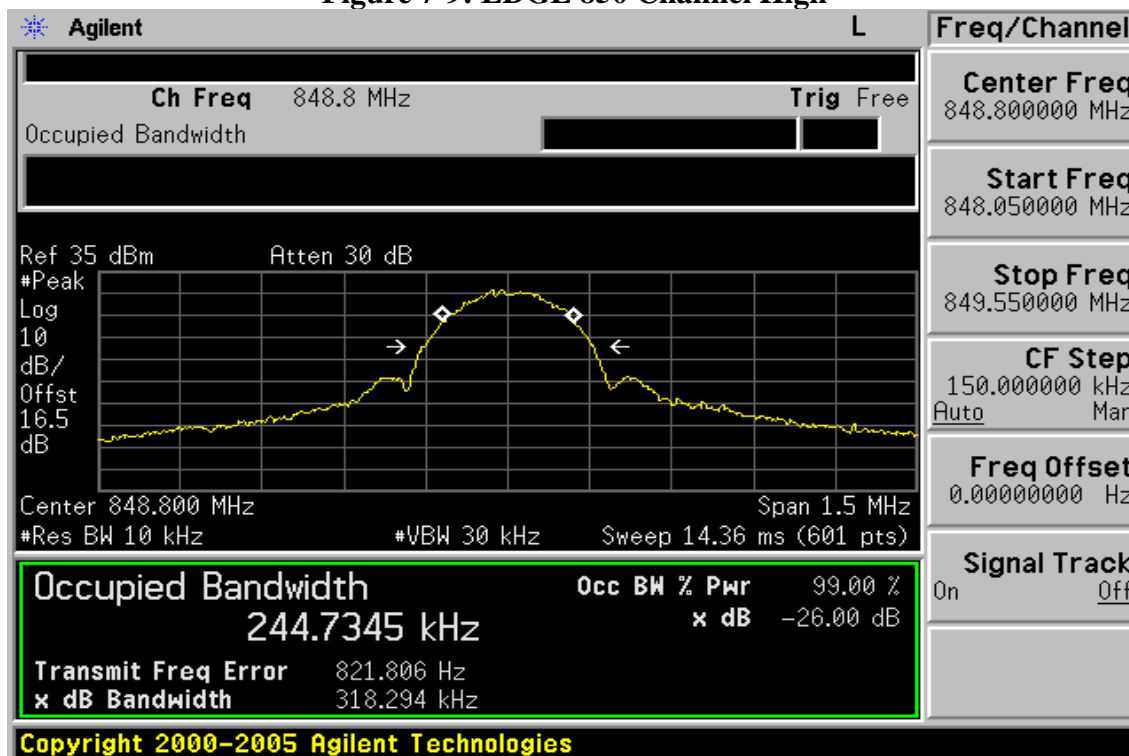
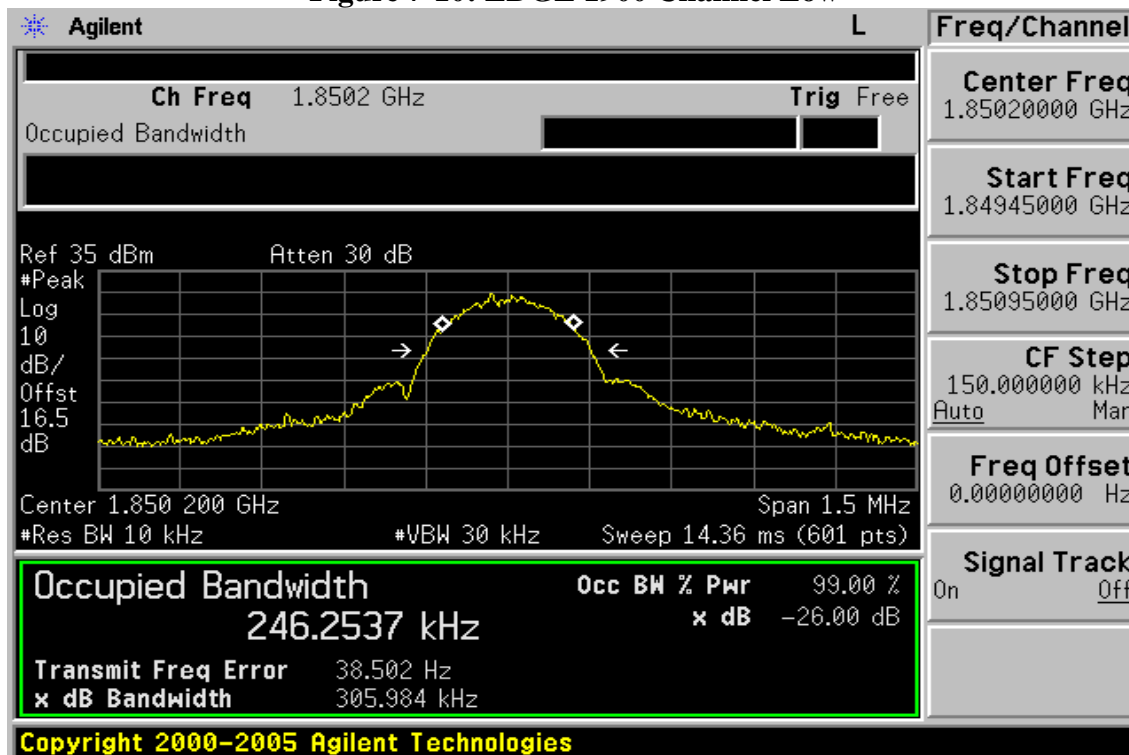


Figure 7-10: EDGE 1900 Channel Low



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Figure 7-11 EDGE 1900 Channel Mid

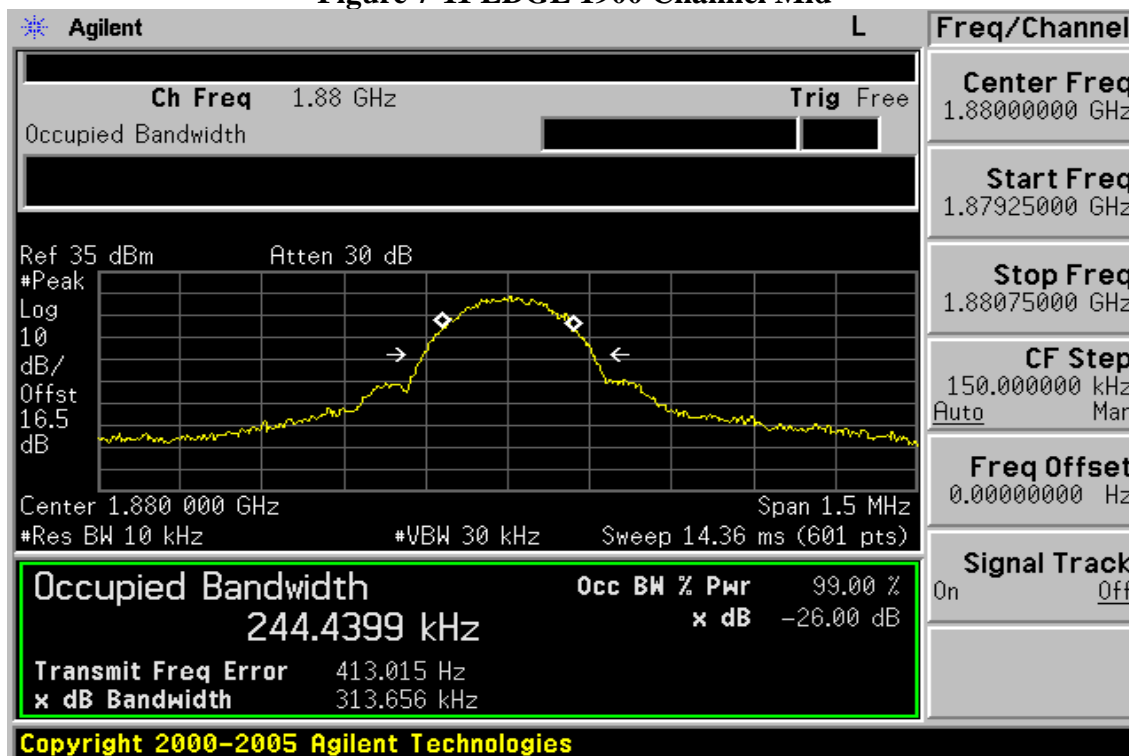
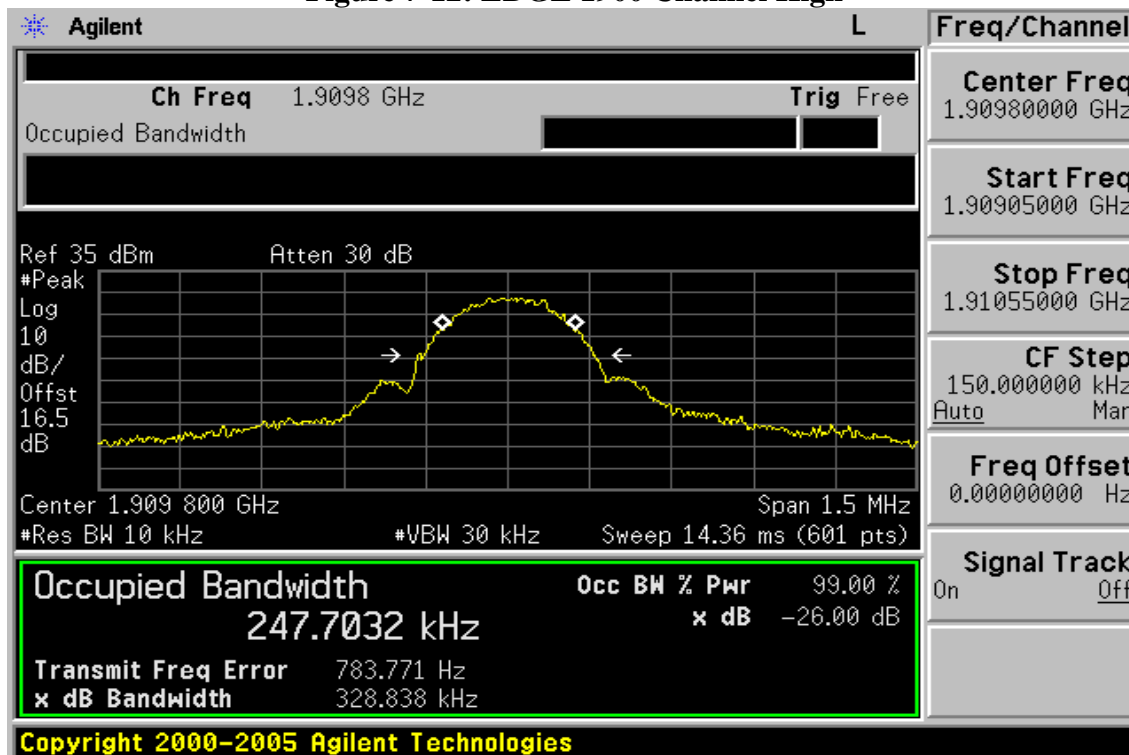


Figure 7-12: EDGE 1900 Channel High



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## 8. OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 8.1. Standard Applicable:

According to FCC §2.1051.

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)

### 8.2. Test SET-UP:

Refer to section 5.2 in this report

### 8.3. Measurement Procedure:

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.

For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic. Limit = -13dBm

Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

### 8.4. Measurement Equipment Used:

Refer to section 2.4 in this report

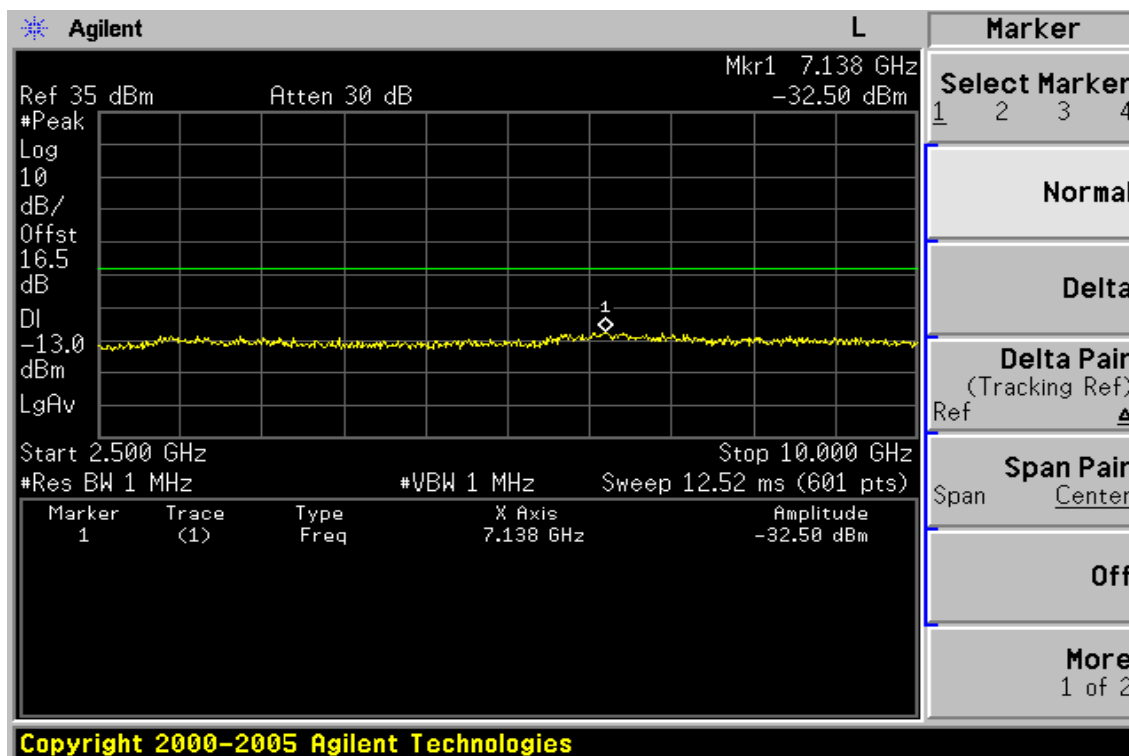
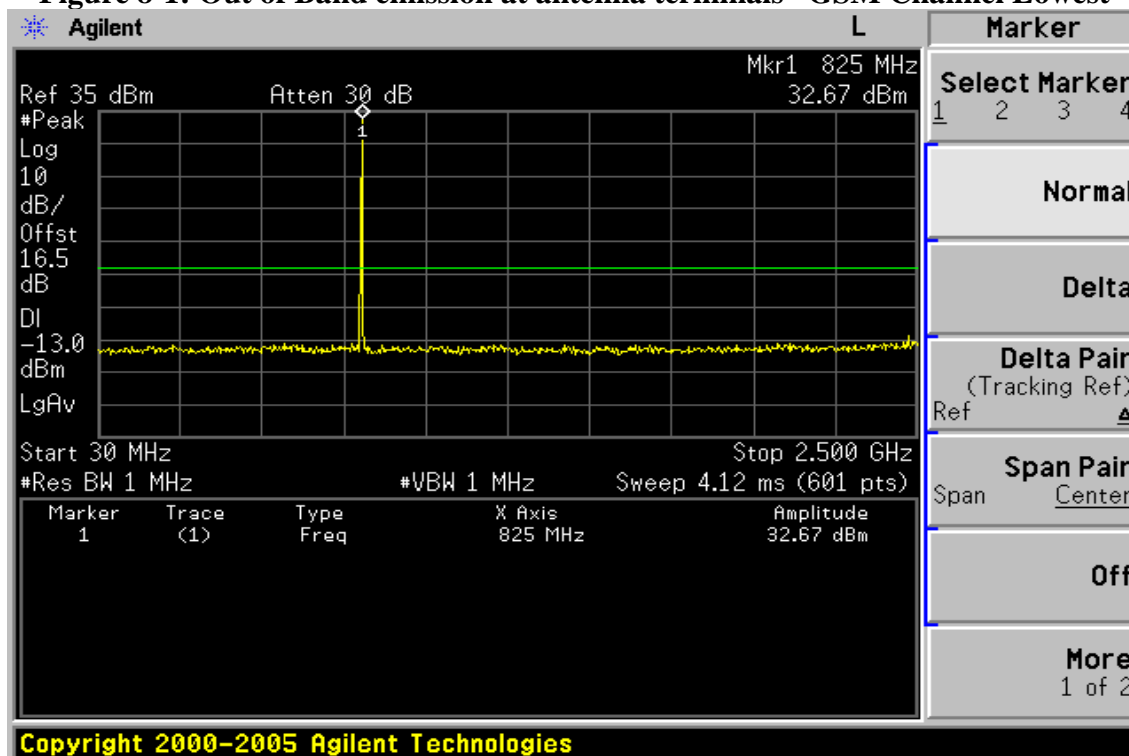
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## 8.5. Measurement Result:

Figure 8-1: Out of Band emission at antenna terminals– GSM Channel Lowest



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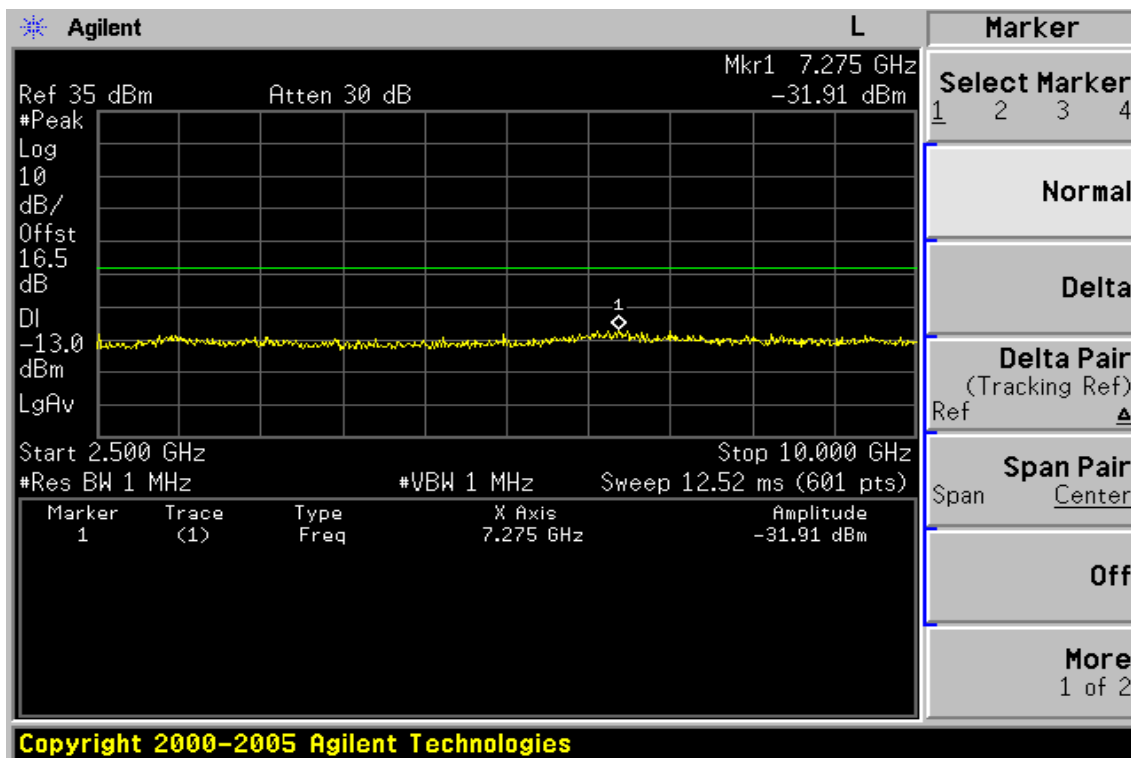
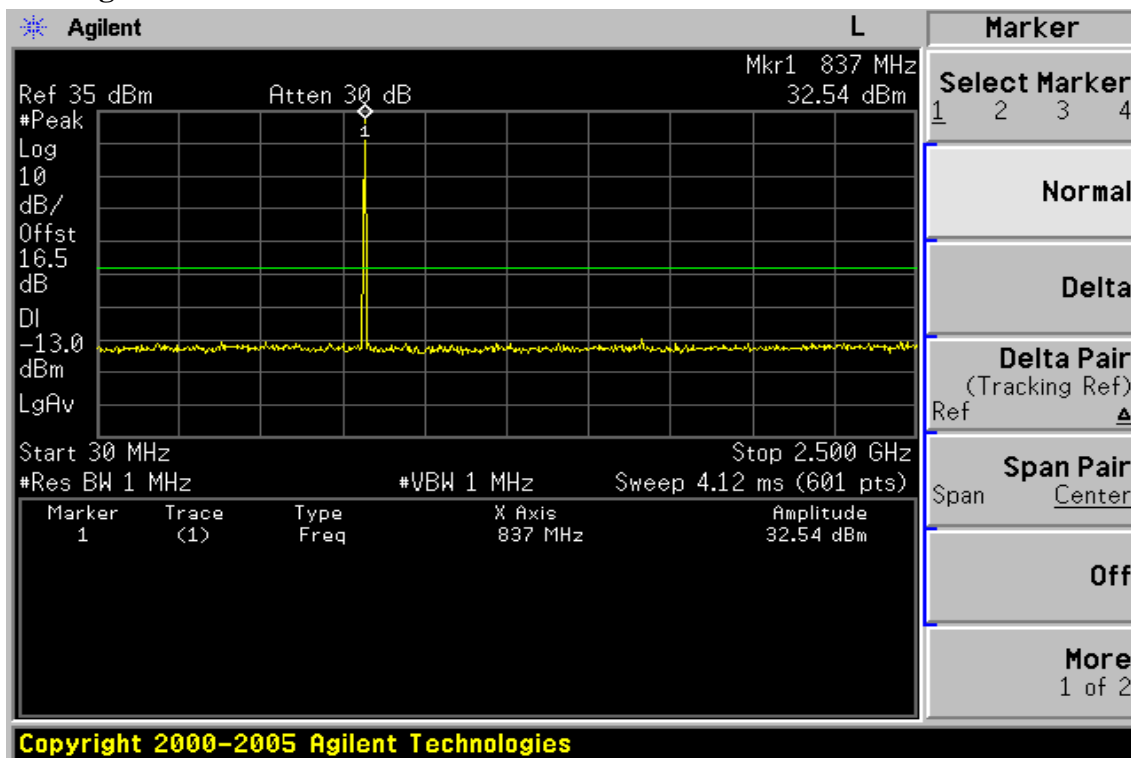
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Figure 8-2: Out of Band emission at antenna terminals –GSM Channel Mid



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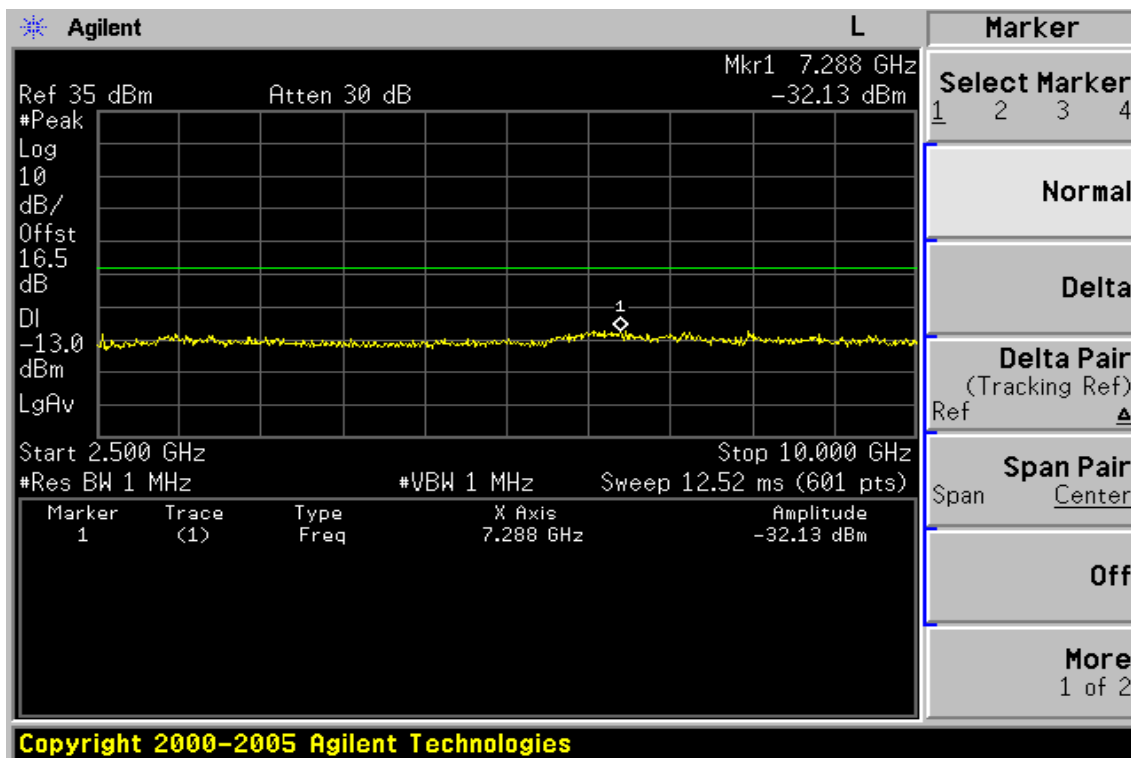
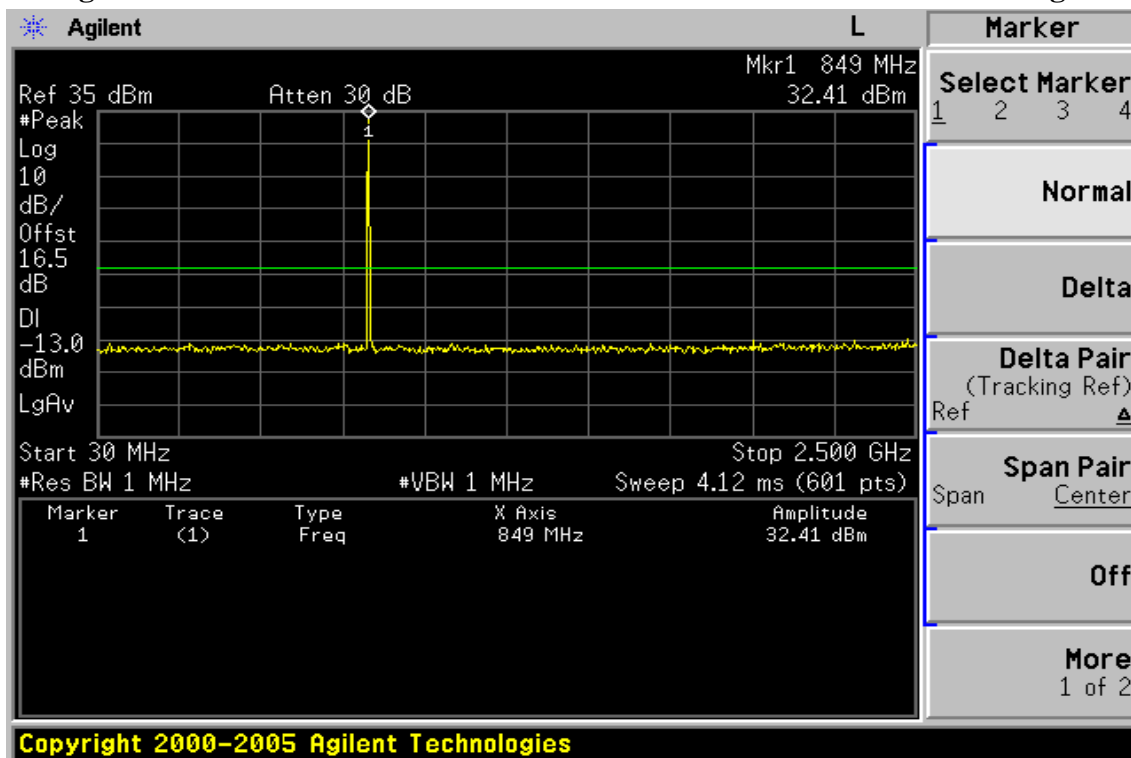
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Figure 8-3: Out of Band emission at antenna terminals–GSM Channel Highest



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Figure 8-4: Band edge emission at antenna terminals – GSM Channel Lowest

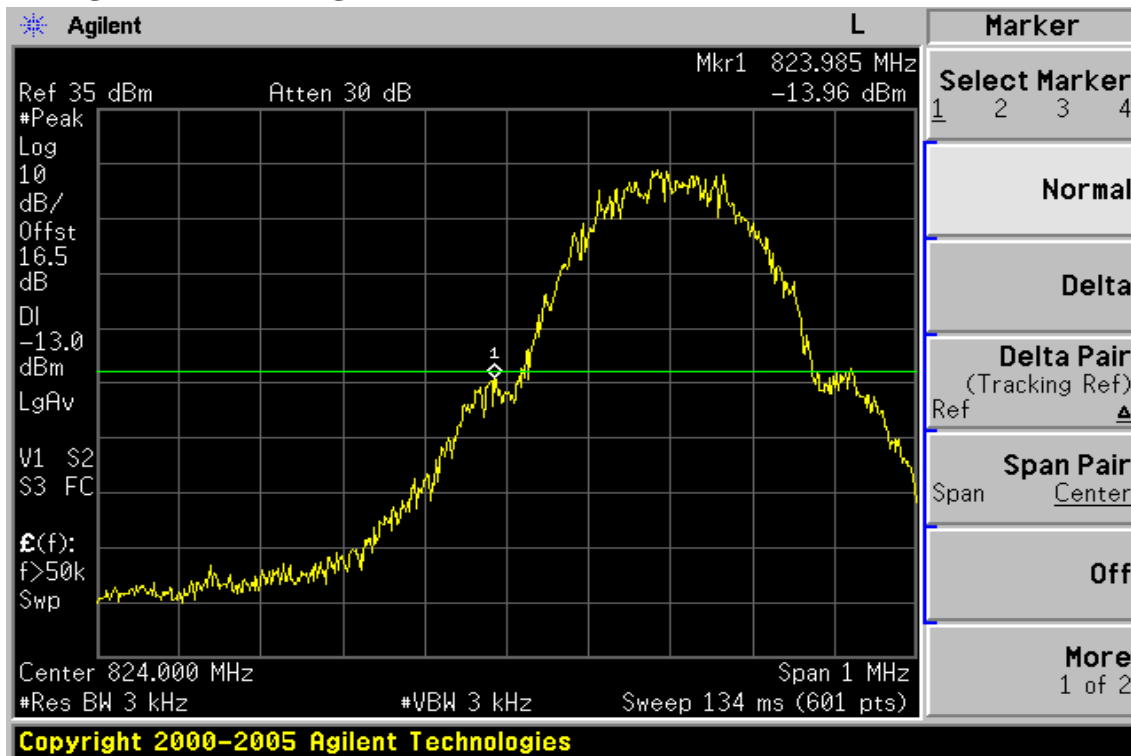


Figure 8-5: Band edge emission at antenna terminals – GSM Channel Highest



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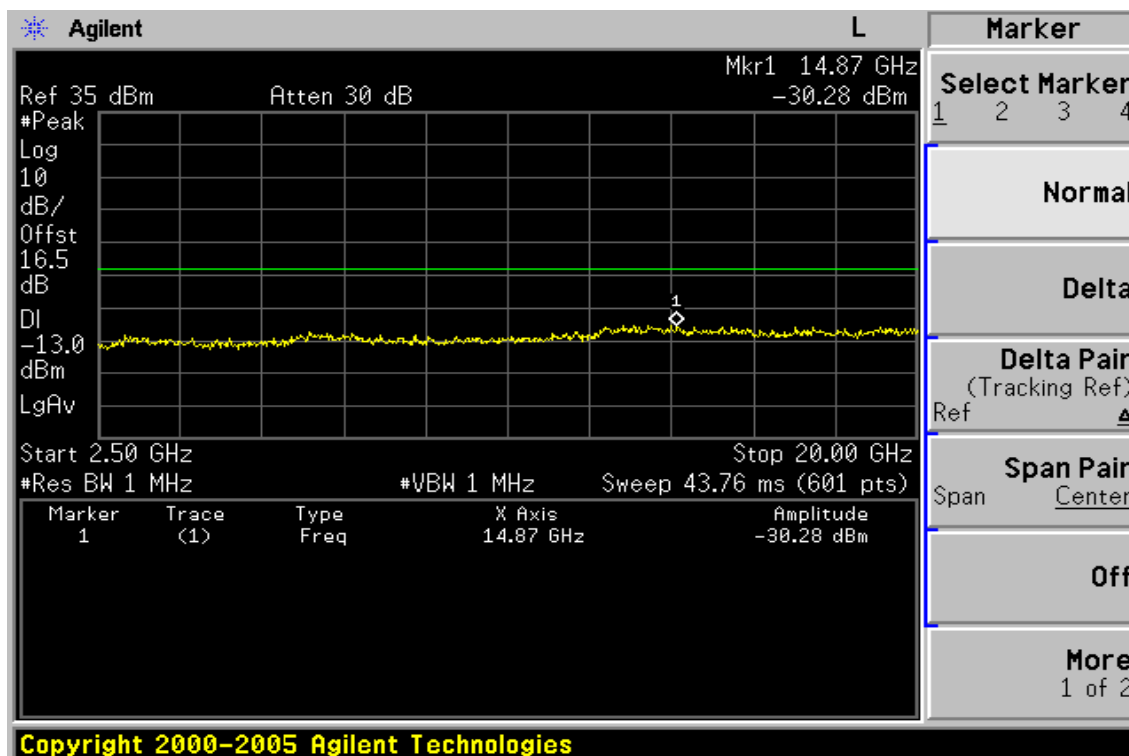
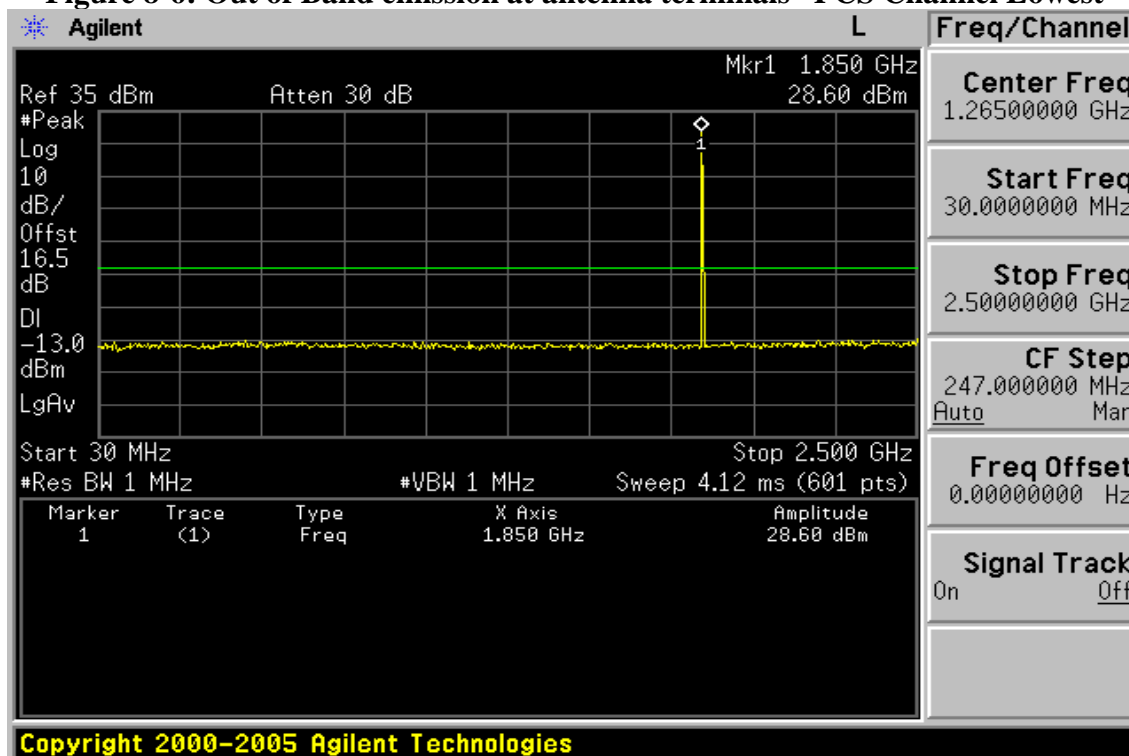
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Figure 8-6: Out of Band emission at antenna terminals– PCS Channel Lowest



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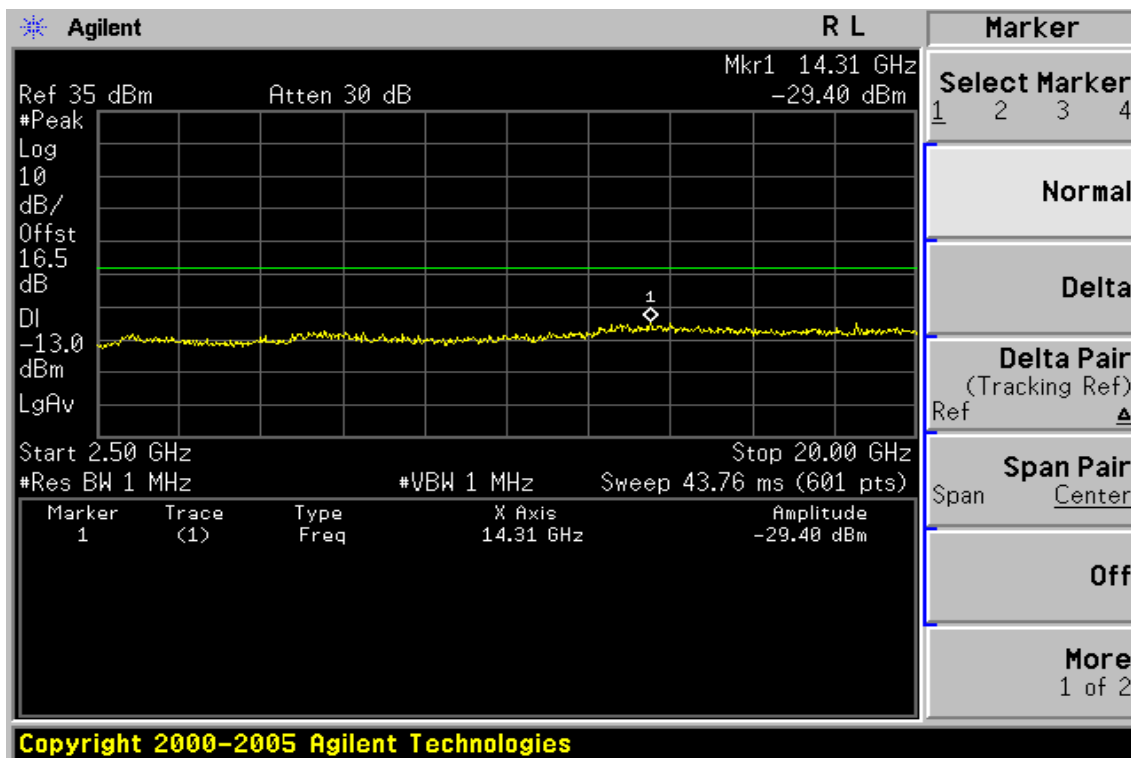
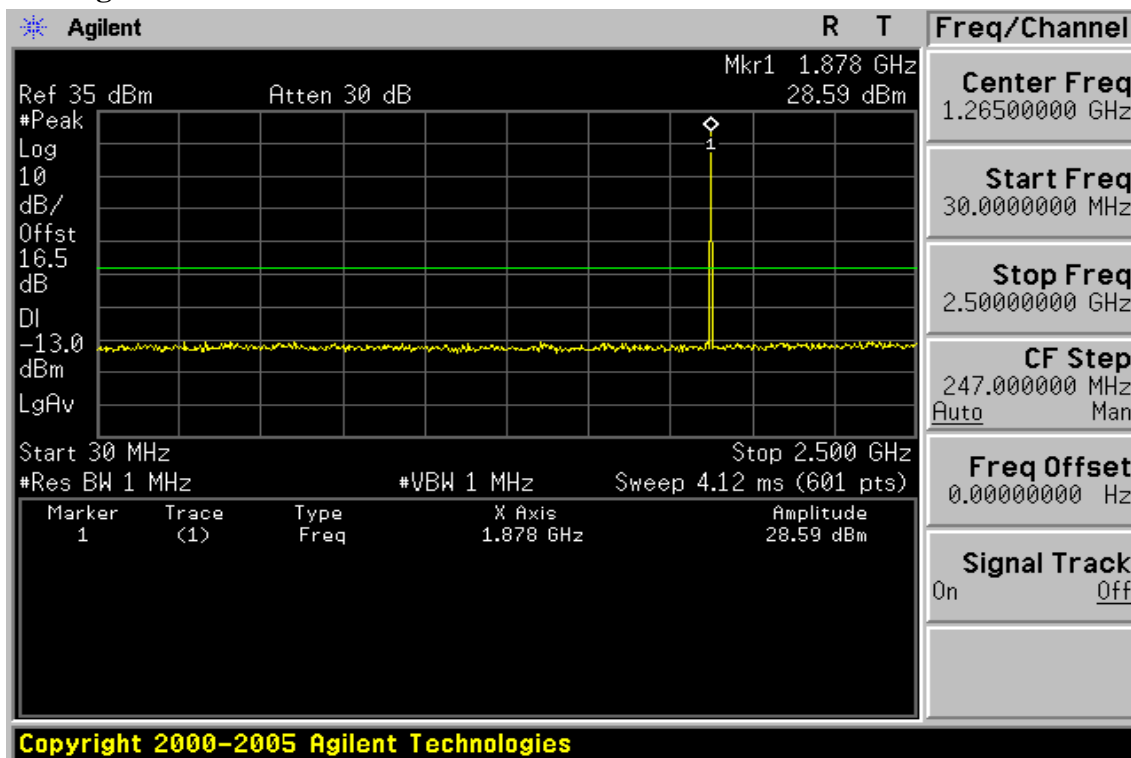
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Figure 8-7: Out of Bandd emission at antenna terminals –PCS Channel Mid



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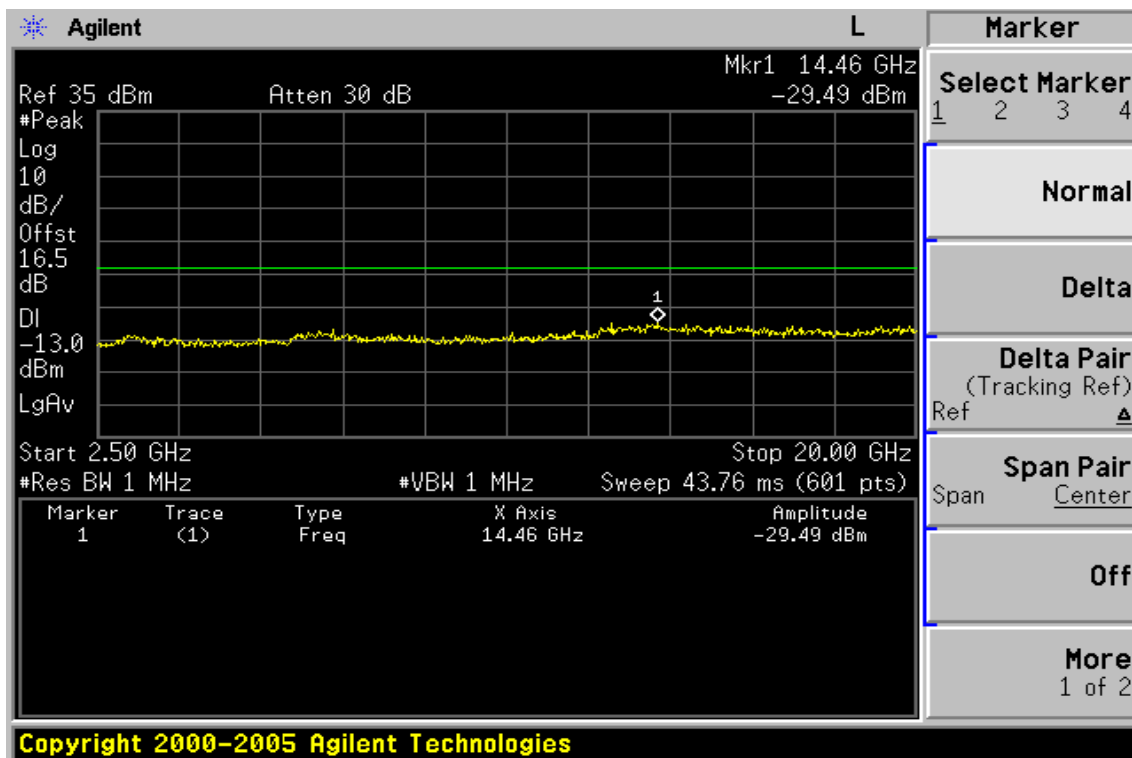
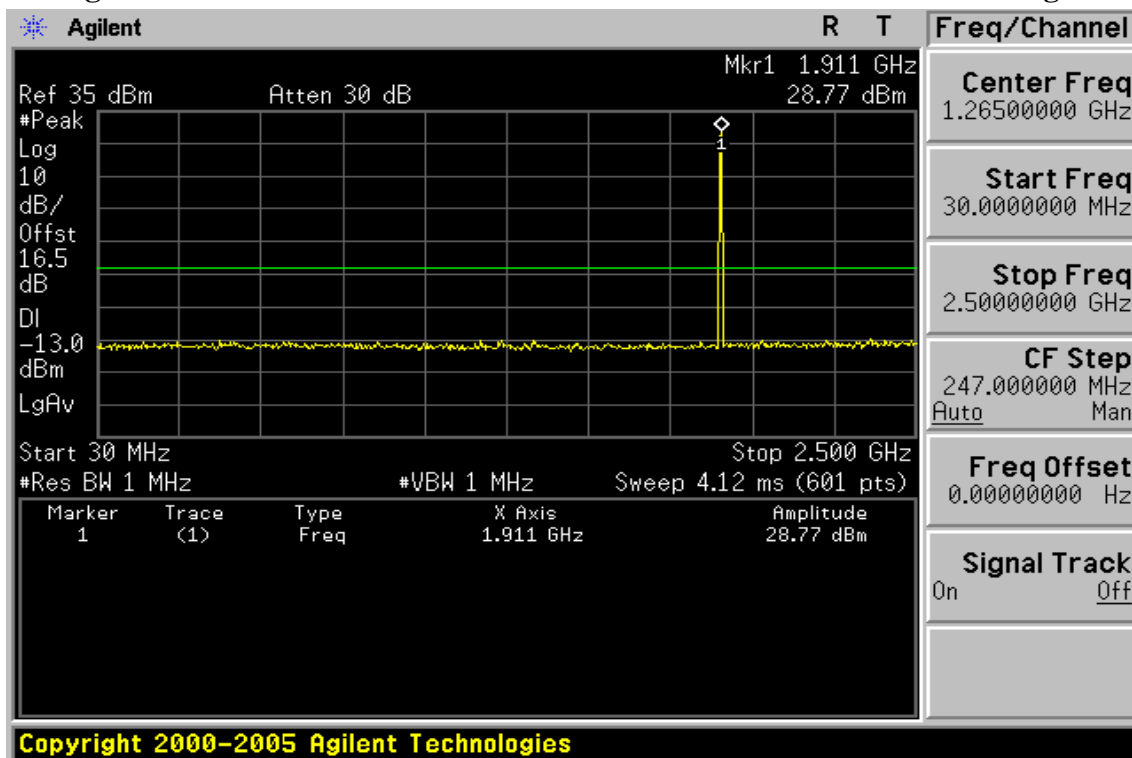
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Figure 8-8: Out of Band emission at antenna terminals–PCS Channel Highest



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Figure 8-9: Bad edge emission at antenna terminals – PCS Channel Lowest

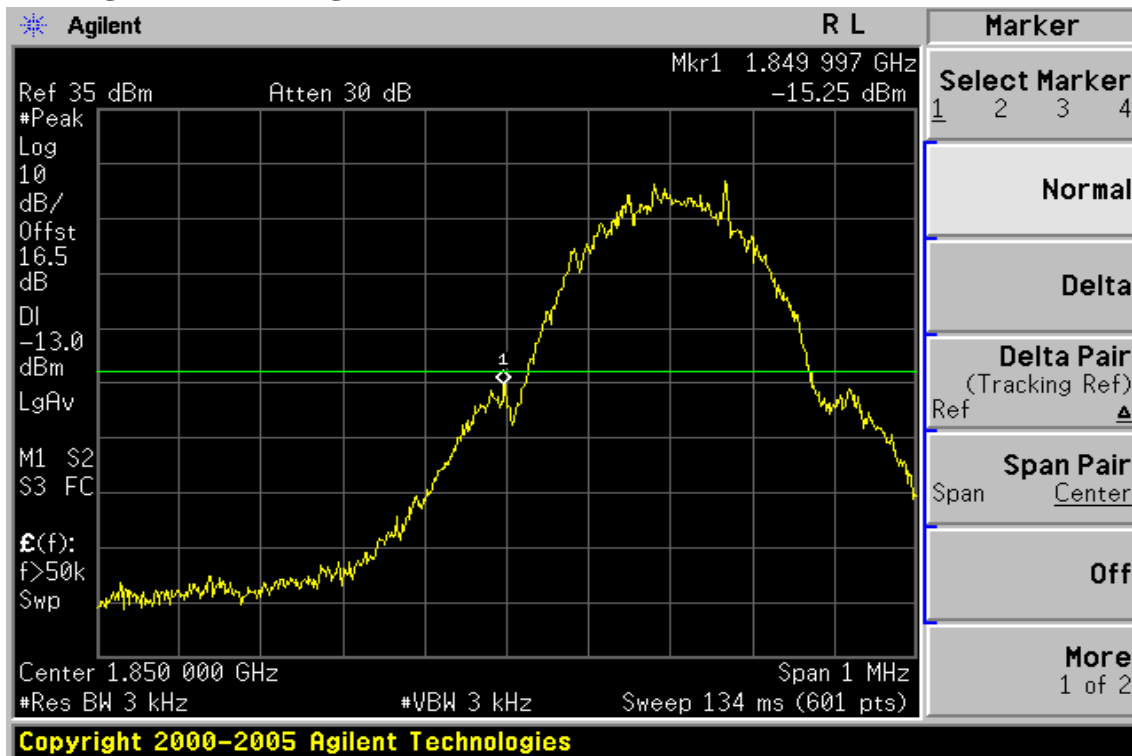
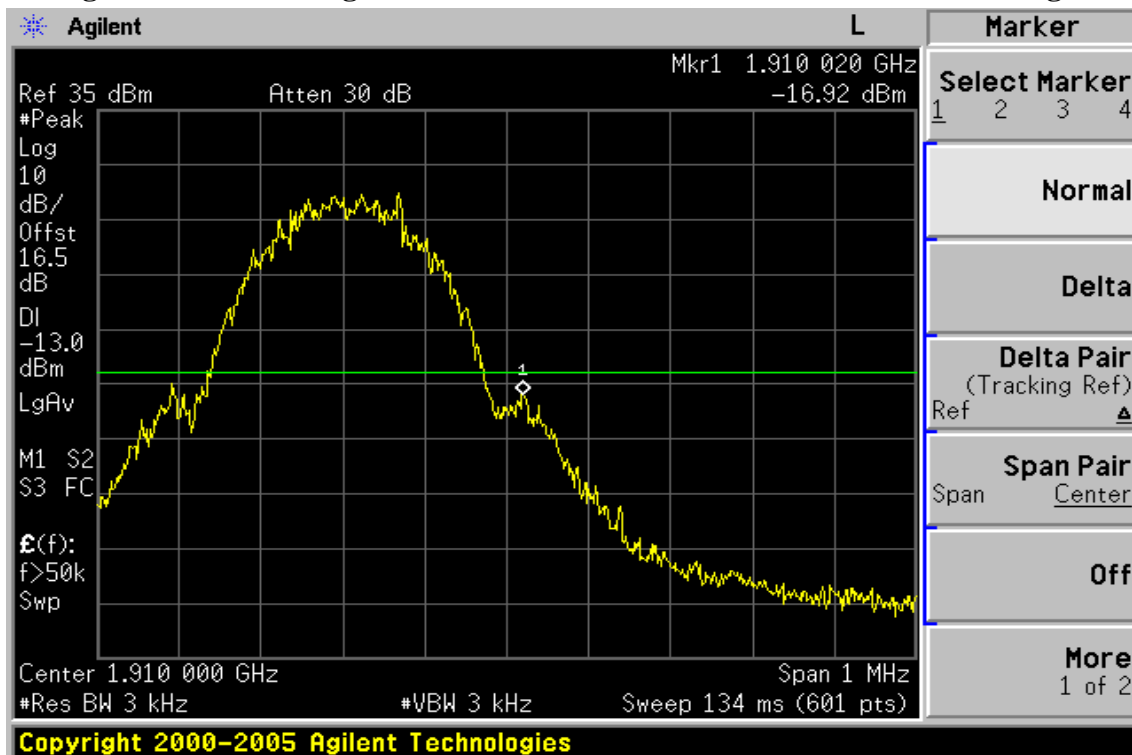


Figure 8-10: Band edge emission at antenna terminals – PCS Channel Highest



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## 9. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

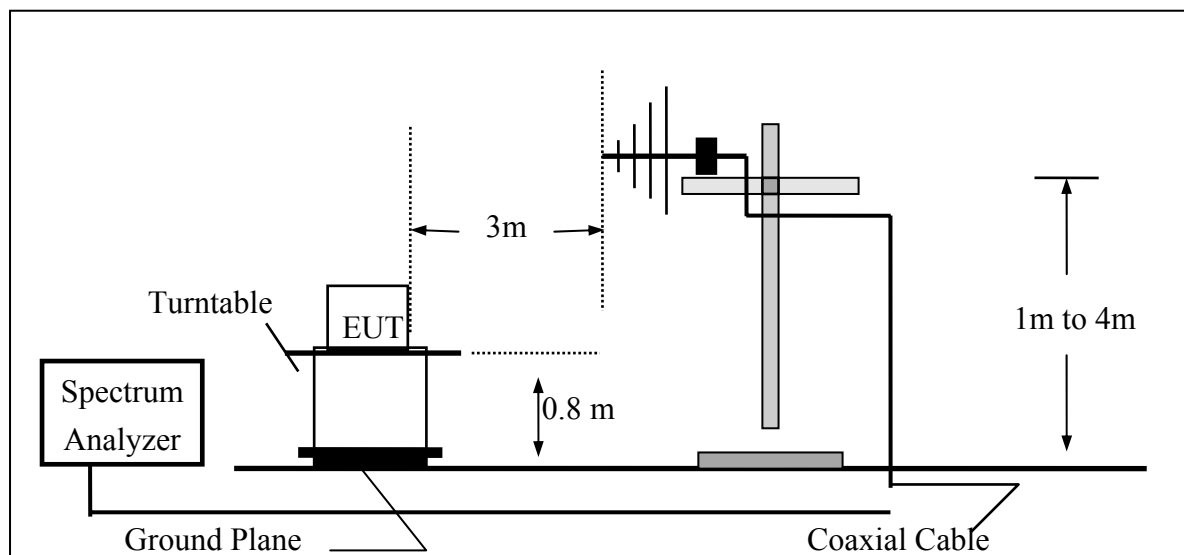
### 9.1. Standard Applicable:

According to FCC §2.1053,

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. EUT Setup (Block Diagram of Configuration):

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



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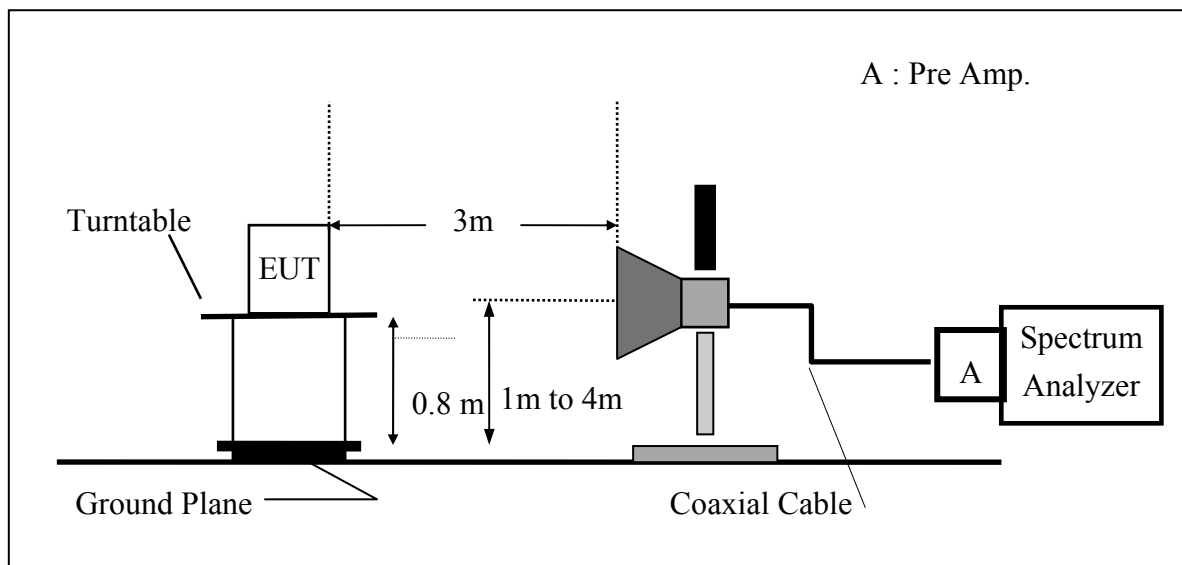
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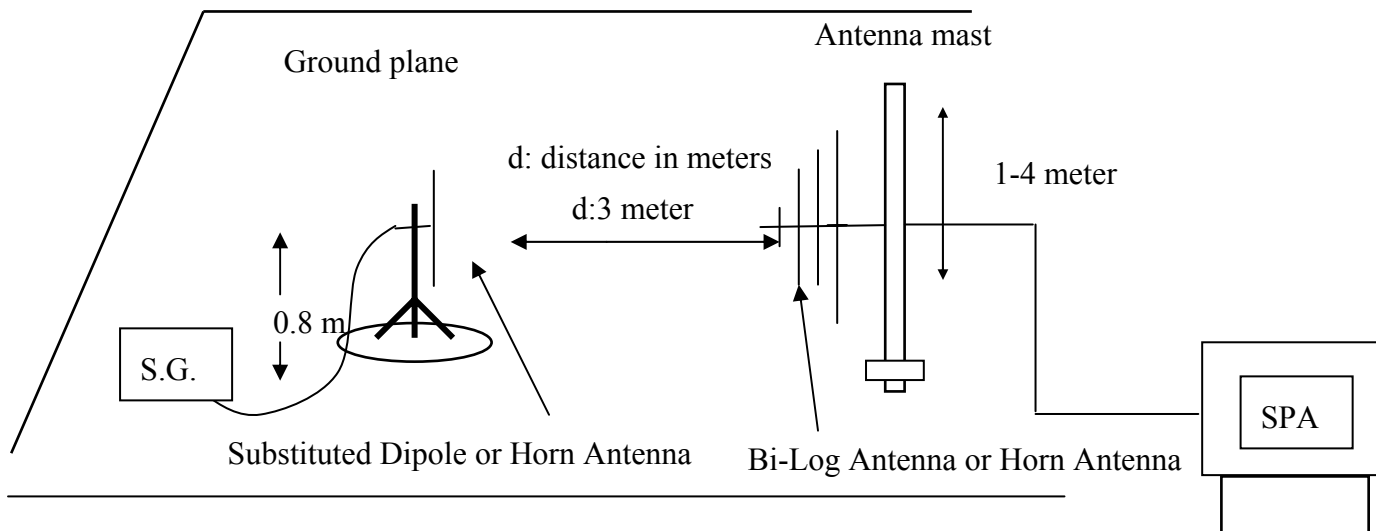
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## (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



## (C) Substituted Method Test Set-UP



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### 9.3. 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 frequency (low, middle and high channels). Once spurious emission were identified, the power of the emission was determined using the substitution method.

ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1710-1755MHz and 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by a horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

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

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

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

### 9.4. Measurement Equipment Used:

Refer to section 2.4 in this report

### 9.5. Measurement Result:

Refer to attach tabular data sheets.

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**Radiated Spurious Emission Measurement Result: GSM 850 Mode**

Operation Mode	: TX CH Low H Mode	Test Date:	Feb. 19, 2010
Fundamental Frequency	: 824.20 MHz	Test By:	Jazz
Temperature	: 25	Pol:	Ver
Humidity	: 65%		

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
31.94	52.37	V	-51.77	-6.43	0.94	-59.14	-13.00	-46.14
64.92	39.85	V	-71.70	-0.77	1.11	-73.58	-13.00	-60.58
77.53	44.34	V	-67.08	-2.12	1.21	-70.41	-13.00	-57.41
90.14	48.77	V	-54.41	-7.75	1.27	-63.43	-13.00	-50.43
104.69	42.77	V	-58.72	-7.76	1.38	-67.86	-13.00	-54.86
153.19	33.71	V	-63.87	-7.80	1.60	-73.27	-13.00	-60.27
824.00	83.33	V	-3.06	-7.87	3.62	-14.56	-13.00	-1.56
1648.40	44.40	V	-60.18	9.29	5.23	-56.12	-13.00	-43.12
2472.60	57.45	V	-43.56	10.08	6.53	-40.01	-13.00	-27.01
3296.80	---	V		12.17	7.71		-13.00	
4121.00	---	V		12.61	8.86		-13.00	
4945.20	---	V		12.65	9.74		-13.00	
5769.40	---	V		13.55	10.54		-13.00	
6593.60	---	V		12.05	11.30		-13.00	
7417.80	---	V		11.49	12.10		-13.00	
8242.00	---	V		11.48	12.71		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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# Radiated Spurious Emission Measurement Result: GSM 850 Mode

Operation Mode : TX CH Low H Mode      Test Date: Feb. 19, 2010  
 Fundamental Frequency : 824.20 MHz      Test By: Jazz  
 Temperature : 25      Pol: Hor  
 Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
41.64	41.58	H	-61.93	-2.31	0.93	-65.17	-13.00	-52.17
62.98	40.05	H	-71.48	-0.64	1.10	-73.22	-13.00	-60.22
90.14	43.84	H	-59.89	-7.75	1.27	-68.91	-13.00	-55.91
104.69	41.60	H	-60.91	-7.76	1.38	-70.05	-13.00	-57.05
193.93	37.40	H	-63.78	-7.84	1.70	-73.31	-13.00	-60.31
245.34	35.83	H	-63.62	-7.89	1.96	-73.47	-13.00	-60.47
824.00	73.27	H	-13.00	-7.87	3.62	-24.50	-13.00	-11.50
1648.40	60.91	H	-43.49	9.29	5.23	-39.43	-13.00	-26.43
2472.60	44.06	H	-56.85	10.08	6.53	-53.30	-13.00	-40.30
3296.80	60.14	H	-38.96	12.17	7.71	-34.50	-13.00	-21.50
4121.00	---	H		12.61	8.86		-13.00	
4945.20	---	H		12.65	9.74		-13.00	
5769.40	---	H		13.55	10.54		-13.00	
6593.60	---	H		12.05	11.30		-13.00	
7417.80	---	H		11.49	12.10		-13.00	
8242.00	---	H		11.48	12.71		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

## Remark:

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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**Radiated Spurious Emission Measurement Result: GSM 850 Mode**

Operation Mode : TX CH Mid H Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 836.60 MHz

Test By: Jazz

Temperature : 25

Pol: Ver

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out- put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
33.88	54.09	V	-49.48	-5.52	0.93	-55.93	-13.00	-42.93
53.28	38.87	V	-69.54	-0.55	1.11	-71.20	-13.00	-58.20
77.53	44.67	V	-66.75	-2.12	1.21	-70.08	-13.00	-57.08
90.14	49.09	V	-54.09	-7.75	1.27	-63.11	-13.00	-50.11
101.78	43.38	V	-58.38	-7.76	1.37	-67.50	-13.00	-54.50
153.19	34.22	V	-63.36	-7.80	1.60	-72.76	-13.00	-59.76
1673.20	44.17	V	-60.39	9.36	5.27	-56.29	-13.00	-43.29
2509.80	60.56	V	-40.22	10.09	6.58	-36.72	-13.00	-23.72
3346.40	---	V		12.28	7.79		-13.00	
4183.00	---	V		12.62	8.93		-13.00	
5019.60	---	V		12.67	9.81		-13.00	
5856.20	---	V		13.68	10.62		-13.00	
6692.80	---	V		11.95	11.39		-13.00	
7529.40	---	V		11.45	12.20		-13.00	
8366.00	---	V		11.59	12.81		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz - 1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belongs to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP\ (dBm) = SG\ Setting(dBm) + Antenna\ Gain\ (dB/dBi) - Cable\ loss\ (dB)$

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Operation Mode : TX CH Mid H Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 836.60 MHz

Test By: Jazz

Temperature : 25

Pol: Hor

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out- put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
39.70	41.45	H	-61.44	-2.79	0.89	-65.13	-13.00	-52.13
62.98	37.11	H	-74.42	-0.64	1.10	-76.16	-13.00	-63.16
90.14	43.77	H	-59.96	-7.75	1.27	-68.98	-13.00	-55.98
104.69	41.37	H	-61.14	-7.76	1.38	-70.28	-13.00	-57.28
203.63	36.46	H	-65.01	-7.84	1.73	-74.59	-13.00	-61.59
245.34	34.28	H	-65.17	-7.89	1.96	-75.02	-13.00	-62.02
1673.20	43.20	H	-61.18	9.36	5.27	-57.08	-13.00	-44.08
2509.80	60.11	H	-40.59	10.09	6.58	-37.09	-13.00	-24.09
3346.40	---	H		12.28	7.79		-13.00	
4183.00	---	H		12.62	8.93		-13.00	
5019.60	---	H		12.67	9.81		-13.00	
5856.20	---	H		13.68	10.62		-13.00	
6692.80	---	H		11.95	11.39		-13.00	
7529.40	---	H		11.45	12.20		-13.00	
8366.00	---	H		11.59	12.81		-13.00	

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**Remark:**

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**Radiated Spurious Emission Measurement Result: GSM 850 Mode**

Operation Mode : TX CH High H Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 848.80 MHz

Test By: Jazz

Temperature : 25

Pol: Ver

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out- put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
31.94	47.76	V	-56.38	-6.43	0.94	-63.75	-13.00	-50.75
65.89	41.61	V	-69.98	-0.83	1.12	-71.93	-13.00	-58.93
77.53	44.42	V	-67.00	-2.12	1.21	-70.33	-13.00	-57.33
90.14	49.40	V	-53.78	-7.75	1.27	-62.80	-13.00	-49.80
101.78	44.71	V	-57.05	-7.76	1.37	-66.17	-13.00	-53.17
162.89	34.76	V	-63.69	-7.81	1.62	-73.12	-13.00	-60.12
850.00	82.18	V	-3.93	-7.88	3.68	-15.49	-13.00	-2.49
1697.60	43.81	V	-60.73	9.44	5.31	-56.60	-13.00	-43.60
2546.40	56.77	V	-43.87	10.20	6.63	-40.31	-13.00	-27.31
3395.20	---	V		12.38	7.87		-13.00	
4244.00	---	V		12.63	9.00		-13.00	
5092.80	---	V		12.74	9.88		-13.00	
5941.60	---	V		13.81	10.70		-13.00	
6790.40	---	V		11.86	11.48		-13.00	
7639.20	---	V		11.40	12.27		-13.00	
8488.00	---	V		11.70	12.91		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP \text{ (dBm)} = SG \text{ Setting (dBm)} + \text{Antenna Gain (dB/dBi)} - \text{Cable loss (dB)}$

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**Radiated Spurious Emission Measurement Result: GSM 850 Mode**

Operation Mode : TX CH High H Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 848.80 MHz

Test By: Jazz

Temperature : 25

Pol: Hor

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
39.70	41.10	H	-61.79	-2.79	0.89	-65.48	-13.00	-52.48
61.04	39.14	H	-72.17	-0.52	1.08	-73.78	-13.00	-60.78
90.14	42.20	H	-61.53	-7.75	1.27	-70.55	-13.00	-57.55
104.69	41.09	H	-61.42	-7.76	1.38	-70.56	-13.00	-57.56
196.84	36.92	H	-64.48	-7.84	1.70	-74.02	-13.00	-61.02
245.34	36.51	H	-62.94	-7.89	1.96	-72.79	-13.00	-59.79
850.00	74.19	H	-12.00	-7.88	3.68	-23.56	-13.00	-10.56
1697.60	43.81	H	-60.54	9.44	5.31	-56.41	-13.00	-43.41
2546.40	57.03	H	-43.57	10.20	6.63	-40.01	-13.00	-27.01
3395.20	---	H		12.38	7.87		-13.00	
4244.00	---	H		12.63	9.00		-13.00	
5092.80	---	H		12.74	9.88		-13.00	
5941.60	---	H		13.81	10.70		-13.00	
6790.40	---	H		11.86	11.48		-13.00	
7639.20	---	H		11.40	12.27		-13.00	
8488.00	---	H		11.70	12.91		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH Low E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1850.20MHz

Test By: Jazz

Temperature : 25

Pol: Ver

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
36.79	51.62	V	-51.11	-4.16	0.91	-56.18	-13.00	-43.18
61.04	39.99	V	-71.36	-0.52	1.08	-72.97	-13.00	-59.97
77.53	45.54	V	-65.88	-2.12	1.21	-69.21	-13.00	-56.21
90.14	49.54	V	-53.64	-7.75	1.27	-62.66	-13.00	-49.66
104.69	44.62	V	-56.87	-7.76	1.38	-66.01	-13.00	-53.01
153.19	33.03	V	-64.55	-7.80	1.60	-73.95	-13.00	-60.95
1850.00	70.79	V	-33.60	9.90	5.56	-29.26	-13.00	-16.26
3700.40	41.69	V	-56.24	12.61	8.31	-51.94	-13.00	-38.94
5550.60	58.31	V	-32.53	13.23	10.33	-29.63	-13.00	-16.63
7400.80	---	V		11.50	12.08		-13.00	
9251.00	---	V		11.92	13.50		-13.00	
11101.20	---	V		11.66	15.11		-13.00	
12951.40	---	V		13.63	16.60		-13.00	
14801.60	---	V		12.76	17.95		-13.00	
16651.80	---	V		15.92	19.14		-13.00	
18502.00	---	V		18.75	10.40		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz - 1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH Low E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1850.20MHz

Test By: Jazz

Temperature : 25

Pol: Hor

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
38.73	41.65	H	-61.54	-3.25	0.90	-65.69	-13.00	-52.69
62.98	39.18	H	-72.35	-0.64	1.10	-74.09	-13.00	-61.09
90.14	44.14	H	-59.59	-7.75	1.27	-68.61	-13.00	-55.61
104.69	40.98	H	-61.53	-7.76	1.38	-70.67	-13.00	-57.67
193.93	36.25	H	-64.93	-7.84	1.70	-74.46	-13.00	-61.46
245.34	35.21	H	-64.24	-7.89	1.96	-74.09	-13.00	-61.09
1850.00	74.38	H	-29.80	9.90	5.56	-25.46	-13.00	-12.46
3700.40	42.93	H	-55.11	12.61	8.31	-50.81	-13.00	-37.81
5550.60	55.14	H	-35.91	13.23	10.33	-33.01	-13.00	-20.01
7400.80	---	H		11.50	12.08		-13.00	
9251.00	---	H		11.92	13.50		-13.00	
11101.20	---	H		11.66	15.11		-13.00	
12951.40	---	H		13.63	16.60		-13.00	
14801.60	---	H		12.76	17.95		-13.00	
16651.80	---	H		15.92	19.14		-13.00	
18502.00	---	H		18.75	10.40		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz - 1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH Mid E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1880MHz

Test By: Jazz

Temperature : 25

Pol: Ver

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
31.94	47.45	V	-56.69	-6.43	0.94	-64.06	-13.00	-51.06
62.98	39.91	V	-71.54	-0.64	1.10	-73.28	-13.00	-60.28
77.53	44.49	V	-66.93	-2.12	1.21	-70.26	-13.00	-57.26
90.14	49.53	V	-53.65	-7.75	1.27	-62.67	-13.00	-49.67
101.78	42.88	V	-58.88	-7.76	1.37	-68.00	-13.00	-55.00
286.08	34.34	V	-64.37	-7.91	2.12	-74.40	-13.00	-61.40
3760.00	45.32	V	-52.34	12.60	8.39	-48.12	-13.00	-35.12
5640.00	51.46	V	-39.12	13.36	10.41	-36.17	-13.00	-23.17
7520.00	---	V		11.45	12.19		-13.00	
9400.00	---	V		11.93	13.61		-13.00	
11280.00	---	V		11.92	15.27		-13.00	
13160.00	---	V		13.33	16.71		-13.00	
15040.00	---	V		13.76	18.15		-13.00	
16920.00	---	V		15.27	19.32		-13.00	
18800.00	---	V		18.68	16.58		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH Mid E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1880MHz

Test By: Jazz

Temperature : 25

Pol: Hor

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out- put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/ EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
38.73	41.62	H	-61.57	-3.25	0.90	-65.72	-13.00	-52.72
62.98	40.02	H	-71.51	-0.64	1.10	-73.25	-13.00	-60.25
90.14	44.27	H	-59.46	-7.75	1.27	-68.48	-13.00	-55.48
104.69	41.20	H	-61.31	-7.76	1.38	-70.45	-13.00	-57.45
196.84	36.60	H	-64.80	-7.84	1.70	-74.34	-13.00	-61.34
245.34	37.32	H	-62.13	-7.89	1.96	-71.98	-13.00	-58.98
3760.00	42.65	H	-55.12	12.60	8.39	-50.91	-13.00	-37.91
5640.00	50.29	H	-40.46	13.36	10.41	-37.51	-13.00	-24.51
7520.00	---	H		11.45	12.19		-13.00	
9400.00	---	H		11.93	13.61		-13.00	
11280.00	---	H		11.92	15.27		-13.00	
13160.00	---	H		13.33	16.71		-13.00	
15040.00	---	H		13.76	18.15		-13.00	
16920.00	---	H		15.27	19.32		-13.00	
18800.00	---	H		18.68	16.58		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH High E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1909.8 MHz

Test By: Jazz

Temperature : 25

Pol: Ver

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
31.94	47.03	V	-57.11	-6.43	0.94	-64.48	-13.00	-51.48
65.89	40.12	V	-71.47	-0.83	1.12	-73.42	-13.00	-60.42
77.53	44.75	V	-66.67	-2.12	1.21	-70.00	-13.00	-57.00
90.14	49.47	V	-53.71	-7.75	1.27	-62.73	-13.00	-49.73
104.69	42.73	V	-58.76	-7.76	1.38	-67.90	-13.00	-54.90
153.19	33.38	V	-64.20	-7.80	1.60	-73.60	-13.00	-60.60
1910.00	70.66	V	-33.67	10.08	5.66	-29.25	-13.00	-16.25
3819.60	43.54	V	-53.85	12.60	8.47	-49.72	-13.00	-36.72
5729.40	---	V		13.49	10.50		-13.00	
7639.20	---	V		11.40	12.27		-13.00	
9549.00	---	V		11.95	13.74		-13.00	
11458.80	---	V		12.17	15.43		-13.00	
13368.60	---	V		12.97	16.82		-13.00	
15278.40	---	V		15.00	18.29		-13.00	
17188.20	---	V		14.47	19.52		-13.00	
19098.00	---	V		18.66	20.78		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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**Radiated Spurious Emission Measurement Result: PCS 1900 Mode**

Operation Mode : TX CH High E2 Mode

Test Date: Feb. 19, 2010

Fundamental Frequency : 1909.8 MHz

Test By: Jazz

Temperature : 25

Pol: Hor

Humidity : 65%

Freq. (MHz)	SPA. Reading (dBuV)	Ant.Pol. H/V	S.G Out-put (dBm)	Antenna Gain (dB/dBi)	Cable Loss (dB)	ERP/EIRP (dBm)	Limit (dBm)	Safe Margin (dBm)
38.73	42.07	H	-61.12	-3.25	0.90	-65.27	-13.00	-52.27
61.04	39.69	H	-71.62	-0.52	1.08	-73.23	-13.00	-60.23
90.14	44.54	H	-59.19	-7.75	1.27	-68.21	-13.00	-55.21
104.69	41.25	H	-61.26	-7.76	1.38	-70.40	-13.00	-57.40
193.93	37.39	H	-63.79	-7.84	1.70	-73.32	-13.00	-60.32
245.34	35.50	H	-63.95	-7.89	1.96	-73.80	-13.00	-60.80
1910.00	78.10	H	-26.01	10.08	5.66	-21.59	-13.00	-8.59
3819.60	42.31	H	-55.20	12.60	8.47	-51.06	-13.00	-38.06
5729.40	---	H		13.49	10.50		-13.00	
7639.20	---	H		11.40	12.27		-13.00	
9549.00	---	H		11.95	13.74		-13.00	
11458.80	---	H		12.17	15.43		-13.00	
13368.60	---	H		12.97	16.82		-13.00	
15278.40	---	H		15.00	18.29		-13.00	
17188.20	---	H		14.47	19.52		-13.00	
19098.00	---	H		18.66	20.78		-13.00	

Measurement uncertainty	30MHz - 80MHz: 5.04dB
	80MHz -1000MHz: 3.76dB
	1GHz - 13GHz: 4.45dB

**Remark:**

- 1 The emission behaviors belong to narrowband spurious emission.
- 2 Remark"---" means that the emission level is too low to be measured
- 3 The result basic equation calculation is as follows:
- 4  $ERP/EIRP (dBm) = SG \text{ Setting}(dBm) + Antenna \text{ Gain} (dB/dBi) - Cable \text{ loss} (dB)$

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## 10. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

### 10.1. Standard Applicable:

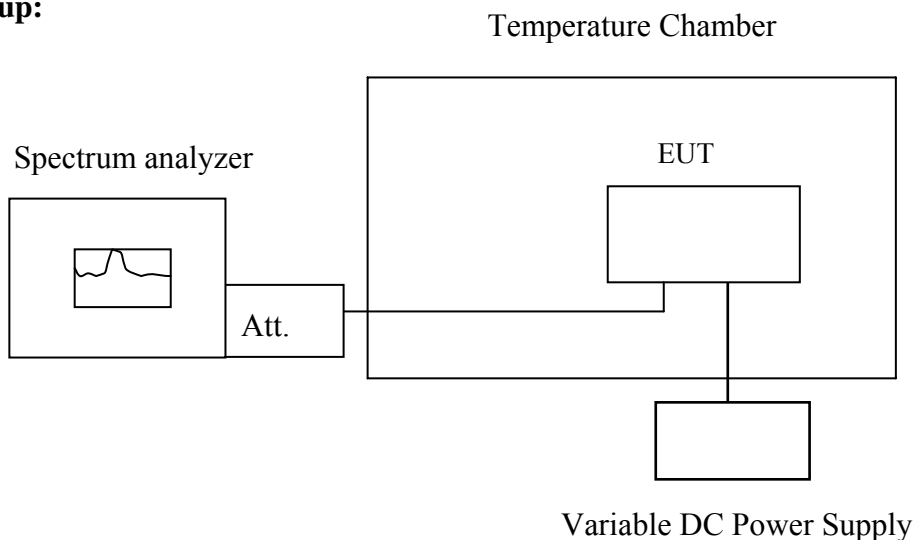
According to FCC §2.1055(a) (1)

Frequency Tolerance:  $\pm 2.5$ ppm for 850MHz band

$\pm 2.5$ ppm for 1900MHz band

§27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 10.2. Test Set-up:



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

### 10.3. 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.

### 10.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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**10.5. Measurement Result:**

Reference Frequency: GSM Mid Channel 836.6 MHz @ 25°C				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
3.7	-30	836.59999	-13.00	2091
3.7	-20	836.599994	-17.00	2091
3.7	-10	836.599989	-12.00	2091
3.7	0	836.599986	-9.00	2091
3.7	10	836.599991	-14.00	2091
3.7	20	836.599977	0.00	2091
3.7	30	836.599983	-6.00	2091
3.7	40	836.599980	-3.00	2091
3.7	50	836.599972	5.00	2091
3.7	60	836.599976	1.00	2091

Reference Frequency: PCS Mid Channel 1880 MHz @ 25°C				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
3.7	-30	1879.999992	-27.00	4700
3.7	-20	1879.999990	-25.00	4700
3.7	-10	1879.999984	-19.00	4700
3.7	0	1879.999978	-13.00	4700
3.7	10	1879.999987	-22.00	4700
3.7	20	1879.999965	0.00	4700
3.7	30	1879.999981	-16.00	4700
3.7	40	1879.999961	4.00	4700
3.7	50	1879.999969	-4.00	4700
3.7	60	1879.999943	22.00	4700

**Note: The battery is rated 3.7V dc.**

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## 11. FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

### 11.1. Standard Applicable:

According to FCC §2.1055(a) (1)

Frequency Tolerance:  $\pm 2.5$ ppm for 850MHz band

$\pm 2.5$ ppm for 1900MHz band

§27.54: The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 11.2. Test Set-up:

Refer to section 10.2 in this report

### 11.3. Measurement Procedure:

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 specified extreme voltage variation ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

### 11.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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### 11.5. Measurement Result:

Reference Frequency: GSM Mid Channel 836.6 MHz @ 25°C				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
4.26	25.00	836.599975	2.00	2091.00
3.70	25.00	836.599977	0.00	2091.00
3.20	25.00	836.599948	29.00	2091.00
3.20 (End Point)	25.00	836.599948	29.00	2091.00

Reference Frequency: PCS Mid Channel 1880 MHz @ 25°C				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
4.26	25	1879.999971	-6.00	4700
3.70	25	1879.999965	0.00	4700
3.20	25	1879.999953	12.00	4700
3.20 (Endpoint)	25	1879.999953	12.00	4700

**Note: The battery is rated 3.7V dc.**

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