



FCC ID: WDBMV3716MV3732

Report No.: EH/2013/60011

Issue Date: Nov. 22, 2013

Page: 1 of 56

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

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

OF

Product Name: 16/32 Ports VoIP GSM Gateway
Brand Name: N/A
Marketing Name: N/A
Model No.: MV-3716 , MV-3732
Model Difference: MV-3716 contains 16 Channels/Ports/GSM modules, MV-3732 contains 32 Channels/Ports/GSM modules.
FCC ID: WDBMV3716MV3732
Report No.: EH/2013/60011
Issue Date: Nov. 22, 2013
FCC Rule Part: 2 , 22H & 24E
Prepared for: PORTech Communications Inc.
150 Shiang-Shung North Road Tai Chung Taiwan 403
Prepared by: SGS Taiwan Ltd.
Electronics & Communication Laboratory
No.134, Wu Kung Road, New Taipei Industrial Park,
Wuku District, New Taipei City, Taiwan 24803

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VERIFICATION OF COMPLIANCE

Applicant: PORTech Communications Inc.
150 Shiang-Shung North Road Tai Chung Taiwan 403

Product Name: 16/32 Ports VoIP GSM Gateway

Brand Name: N/A

Marketing Name: N/A

Model No.: MV-3716 , MV-3732

Model Difference: MV-3716 contains 16 Channels/Ports /GSM modules, MV-3732 contains 32 Channels/Ports /GSM modules.

FCC ID: WDBMV3716MV3732

File Number: EH/2013/60011

Date of test: Jun. 21, 2013 ~ Nov. 19, 2013

Date of EUT Received: Jun. 21, 2013

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 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:

Nov. 22, 2013

Nick Lin / Engineer

Prepared By:

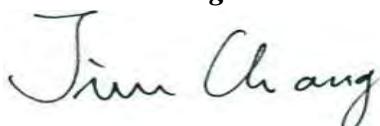


Date:

Nov. 22, 2013

Julia Chang / Clerk

Approved By:



Date:

Nov. 22, 2013

Jim Chang / Supervisor

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Table of Contents

1. GENERAL PRODUCT INFORMATION	6
1.1. Product Description.....	6
1.2. Related Submittal(s) / Grant (s)	7
1.3. Test Methodology.....	7
1.4. Test Facility	7
1.5. Special Accessories	7
1.6. Equipment Modifications.....	7
2. SYSTEM TEST CONFIGURATION	8
2.1. EUT Configuration.....	8
2.2. EUT Exercise	8
2.3. Test Procedure	8
2.4. Measurement Equipment Used:	9
2.5. Configuration of Tested System	11
3. SUMMARY OF TEST RESULTS	12
4. DESCRIPTION OF TEST MODES	14
5. MEASUREMENT UNCERTAINTY	15
6. RF POWER OUTPUT MEASUREMENT	16
6.1 Standard Applicable:	16
6.2 Test Set-up:.....	16
6.3 Measurement Procedure:.....	16
6.4 Measurement Equipment Used:	17
6.5 Measurement Result:.....	17
7. ERP, EIRP MEASUREMENT	18
7.1 Standard Applicable:	18
7.2 Test SET-UP (Block Diagram of Configuration):	18
7.3. Measurement Procedure:.....	20
7.4. Measurement Equipment Used:	21
7.5. Measurement Result: (Peak) –using option of peak measurement	22
8. OCCUPIED BANDWIDTH MEASUREMENT	23
8.1. Standard Applicable:	23
8.2. Test Set-up:.....	23
8.3. Measurement Procedure:.....	23
8.4. Measurement Equipment Used:	23
8.5. Measurement Result:.....	23

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9. OUT OF BAND EMISSION AT ANTENNA TERMINALS	28
9.1. Standard Applicable:	28
9.2. Test SET-UP:	28
9.3. Measurement Procedure:	29
9.4. Measurement Equipment Used:	29
9.5. Measurement Result:	29
10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT	38
10.1. Standard Applicable:	38
10.2. EUT Setup (Block Diagram of Configuration):	39
10.3. Measurement Procedure:	40
10.4. Measurement Equipment Used:	40
10.5. Measurement Result:	40
11. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT	53
11.1. Standard Applicable:	53
11.2. Test Set-up:	53
11.3. Measurement Procedure:	53
11.4. Measurement Equipment Used:	53
11.5. Measurement Result:	54
12. Simultaneous Transmission Evaluation	55

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	16/32 Ports VoIP GSM Gateway
Brand Name:	N/A
Marketing Name:	N/A
Model No.:	MV-3716 , MV-3732
Model difference:	MV-3716 contains 16 Channels/Ports/ GSM modules, MV-3732 contains 32 Channels/Ports/GSM modules.
Hardware Version:	V1A
Software Version:	N/A
Network Cable:	Model No.: N/A, Supplier: N/A
Power Supply:	12Vdc from AC/DC adapter, Model No.: STD-12090, Supplier: Adapter Technology Co., Ltd

GSM:

Cellular Phone Standards Frequency Range and Power:	Operating Frequency		Rated Power
	GSM 850	824.2 MHz– 848.8 MHz	33 dBm
	GSM 1900	1850.2MHz–1909.8MHz	30 dBm
IMEI:	862170019221306		
Antenna Designation:	Mini Mag Antenna, Model No.: C02+M36-1+174U+SMA M Antenna Gain: GSM900MHz:3.92dBi, GSM1800 MHz: 2.97dBi		

This test report applies for 850 /1900 GSM

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1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: WDBMV3716MV3732** filing to comply with Section Part 22 subpart H, Part 24 subpart E of the FCC CFR 47 Rules.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures document of TIA/EIA 603C and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057

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

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

KDB971168 D01 Power Meas license Digital System v01 as the supplemental guideline to conduct the measurement, including Peak to Power Average Ratio, Average Power over the fundamental signal BW (EIRP/ERP) and Signal Bandwidth..

1.4. 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: 2009. FCC Registration Number are: 990257, Canada Registration Number: 4620A-4

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.

All equipment is calibrated externally and traceable to SI (International System of Unit).

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. 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 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 placed on a 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 of ANSI C63.4:2009.

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2.4. 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	02/08/2012	02/07/2014
Power Sensor	Anritsu	MA2411B	917032	02/08/2012	02/07/2014
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014
Spectrum Analyzer	Agilent	E4440A	MY45304525	03/15/2013	03/14/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2013	02/27/2014
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2013	01/04/2014
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2013	02/27/2014
Splitter	Agilent	11636B	N/A	02/28/2013	02/27/2014

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/30/2013	05/29/2014
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/06/2013	02/07/2014
Spectrum Analyzer	R&S	FSV-30	101398	10/22/2013	10/21/2014
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Bilog Antenna	SCHWAZBECK	VULB9160	3158	11/24/2011	11/23/2013
Horn antenna	ETS.LINDGREN	3117	123995	05/31/2013	05/30/2014
Horn antenna	ETS.LINDGREN	3117	123991	01/21/2013	01/20/2015
Horn Antenna	Schwarzbeck	BBHA9170	184	01/17/2012	01/16/2014
Horn Antenna	Schwarzbeck	BBHA9170	185	07/19/2013	07/18/2014
RF amplifier	Miteq	AMF-6F-2600	971576	01/29/2013	01/28/2014
Signal Generator	R&S	SMR40	100210	02/02/2012	02/01/2014
Signal Generator	Agilent	E4438C	MY45093613	07/30/2013	07/29/2014
Pre-Amplifier	Agilent	8447D	1937A02834	01/04/2013	01/03/2014

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Issue Date: Nov. 22, 2013

Page: 10 of 56

Pre-Amplifier	EMC Instruments	EMC0126530	980038	01/04/2013	01/03/2014
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2013	02/27/2014
Radio Communication	R & S	CMU200	102189	06/17/2013	06/16/2014
Radio Communication	Anritsu	MT8820C	6200995019	10/21/2013	10/20/2014
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	01/04/2013	01/03/2014
Low Loss Cable	HUBER+SUHNER	966_Rx	3m	01/04/2013	01/03/2014
Filter 800-1000	Micro-Tronics	EWT	M2	02/28/2013	02/28/2014
Filter 1800-2000	Micro-Tronics	EWT	M2	02/28/2013	02/28/2014
Filter 1700-1800	Micro-Tronics	BRC15751	001	02/28/2013	02/28/2014
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	02/28/2013	02/28/2014
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	02/28/2013	02/28/2014
3m Site NSA	SGS	966 chamber	N/A	07/15/2013	07/14/2014

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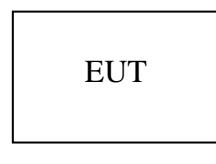
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2.5. Configuration of Tested System

Fig. 2-1 Configuration of Radiated Emission



Fig. 2-2 Configuration of Tested System (Remote Side)



Remote Side

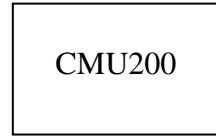


Table 2-1 Equipment Used in

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
2.	Power Meter	Anritsu	ML2495A	1005007	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 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 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 vs. Temperature	Compliant

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FCC ID: WDBMV3716MV3732

Report No.: EH/2013/60011

Issue Date: Nov. 22, 2013

Page: 13 of 56

Max ERP/EIRP measurement result:

	dBm		W
GSM 850 Band	30.05	ERP	1.012
GSM 1900 Band	23.02	EIRP	0.200

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4. DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

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

The list of channel selected to conduct the measurements

GSM 850:

Channel Low: AFRCN 128 at 824.2MHz, Channel Mid: AFRCN 190 at 836.6MHz, Channel High: AFRCN 251 at 848.8MHz.

GSM 1900:

Channel Low: AFRCN 512 at 1850.2MHz, Channel Mid: AFRCN 661 at 1880.0MHz, Channel High AFRCN 810 at 1909.8MHz

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. The worst-case of E2 position for GSM/ 850/ 1900 were reported.

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.42 dB
ERP/ EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 123.36 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 1.55 dB
Peak to Average Ratio	+/- 1.55 dB
Frequency Stability vs. Temperature	+/- 123.36 Hz
Frequency Stability vs. Voltage	+/- 123.36 Hz
Temperature	+/- 0.8 °C
Humidity	+/- 4.7 %
DC / AC Power Source	DC= +/- 1%, AC=+/- 0.2%

Radiated Spurious Emission:

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

Measurement uncertainty (Polarization : Horizontal)	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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6. RF POWER OUTPUT MEASUREMENT

6.1 Standard Applicable:

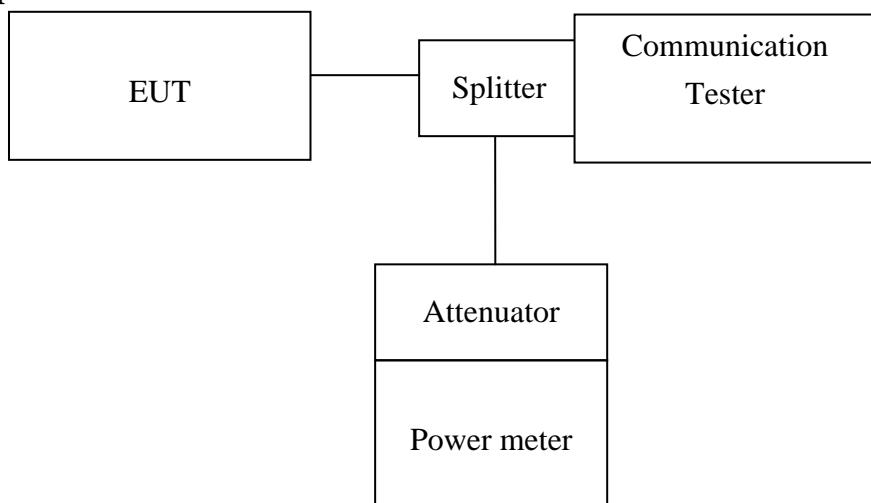
According to FCC §2.1046.

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

FCC 24.232(c) Peak Power Measurement limited to 2W

FCC 24.232(c) Equipment must employ means to limit the power to the minimum necessary for successful communication.

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

Necessary Communication complying with 24.232 (c) and 27.5(d)(4)

Set CMU200 (base-station simulator) MS Signal with packet data submenu; SLOT Configuration Set appropriate level to verify if or not power on mobile station's link with simulator still exists.

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6.4 Measurement Equipment Used:

Refer to section 2.4 in this report

6.5 Measurement Result:

6.5.1 RF Conducted Output Power

6.5.1.1. GSM (GMSK; 8-PSK)

Result:

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Average Burst Power (dBm)
GSM 850	824.2	128	33.00	32.90
	836.6	190	32.90	32.80
	848.8	251	33.00	32.80

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Average Burst Power (dBm)
GSM 1900	1850.2	512	28.40	28.20
	1880.0	661	28.10	28.00
	1909.8	810	27.50	27.40

Cable loss offset Low Band: 1.2dB

Cable loss offset High Band: 1.6dB

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7. ERP, EIRP MEASUREMENT

7.1. Standard Applicable:

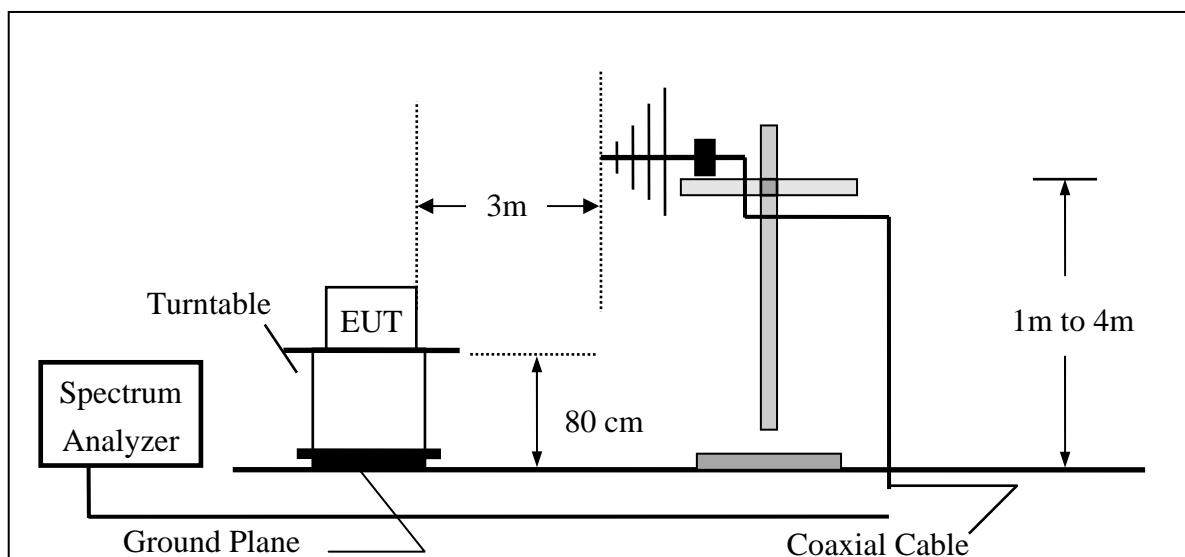
According to FCC §2.1046

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

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

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

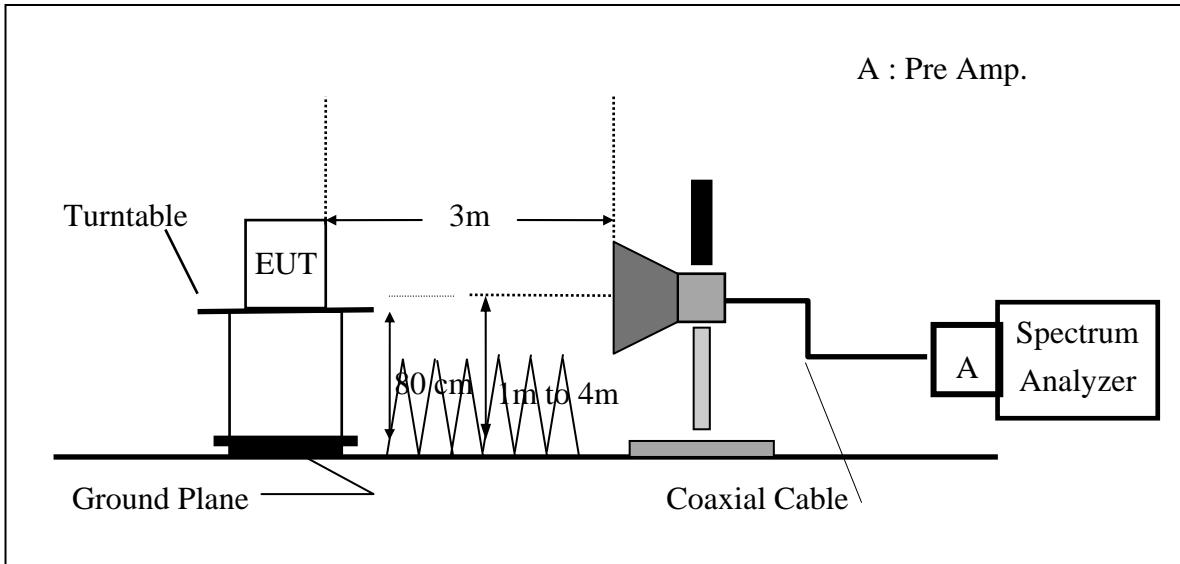
(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



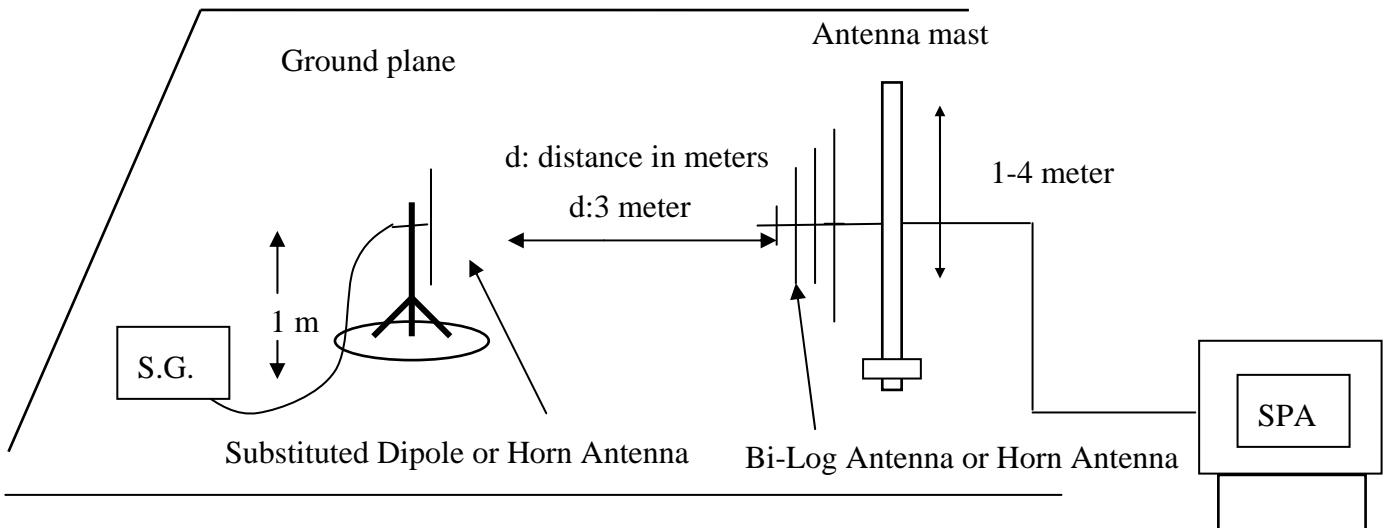
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(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



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7.3. 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 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 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:

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

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

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 $\text{VBW} \geq 3 \times \text{RBW}$.

Or,

2. KDB 971168 D01 Power Meas License Digital Systems v01 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 $\approx 1\text{--}5\%$ 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 = $601 \times 10^{-3} = 6\text{s}$).

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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.

7.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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

EUT				Measurement					
Operation Band	Pol.	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	ERP	Limit
		MHz		V/H	dBm	dBd	dB	dBm	dBm
GSM850	E2	824.2	128	V	25.26	3.91	-3.03	26.14	38.45
				H	25.43	3.91	-3.03	26.31	38.45
		836.6	190	V	28.98	3.89	-3.07	29.80	38.45
				H	29.23	3.89	-3.07	30.05	38.45
		848.8	251	V	28.28	3.87	-3.11	29.04	38.45
				H	26.02	3.87	-3.11	26.78	38.45

Remark :

(1) The RBW,VBW of SPA for measurement RBW=300 KHz, VBW=1MHz

EUT				Measurement					
Operation Band	Pol.	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
		MHz		V/H	dBm	dB	dBm	dBm	dBm
GSM 1900	E2	1850.2	512	V	22.61	5.08	-4.67	23.02	33.00
				H	11.42	5.08	-4.67	11.83	33.00
		1880.0	661	V	22.03	5.00	-4.70	22.33	33.00
				H	12.01	5.00	-4.70	12.3	33.00
		1909.8	810	V	21.85	4.92	-4.74	22.04	33.00
				H	14.96	4.92	-4.74	15.15	33.00

Remark :

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

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8. OCCUPIED BANDWIDTH MEASUREMENT

8.1. Standard Applicable:

According to §FCC 2.1049 (99%)

8.2. Test Set-up:

Refer to section 6.2 in this report

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, -20dBc display line was placed on the screen (or 20dB 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

8.4. Measurement Equipment Used:

Refer to section 2.4 in this report

8.5. Measurement Result:

Refer to next pages.

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99% Bandwidth

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (kHz)
GSM 850	824.20	128	246.6111
	836.60	190	239.4730
	848.80	251	237.8681

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (kHz)
GSM 1900	1850.20	512	242.5623
	1880.00	661	237.8206
	1909.80	810	242.6575

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99% Bandwidth Test Data

Figure 8-1: GSM 850 Channel Low

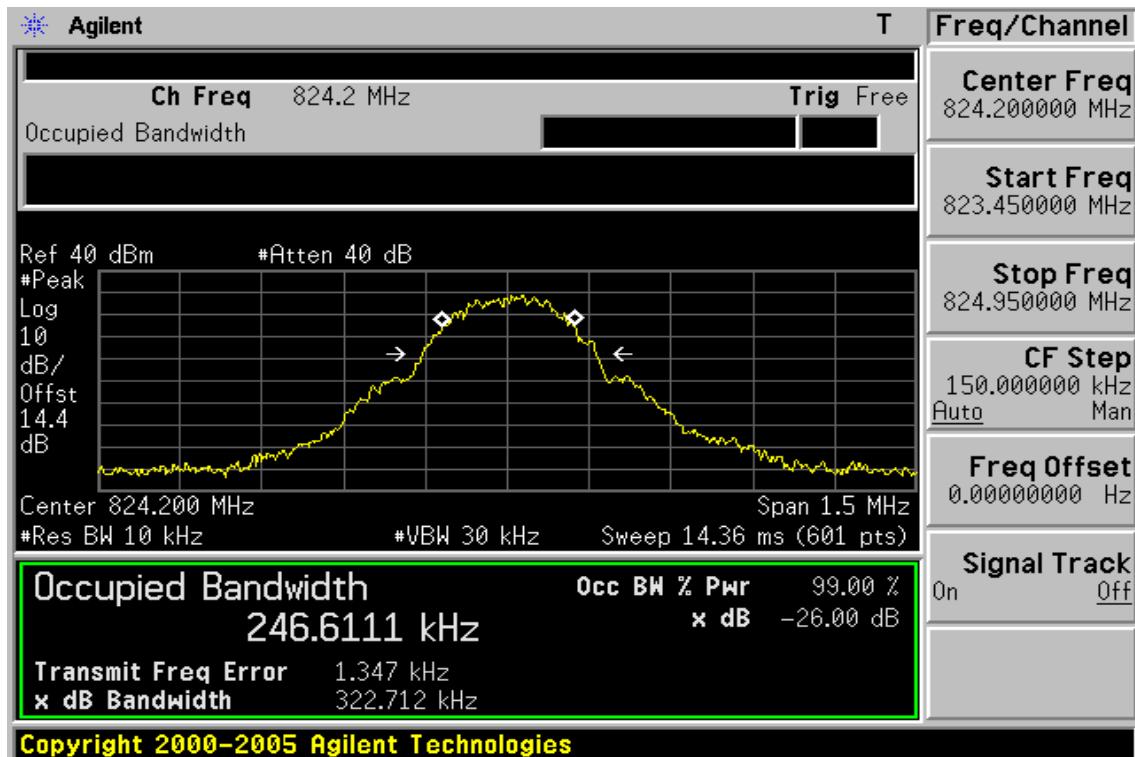
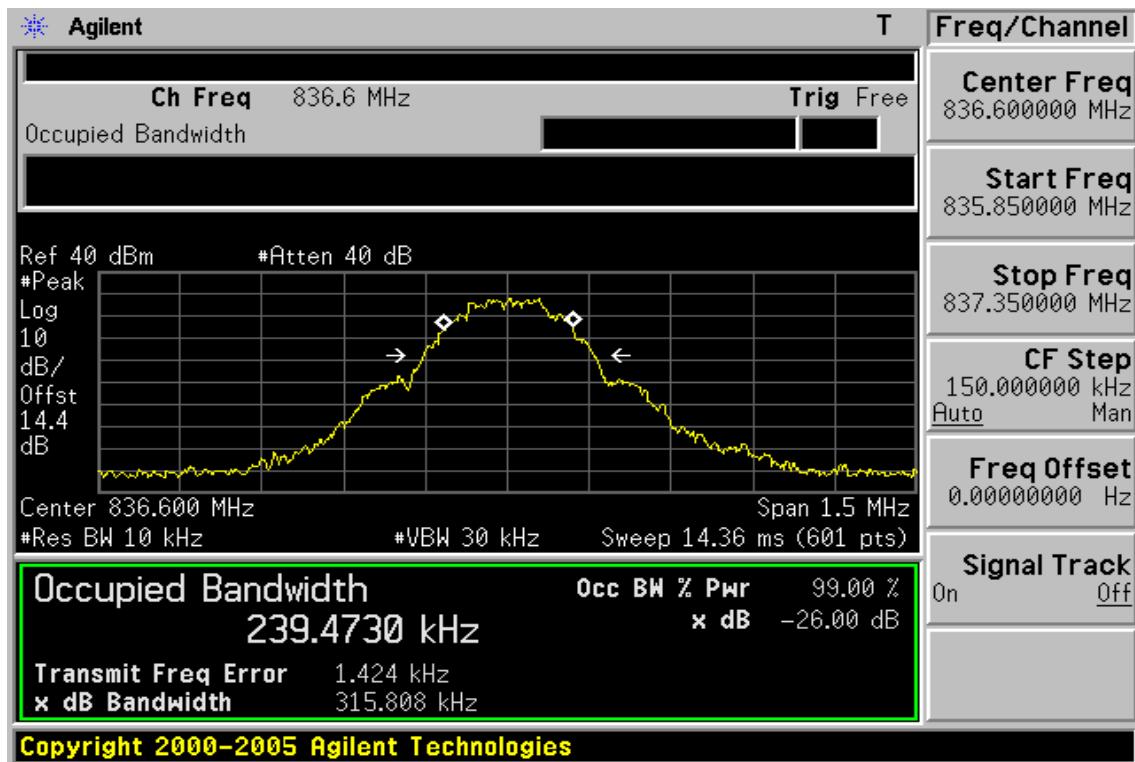


Figure 8-2: GSM 850 Channel Mid



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Figure 8-3: GSM 850 Channel High

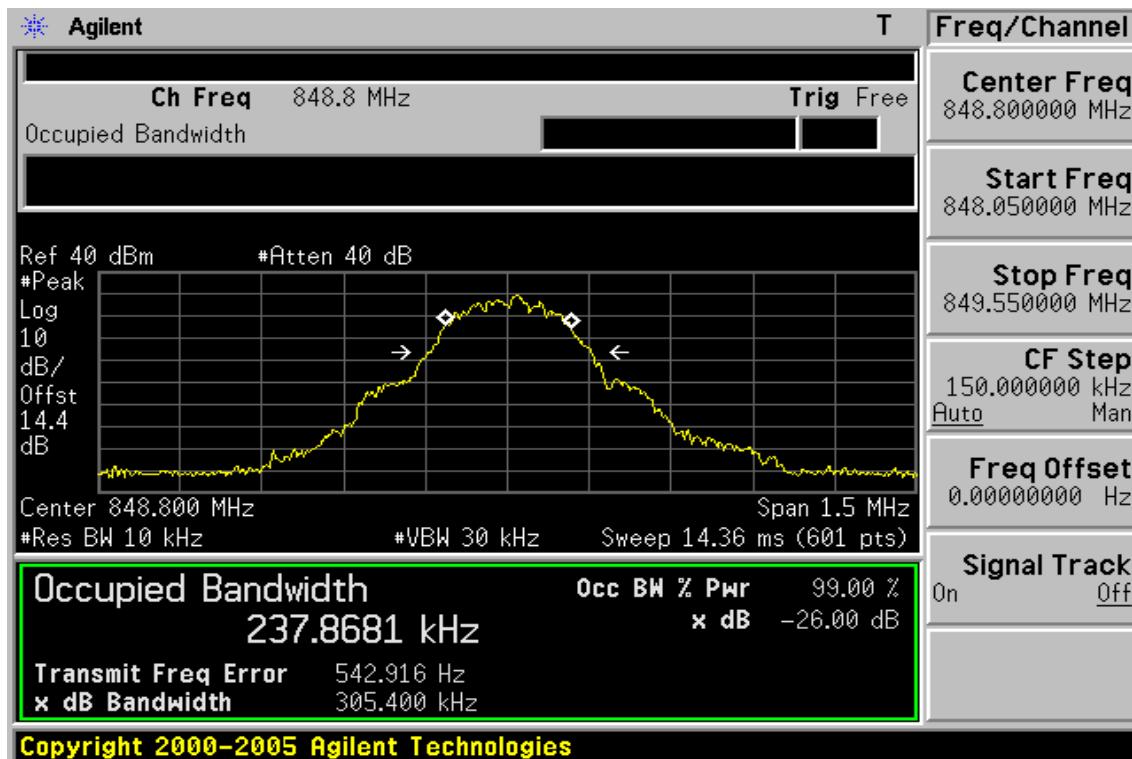
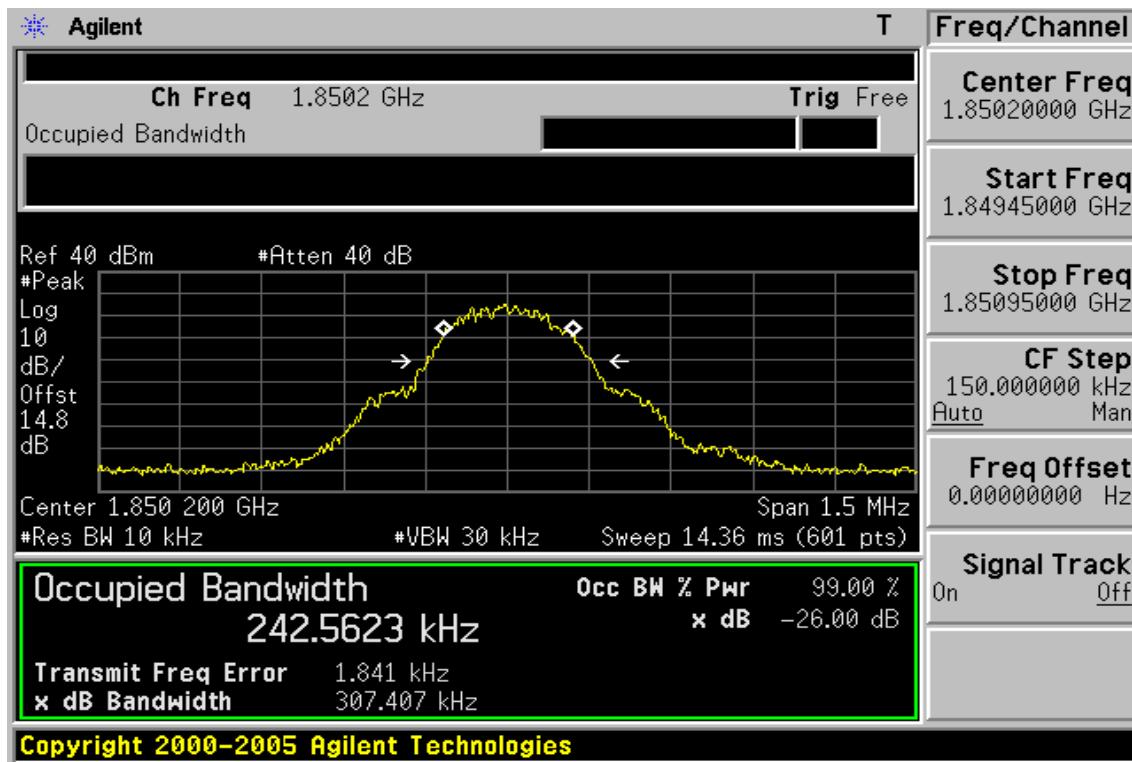


Figure 8-4: GSM 1900 Channel Low



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Figure 8-5: GSM 1900 Channel Mid

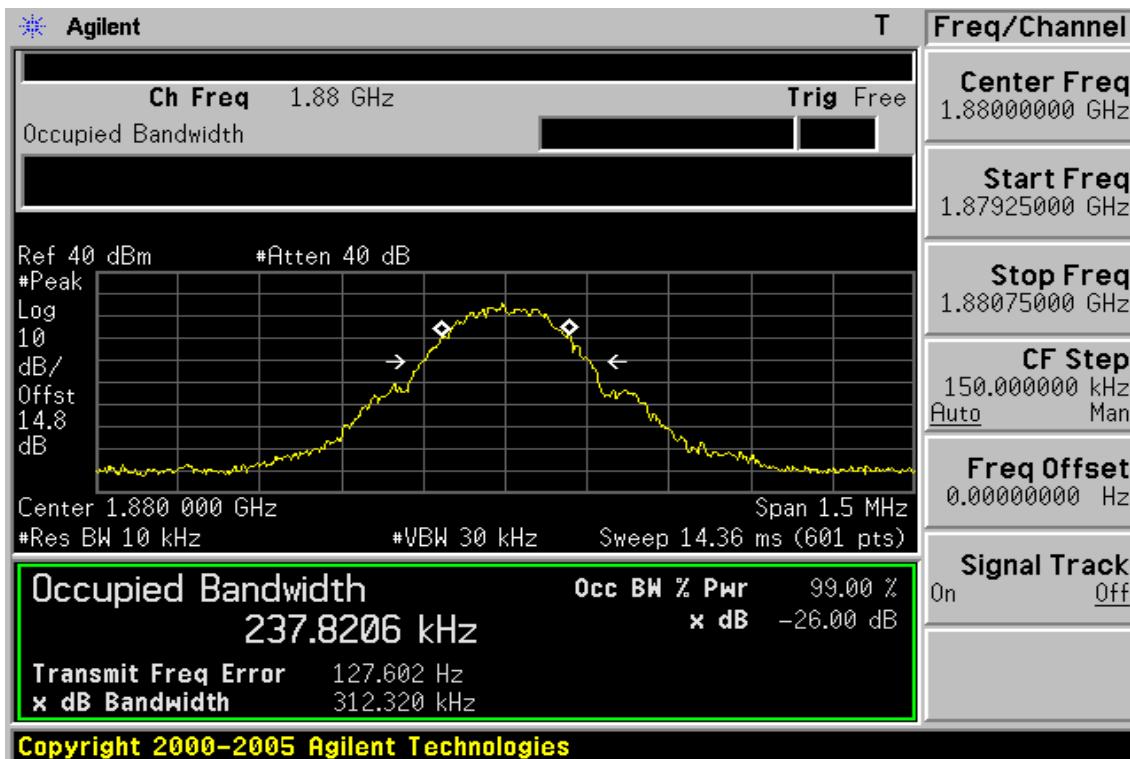
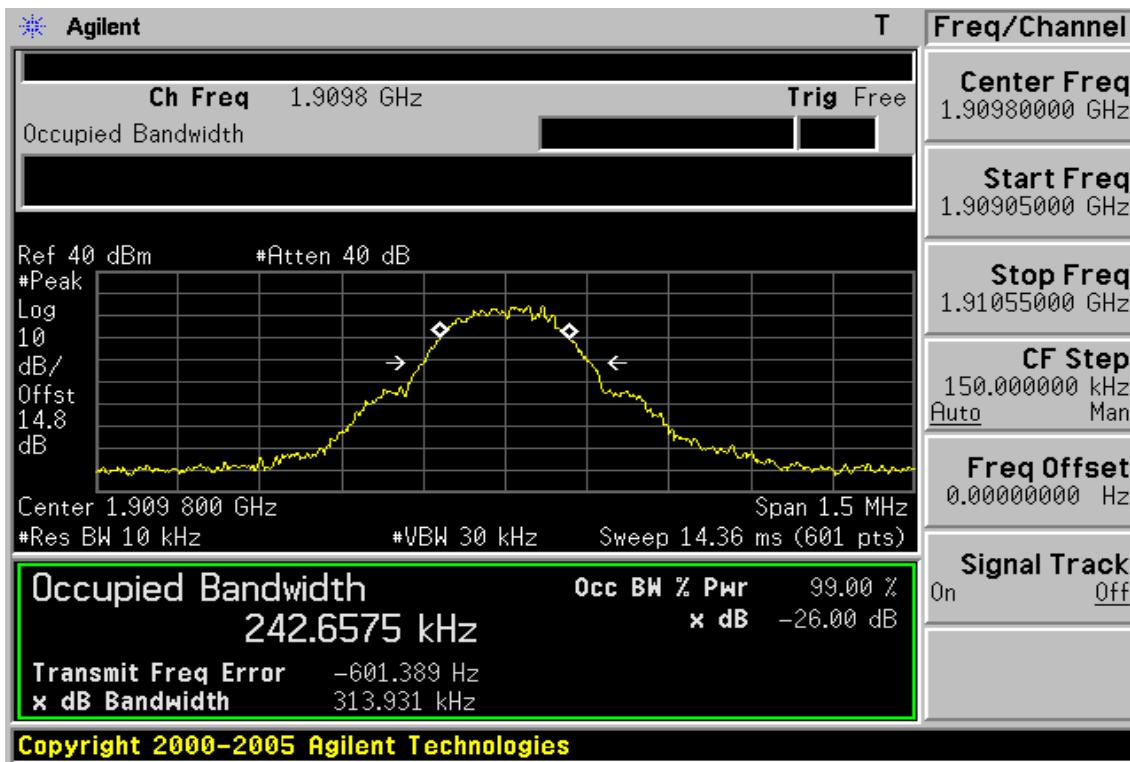


Figure 8-6: GSM 1900 Channel High



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9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

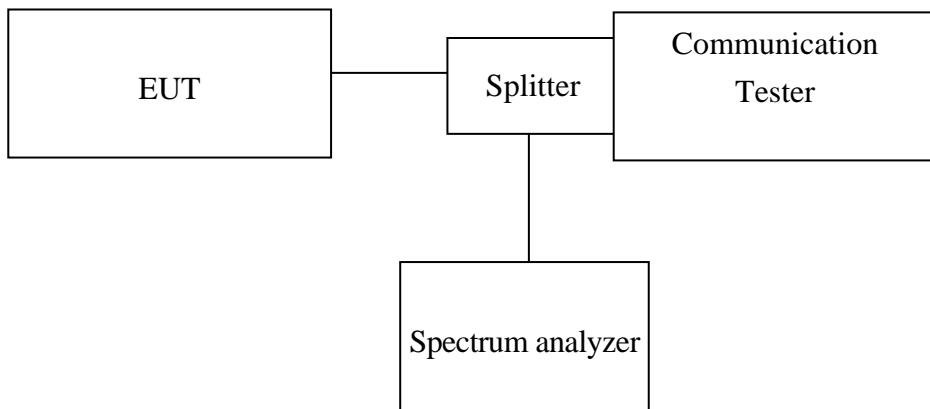
9.1. Standard Applicable:

According to FCC §2.1051.

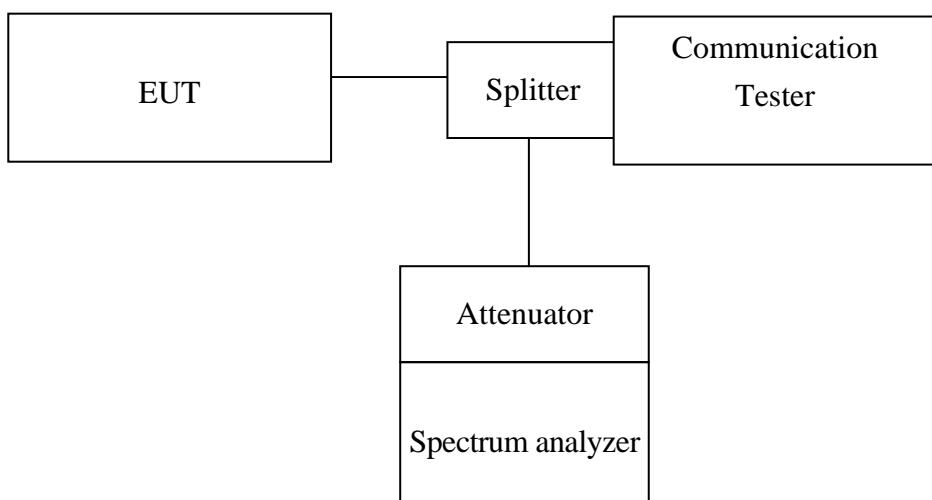
FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean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

9.2. Test SET-UP:

Out of band emission



Band Edge



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9.3. 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= 10 th 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.

Conducted Emission:

- 1、 To connect Antenna Port of EUT to Spectrum.
- 2、 Set RBW = 1MHz & VBW = 1MHz on Spectrum.
- 3、 Sweep the frequency to determine spurious emission as seen on spectrum from span of 30 to 1G, 1G to 2.5G, 2.5G to 7.5G, 7.5G to 10G ,10G to 15G and 15G to 20GHz
- 4、 Via Software, combine 6 spans of frequency range into one plot

9.4. Measurement Equipment Used:

Refer to section 2.4 in this report

9.5. Measurement Result:

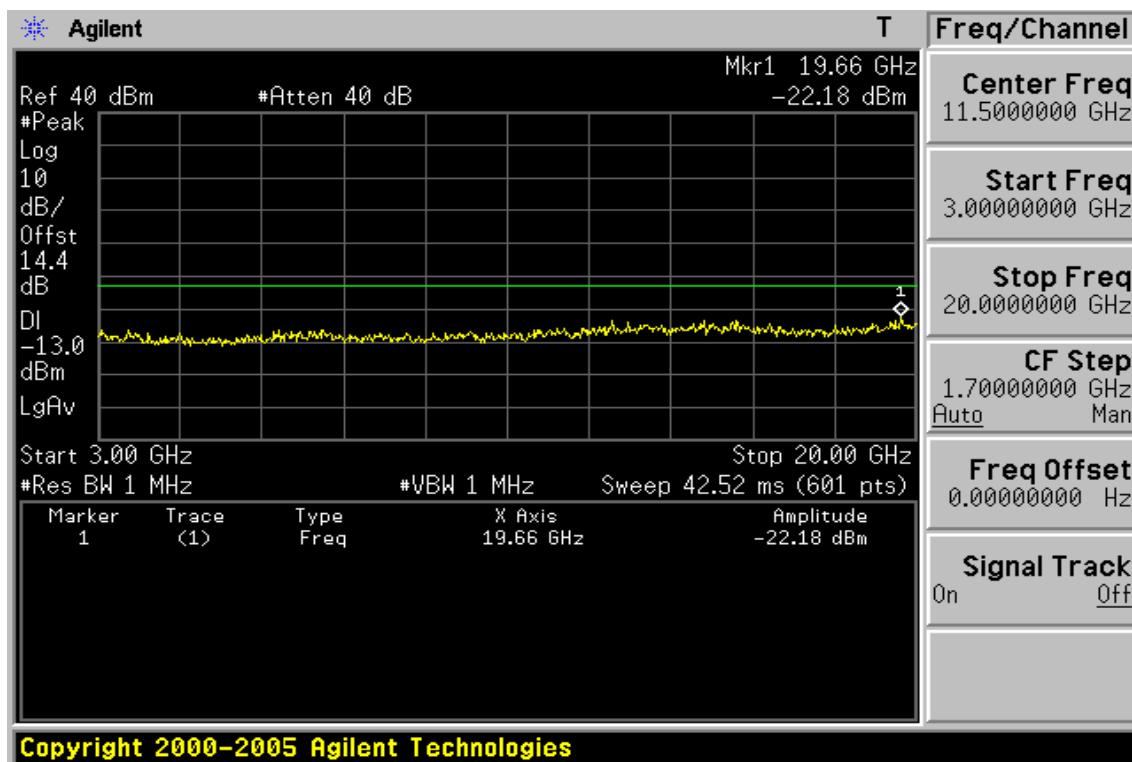
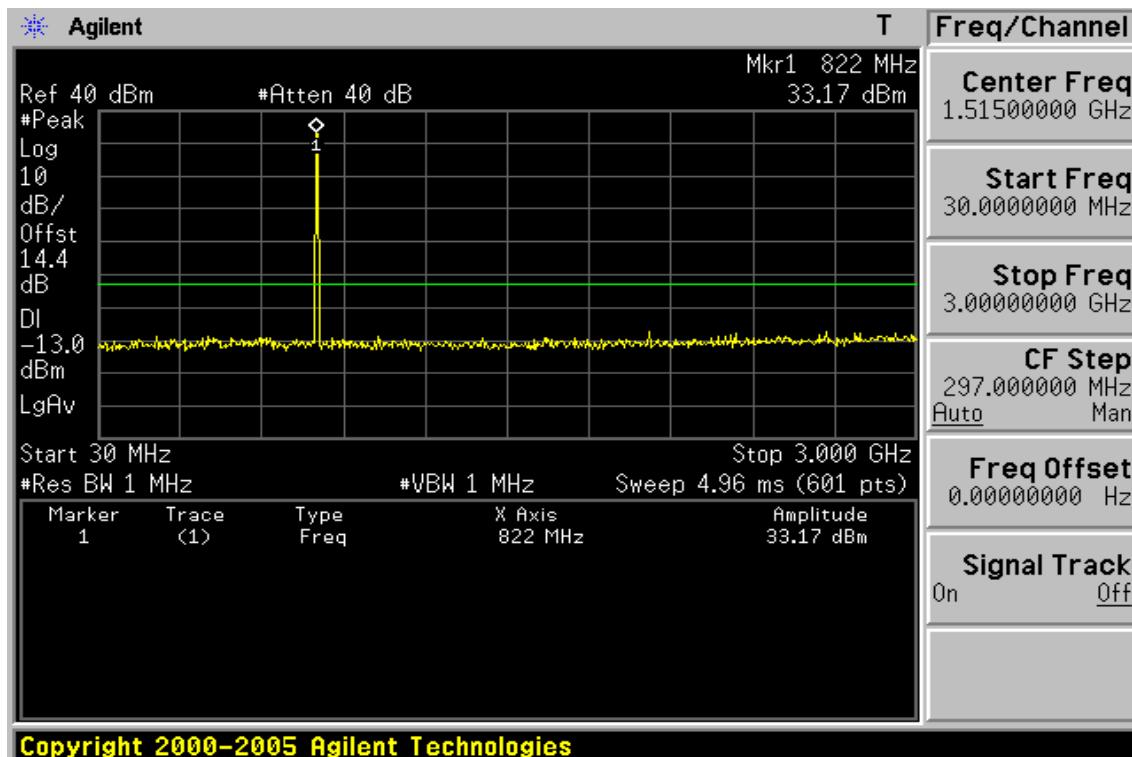
Refer to next pages.

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

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Figure 9-1: Out of Band emission at antenna terminals – GSM 850 Channel Lowest

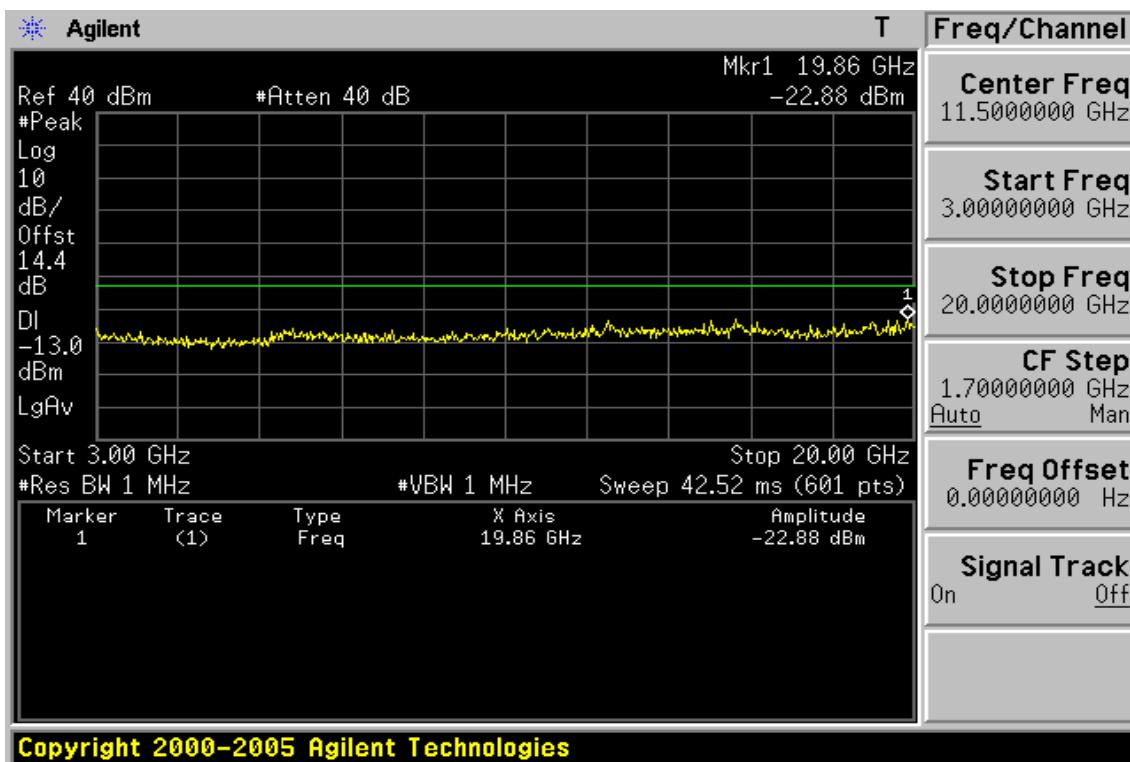
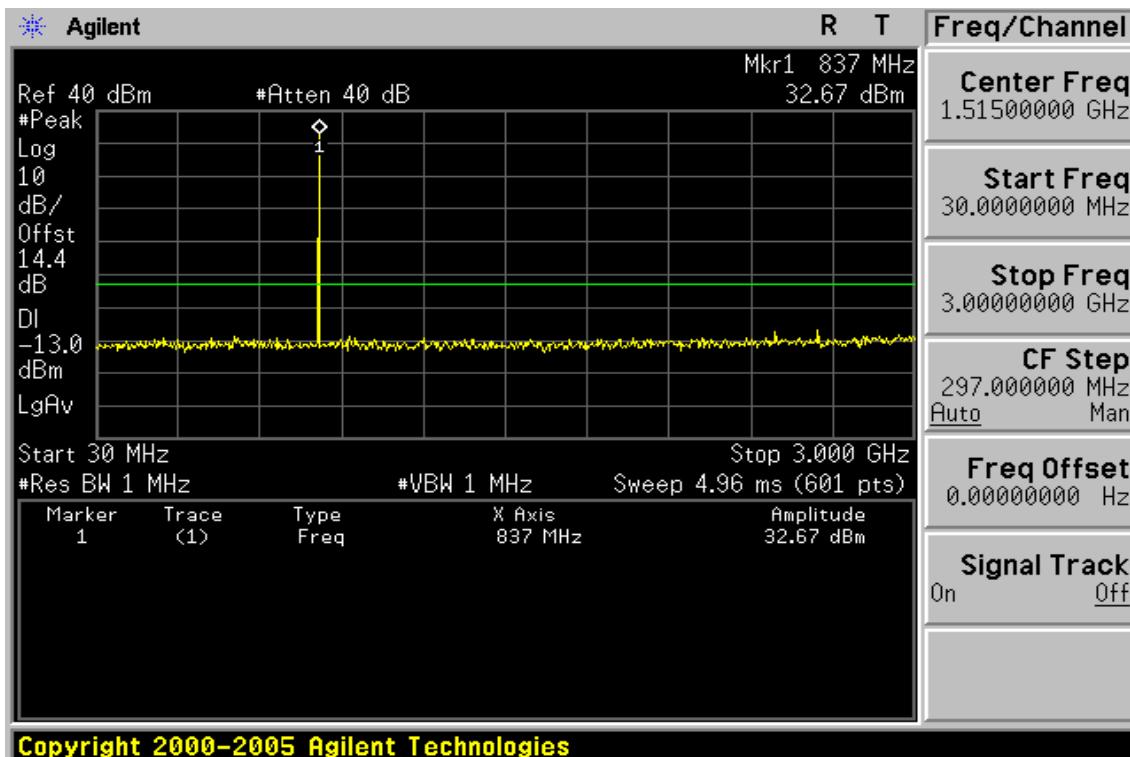


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Figure 9-2: Out of Band emission at antenna terminals –GSM 850 Channel Mid

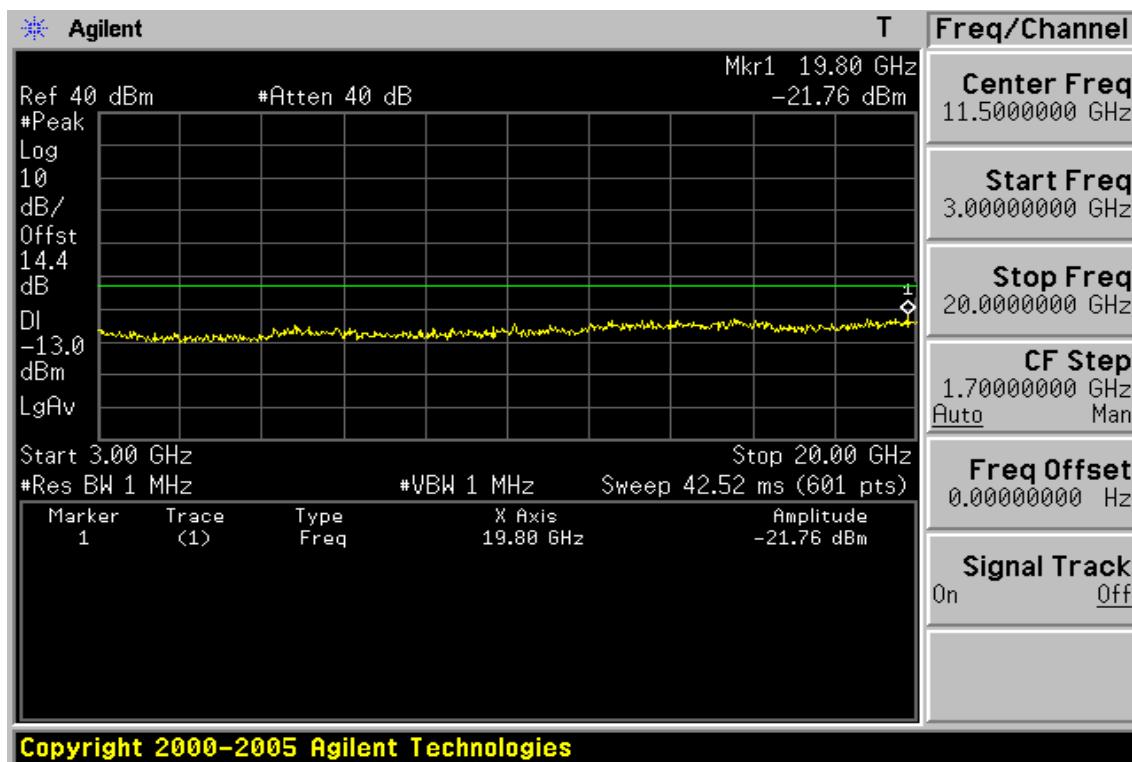
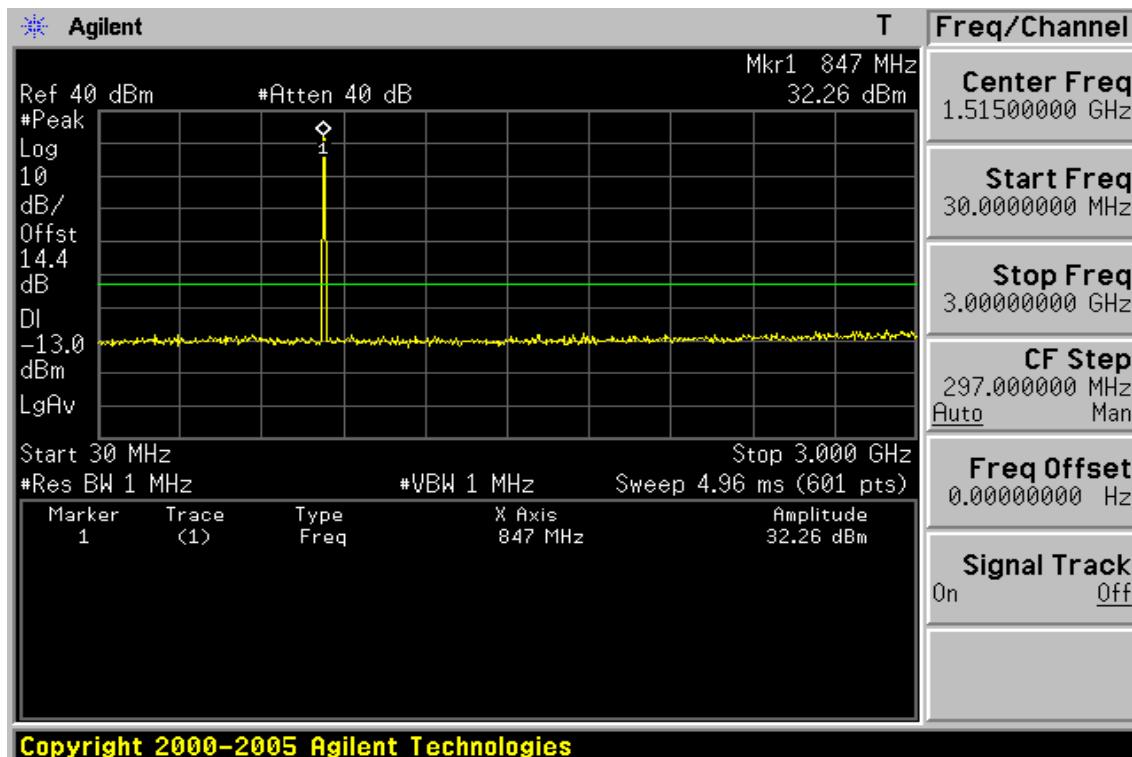


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Figure 9-3: Out of Band emission at antenna terminals –GSM 850 Channel Highest



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Figure 9-4: Band edge emission at antenna terminals –GSM 850 Channel Lowest

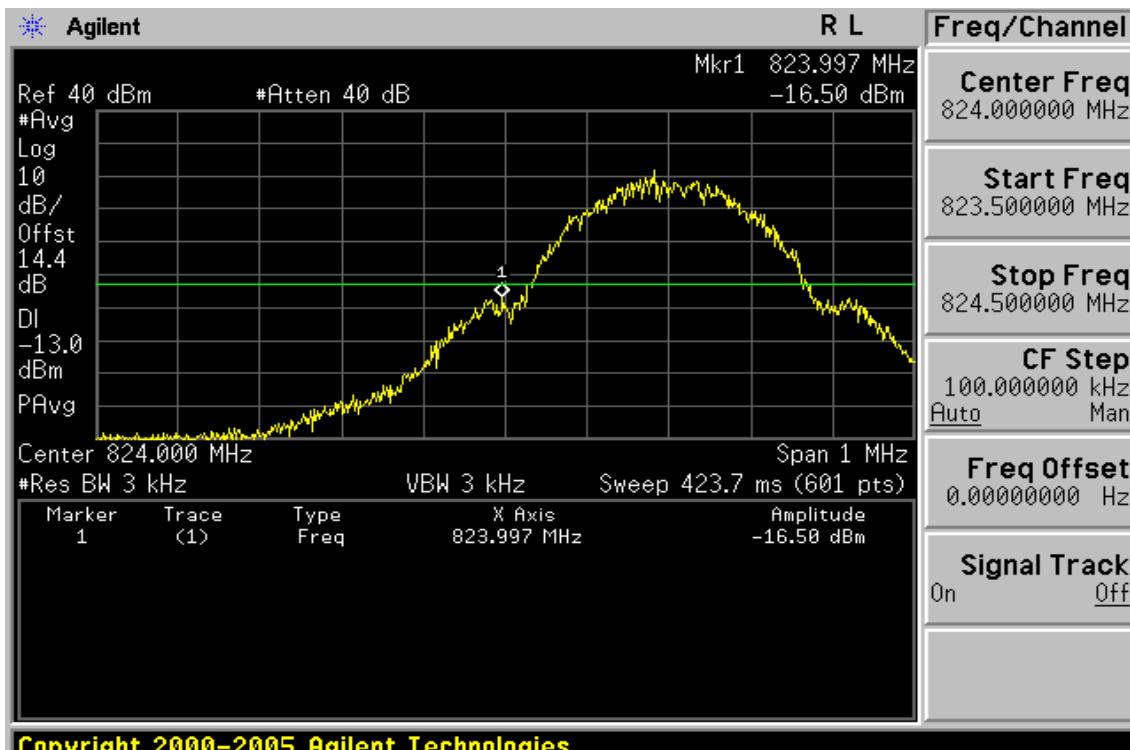
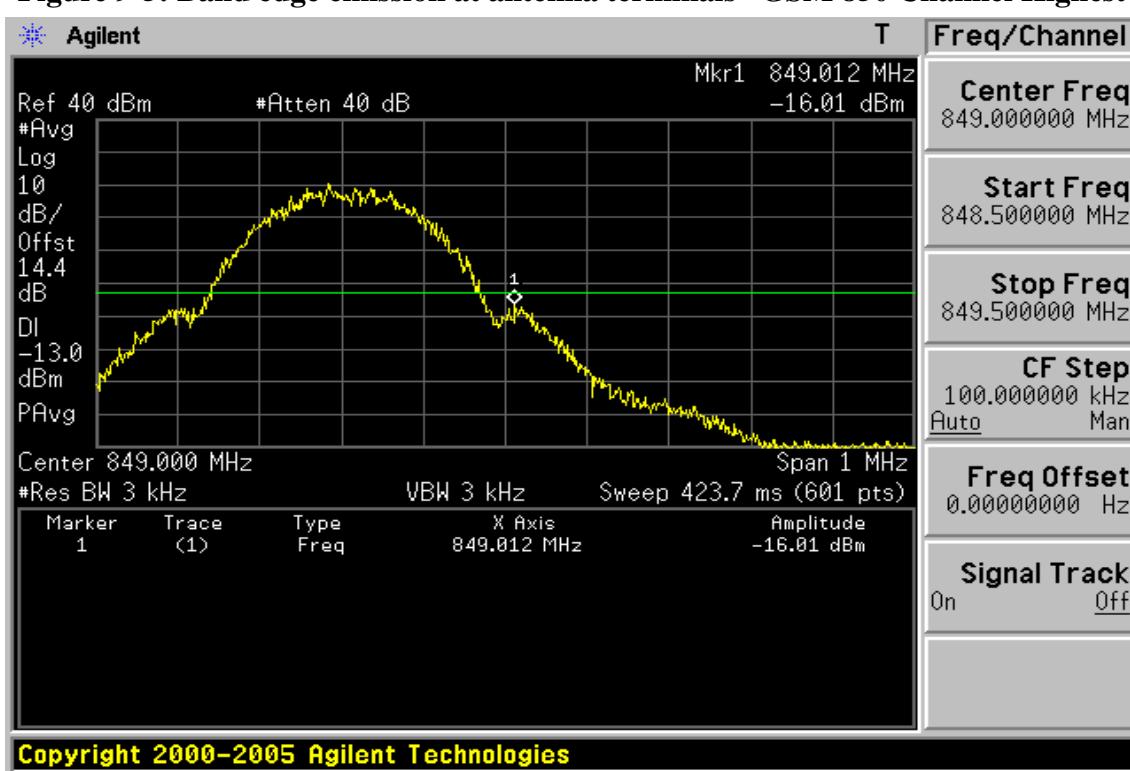


Figure 9-5: Band edge emission at antenna terminals –GSM 850 Channel Highest

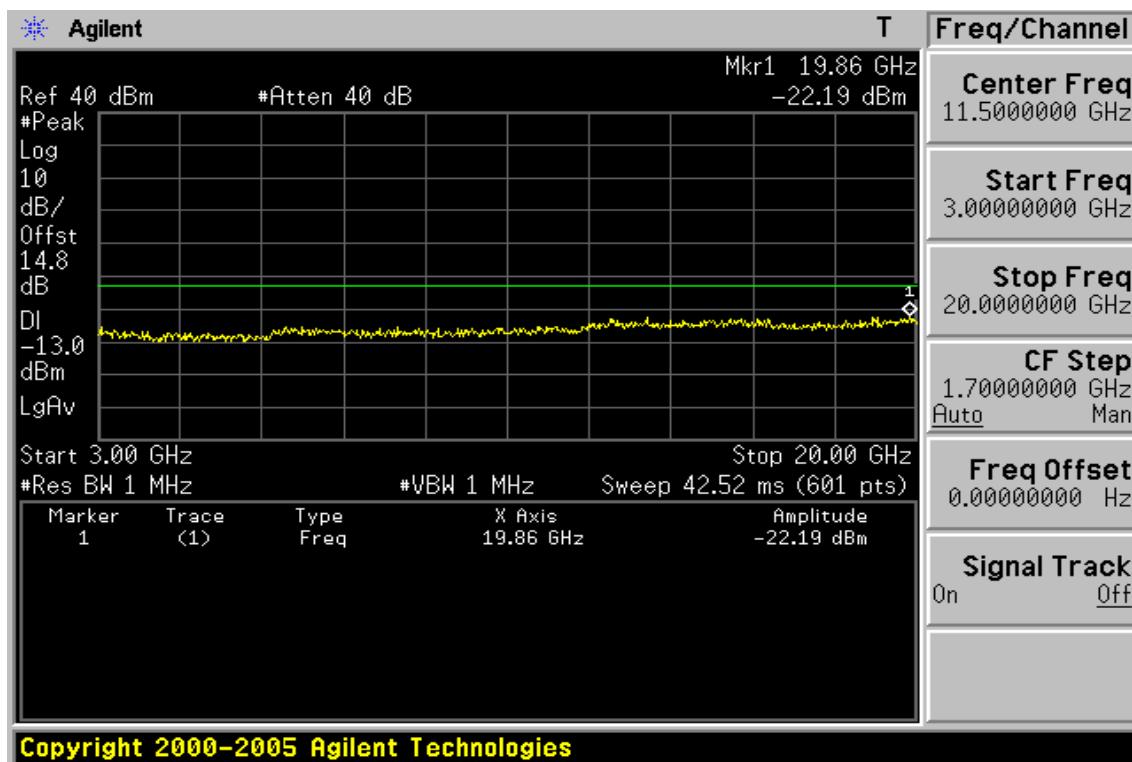
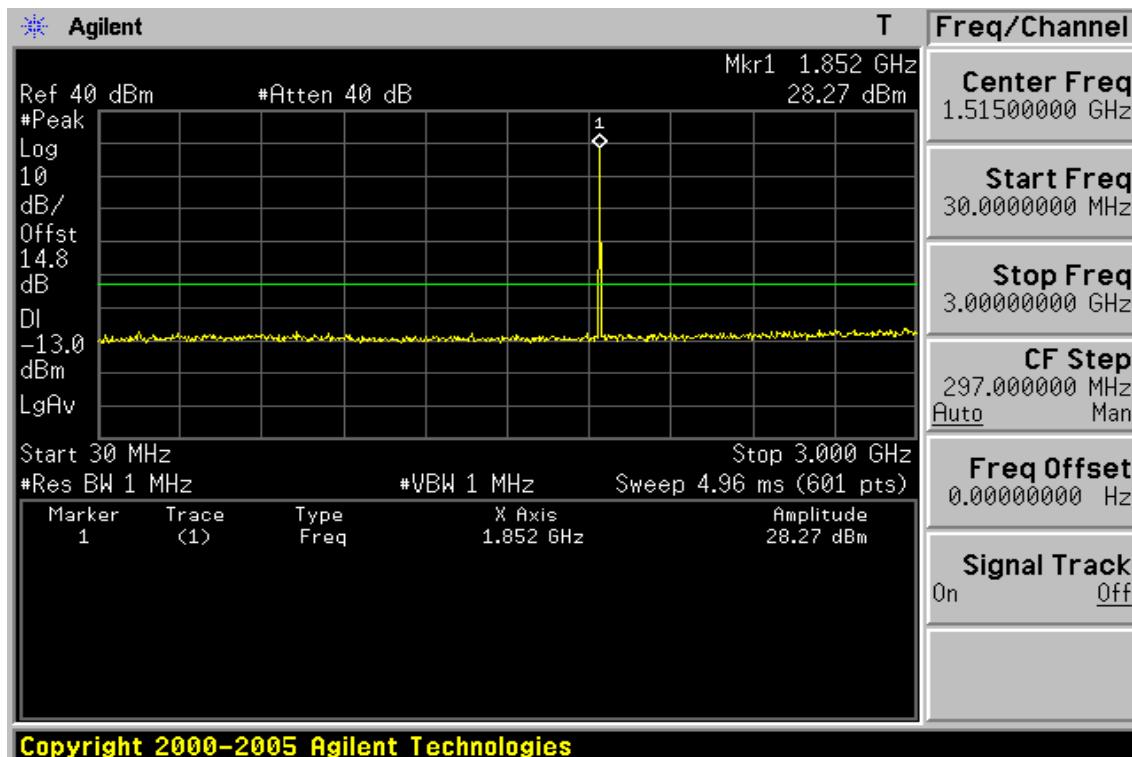


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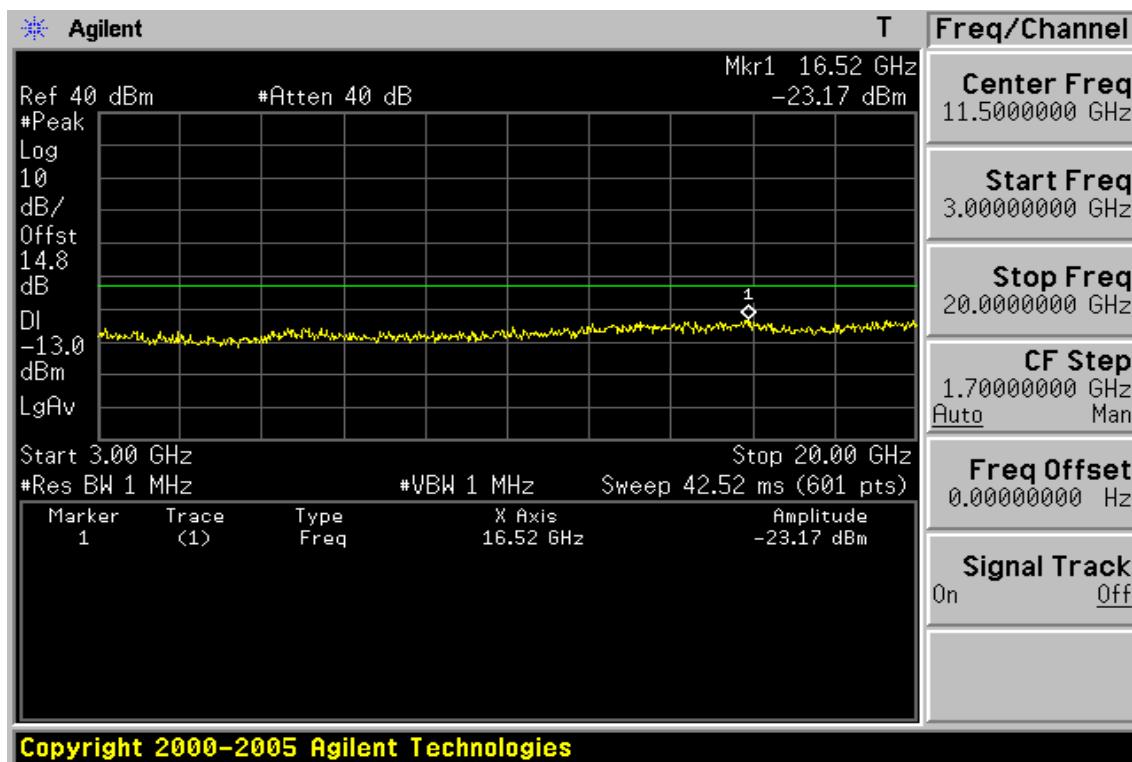
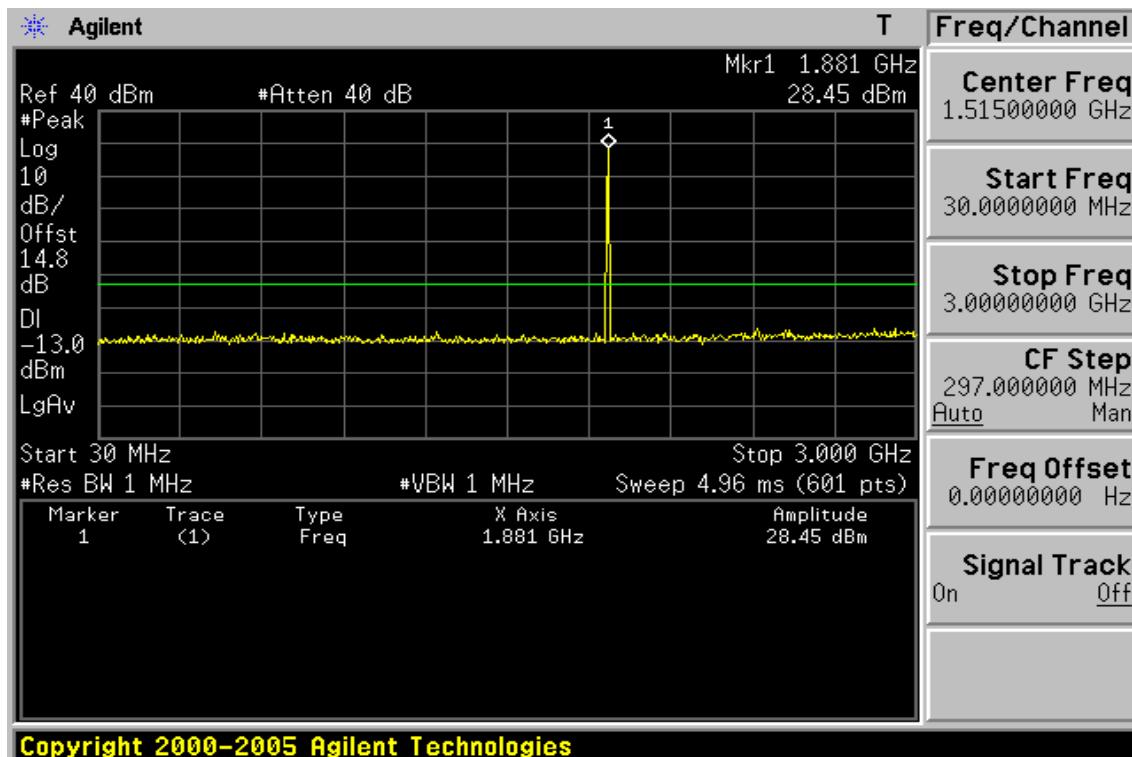
Figure 9-6: Out of Band emission at antenna terminals – GSM 1900 Channel Lowest



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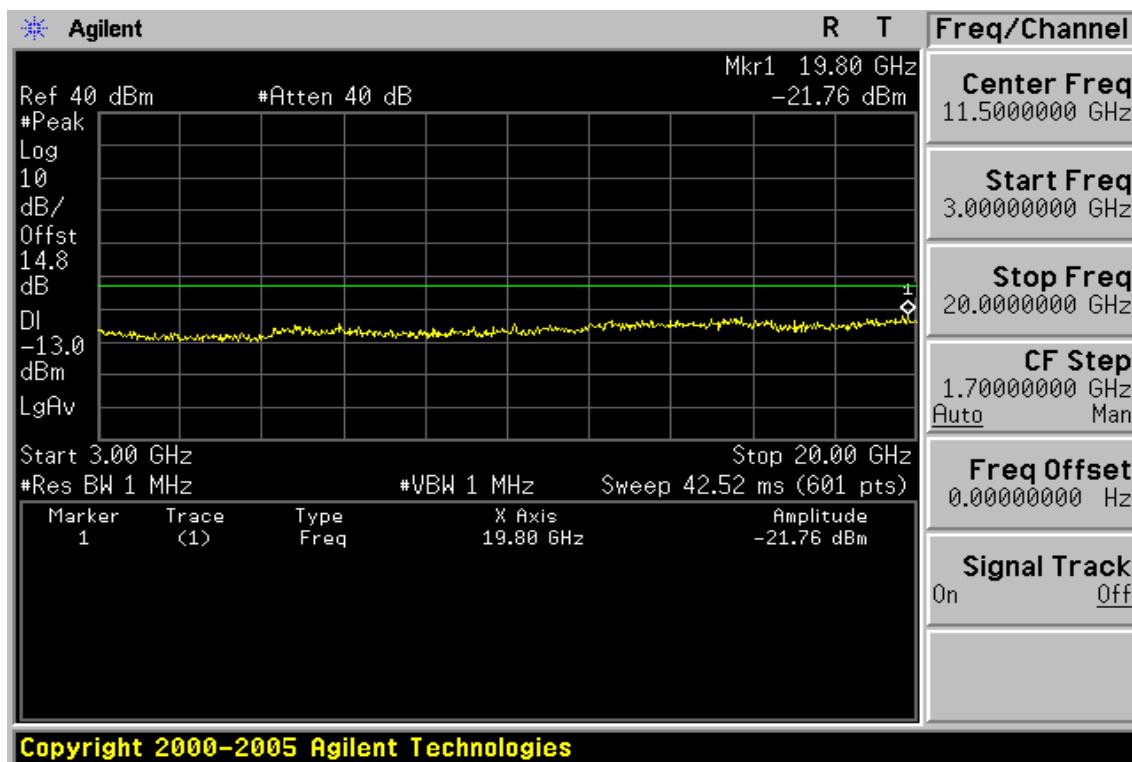
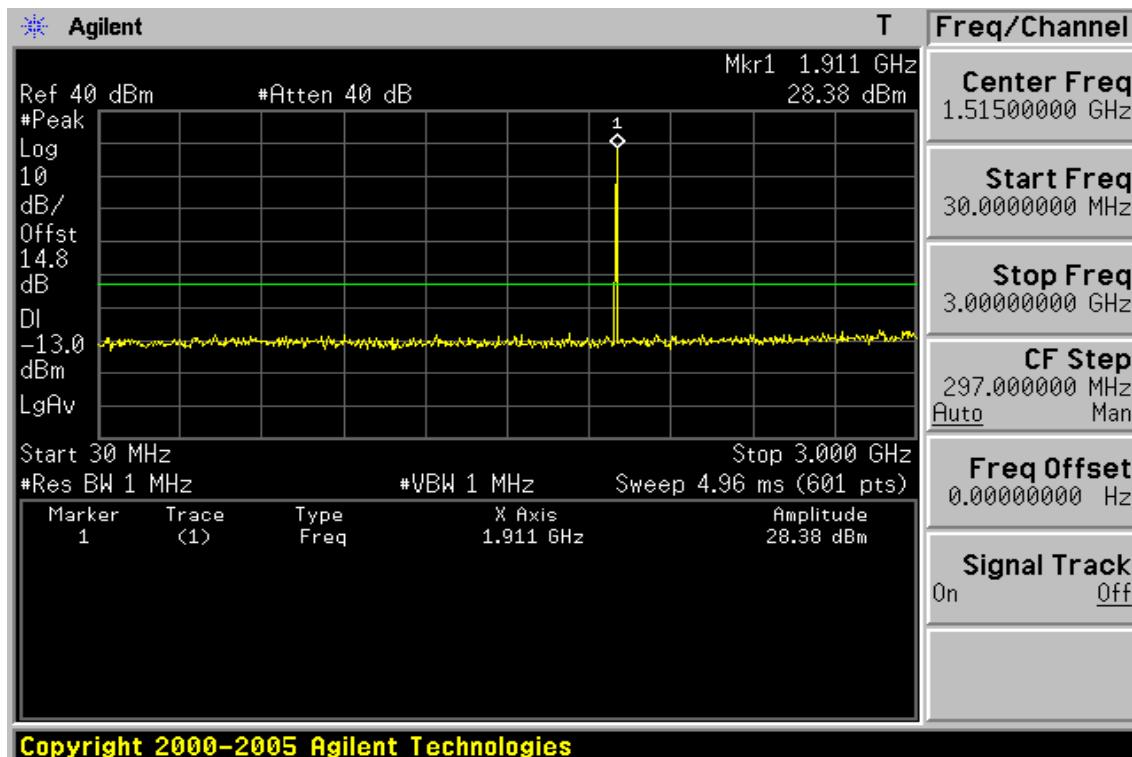
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Figure 9-7: Out of Band emission at antenna terminals – GSM 1900 Channel Mid

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Figure 9-8: Out of Band emission at antenna terminals –GSM 1900 Channel Highest

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Figure 9-9: Band edge emission at antenna terminals –GSM 1900 Channel Lowest

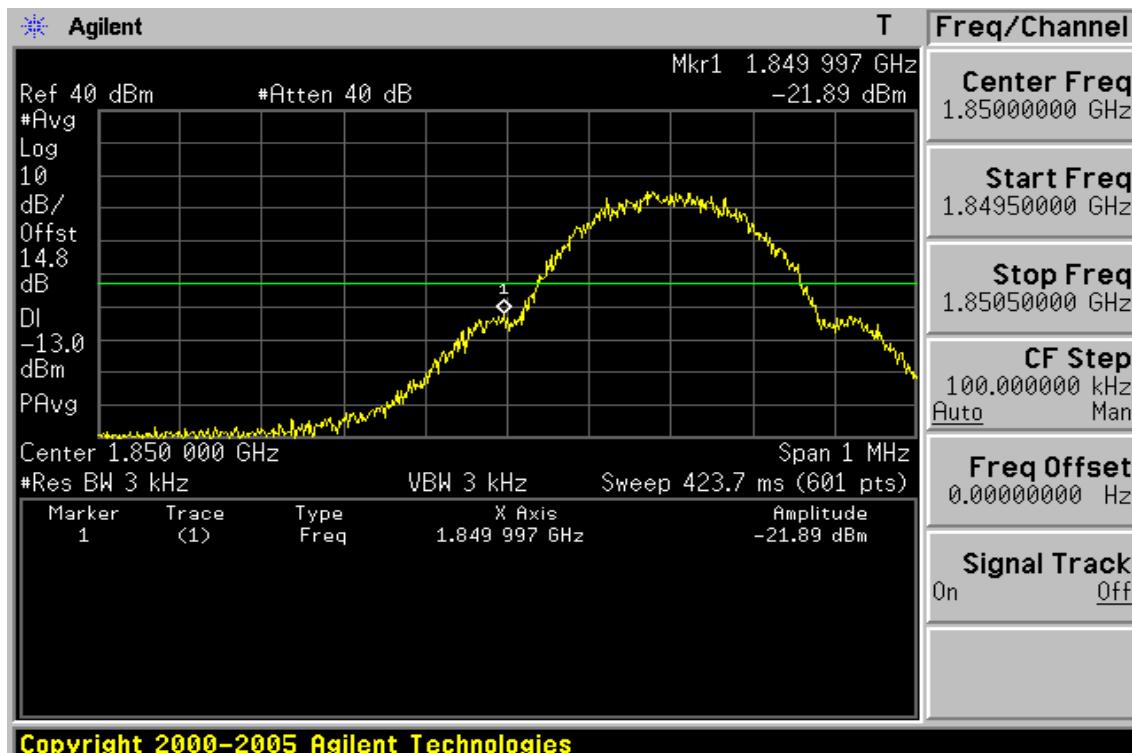
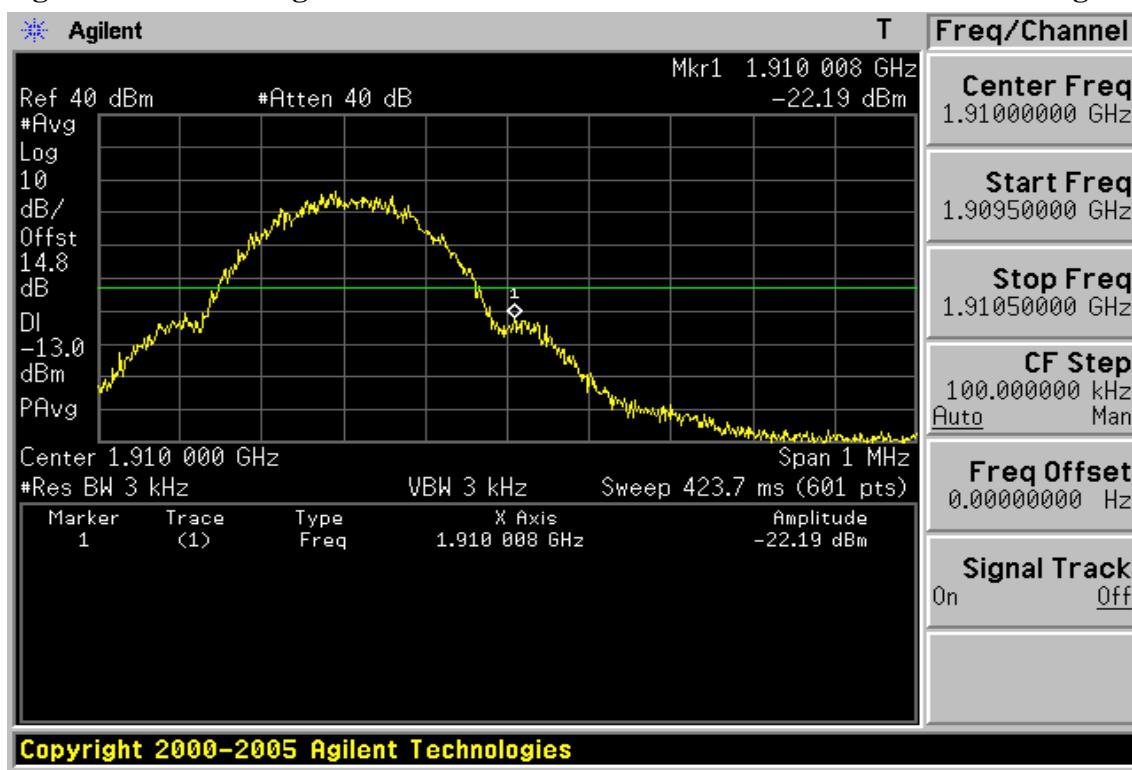


Figure 9-10: Band edge emission at antenna terminals –GSM 1900 Channel Highest



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10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

10.1. Standard Applicable:

According to FCC §2.1053

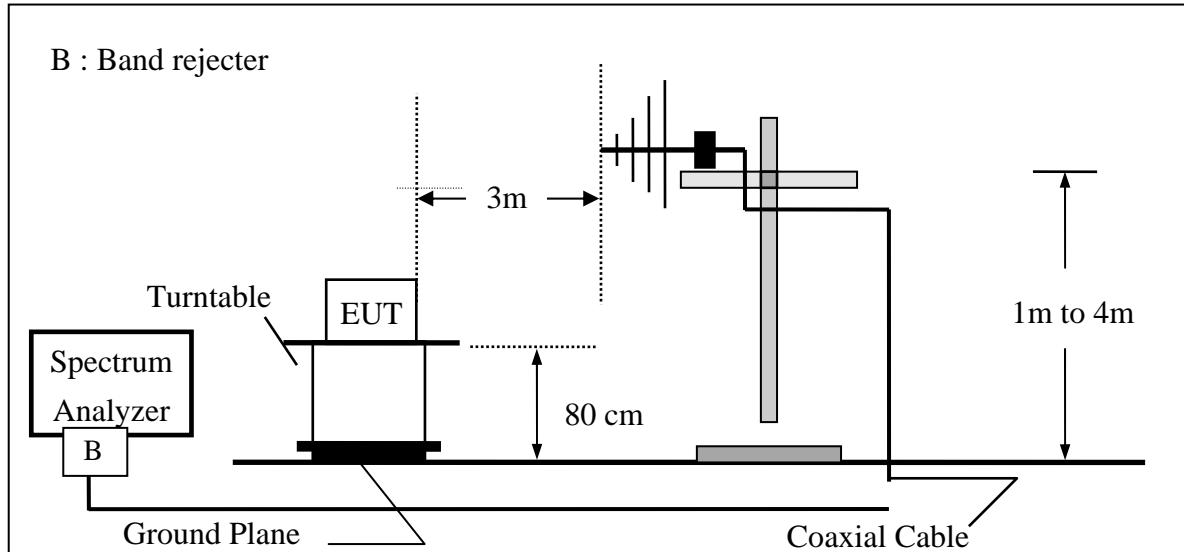
FCC §22.917(a), §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean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

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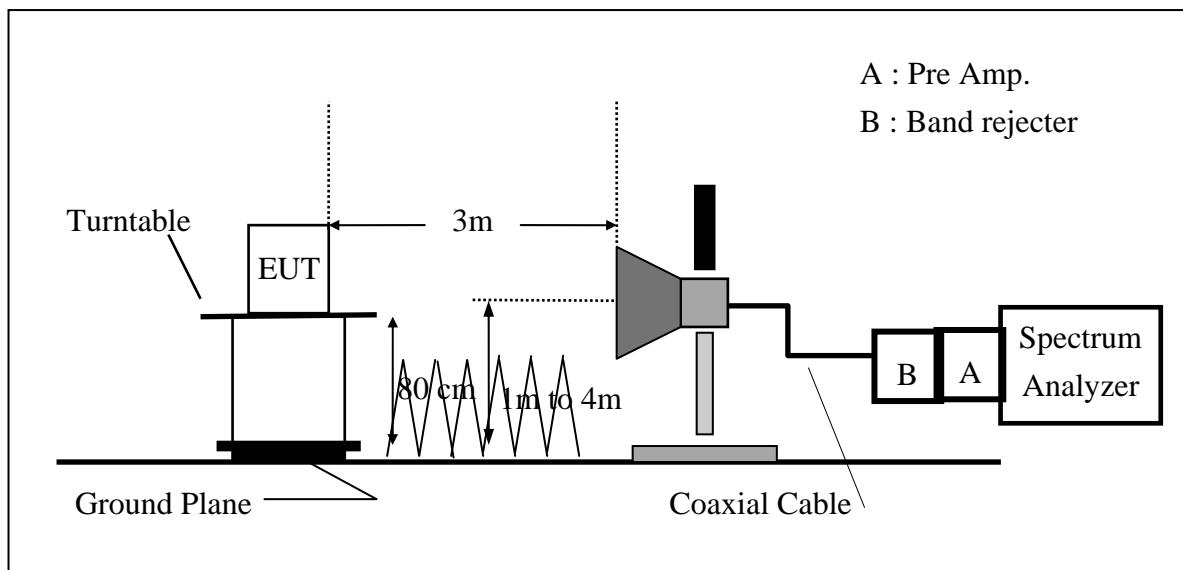
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10.2. EUT Setup (Block Diagram of Configuration):

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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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 frequency (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.

ERP= S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

EIRP = S.G. output (dBm) + Antenna Gain(dBi) – Cable Loss (dB)

10.4. Measurement Equipment Used:

Refer to section 2.4 in this report

10.5. Measurement Result:

Refer to attach tabular data sheets.

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Radiated Spurious Emission Measurement Result: GSM 850 Mode

Operation Band :GSM 850
ARFCN :CH 128 Test Date :2013-11-19
Fundamental Frequency :824.2 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX LOW Engineer :Nick
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
62.98	S	-48.26	-38.32	-8.94	-1.00	-13.00	-35.26
82.38	S	-50.42	-46.41	-2.96	-1.05	-13.00	-37.42
125.06	S	-54.47	-50.78	-2.39	-1.30	-13.00	-41.47
250.19	S	-51.71	-53.45	3.44	-1.71	-13.00	-38.71
375.32	S	-59.62	-61.57	3.98	-2.03	-13.00	-46.62
625.58	S	-50.23	-51.28	3.70	-2.65	-13.00	-37.23
1648.40	H	-51.30	-50.42	3.54	-4.42	-13.00	-38.30
2472.60	H	-53.45	-51.65	3.65	-5.45	-13.00	-40.45
3296.80	H	-55.84	-54.94	5.52	-6.42	-13.00	-42.84
4121.00	H	-54.01	-53.95	7.10	-7.16	-13.00	-41.01
5769.40	H	-52.87	-52.50	8.20	-8.57	-13.00	-39.87

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

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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Operation Band :GSM 850
ARFCN :CH 128 Test Date :2013-11-19
Fundamental Frequency :824.2 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX LOW Engineer :Nick
EUT Pol. :E2 Plan 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
62.98	S	-46.48	-36.54	-8.94	-1.00	-13.00	-33.48
125.06	S	-53.97	-50.28	-2.39	-1.30	-13.00	-40.97
175.50	S	-53.25	-51.74	-0.06	-1.45	-13.00	-40.25
250.19	S	-51.18	-52.92	3.44	-1.71	-13.00	-38.18
375.32	S	-49.48	-51.44	3.98	-2.03	-13.00	-36.48
625.58	S	-56.16	-57.20	3.70	-2.65	-13.00	-43.16
1648.40	H	-58.10	-57.23	3.54	-4.42	-13.00	-45.10
2472.60	H	-54.26	-52.46	3.65	-5.45	-13.00	-41.26
3296.80	H	-56.84	-55.94	5.52	-6.42	-13.00	-43.84

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

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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Operation Band :GSM 850
ARFCN :CH 190 Test Date :2013-11-19
Fundamental Frequency :836.6 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX MID Engineer :Nick
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
62.98	S	-45.26	-35.32	-8.94	-1.00	-13.00	-32.26
89.17	S	-50.46	-48.48	-0.79	-1.18	-13.00	-37.46
112.45	S	-53.49	-50.04	-2.20	-1.25	-13.00	-40.49
250.19	S	-52.24	-53.98	3.44	-1.71	-13.00	-39.24
375.32	S	-57.94	-59.90	3.98	-2.03	-13.00	-44.94
625.58	S	-51.94	-52.99	3.70	-2.65	-13.00	-38.94
1673.20	H	-49.65	-48.67	3.47	-4.45	-13.00	-36.65
2509.80	H	-55.93	-54.16	3.72	-5.49	-13.00	-42.93
3346.40	H	-58.25	-57.44	5.66	-6.47	-13.00	-45.25

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

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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Operation Band :GSM 850
ARFCN :CH 190 Test Date :2013-11-19
Fundamental Frequency :836.6 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX MID Engineer :Nick
EUT Pol. :E2 Plan 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
62.01	S	-49.21	-38.95	-9.27	-1.00	-13.00	-36.21
125.06	S	-52.84	-49.14	-2.39	-1.30	-13.00	-39.84
175.50	S	-56.41	-54.90	-0.06	-1.45	-13.00	-43.41
250.19	S	-51.90	-53.63	3.44	-1.71	-13.00	-38.90
375.32	S	-49.88	-51.84	3.98	-2.03	-13.00	-36.88
625.58	S	-57.81	-58.86	3.70	-2.65	-13.00	-44.81
1673.20	H	-59.67	-58.69	3.47	-4.45	-13.00	-46.67
2509.80	H	-57.94	-56.16	3.72	-5.49	-13.00	-44.94

ERP(dBm) = SG Level(dBm) + Antenna Gain(dBd) + 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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Operation Band :GSM 850
ARFCN :CH 251 Test Date :2013-11-19
Fundamental Frequency :848.8 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX HIGH Engineer :Nick
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
63.95	S	-47.05	-37.43	-8.62	-1.00	-13.00	-34.05
112.45	S	-50.79	-47.34	-2.20	-1.25	-13.00	-37.79
250.19	S	-52.15	-53.89	3.44	-1.71	-13.00	-39.15
375.32	S	-59.58	-61.54	3.98	-2.03	-13.00	-46.58
625.58	S	-52.10	-53.14	3.70	-2.65	-13.00	-39.10
650.80	S	-54.67	-55.93	3.94	-2.68	-13.00	-41.67
1697.60	H	-58.05	-56.97	3.40	-4.48	-13.00	-45.05
2546.40	H	-57.46	-55.71	3.79	-5.54	-13.00	-44.46
3395.20	H	-58.28	-57.57	5.80	-6.52	-13.00	-45.28
4244.00	H	-55.20	-55.03	7.10	-7.27	-13.00	-42.20

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

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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Operation Band :GSM 850
ARFCN :CH 251 Test Date :2013-11-19
Fundamental Frequency :848.8 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX HIGH Engineer :Nick
EUT Pol. :E2 Plan 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
62.01	S	-49.03	-38.76	-9.27	-1.00	-13.00	-36.03
125.06	S	-53.62	-49.93	-2.39	-1.30	-13.00	-40.62
175.50	S	-55.57	-54.06	-0.06	-1.45	-13.00	-42.57
250.19	S	-51.18	-52.91	3.44	-1.71	-13.00	-38.18
375.32	S	-50.09	-52.05	3.98	-2.03	-13.00	-37.09
625.58	S	-57.78	-58.83	3.70	-2.65	-13.00	-44.78
2546.40	H	-58.51	-56.76	3.79	-5.54	-13.00	-45.51
4244.00	H	-53.77	-53.60	7.10	-7.27	-13.00	-40.77

ERP(dBm) = SG Level(dBm) + Antenna Gain(dBd) + 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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Radiated Spurious Emission Measurement Result: GSM 1900 Mode

Operation Band :GSM 1900
ARFCN :CH 512 Test Date :2013-11-19
Fundamental Frequency :1850.2 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX LOW Engineer :Nick
EUT Pol. :E2 Plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit	Margin
						dBm	dB
61.04	S	-45.07	-36.63	-7.45	-1.00	-13.00	-32.07
111.48	S	-44.63	-43.33	-0.05	-1.25	-13.00	-31.63
265.71	S	-43.39	-47.26	5.63	-1.76	-13.00	-30.39
334.58	S	-47.13	-51.34	6.15	-1.95	-13.00	-34.13
625.58	S	-46.41	-49.61	5.85	-2.65	-13.00	-33.41
750.71	S	-42.26	-45.25	5.83	-2.85	-13.00	-29.26
3700.40	H	-52.97	-54.78	8.62	-6.80	-13.00	-39.97
5550.60	H	-38.22	-40.12	10.30	-8.40	-13.00	-25.22
7400.80	H	-49.46	-51.64	11.96	-9.78	-13.00	-36.46
9251.00	H	---					
11101.20	H	---					
12951.40	H	---					
14801.60	H	---					
16651.80	H	---					
18502.00	H	---					

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

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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Operation Band :GSM 1900
ARFCN :CH 512 Test Date :2013-11-19
Fundamental Frequency :1850.2 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX LOW Engineer :Nick
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
62.01	S	-46.99	-38.88	-7.12	-1.00	-13.00	-33.99
191.02	S	-45.29	-48.57	4.77	-1.49	-13.00	-32.29
237.58	S	-48.58	-52.46	5.54	-1.66	-13.00	-35.58
375.32	S	-49.30	-53.41	6.13	-2.03	-13.00	-36.30
750.71	S	-44.75	-47.73	5.83	-2.85	-13.00	-31.75
875.84	S	-49.54	-52.26	5.91	-3.19	-13.00	-36.54
3700.40	H	---					
5550.60	H	-47.83	-49.73	10.30	-8.40	-13.00	-34.83
7400.80	H	---					
9251.00	H	---					
11101.20	H	---					
12951.40	H	---					
14801.60	H	---					
16651.80	H	---					
18502.00	H	---					

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

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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Operation Band :GSM 1900
ARFCN :CH 661 Test Date :2013-11-19
Fundamental Frequency :1880.0 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX MID Engineer :Nick
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
62.01	S	-44.62	-36.50	-7.12	-1.00	-13.00	-31.62
117.30	S	-45.87	-44.52	-0.08	-1.27	-13.00	-32.87
191.02	S	-48.37	-51.64	4.77	-1.49	-13.00	-35.37
325.85	S	-46.88	-51.01	6.06	-1.93	-13.00	-33.88
625.58	S	-46.95	-50.14	5.85	-2.65	-13.00	-33.95
750.71	S	-42.63	-45.62	5.83	-2.85	-13.00	-29.63
3760.00	H	-53.13	-55.02	8.74	-6.85	-13.00	-40.13
5640.00	H	-39.36	-41.19	10.30	-8.47	-13.00	-26.36
7520.00	H	---					
9400.00	H	---					
11280.00	H	---					
13160.00	H	---					
15040.00	H	---					
16920.00	H	---					
18800.00	H	---					

EIRP(dBm) = SG Level(dBm) + Antenna Gain(dBi) + 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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Operation Band :GSM 1900
ARFCN :CH 661 Test Date :2013-11-19
Fundamental Frequency :1880.0 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX MID Engineer :Nick
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
39.70	S	-49.00	-36.03	-12.17	-0.80	-13.00	-36.00
191.02	S	-45.30	-48.58	4.77	-1.49	-13.00	-32.30
237.58	S	-50.03	-53.90	5.54	-1.66	-13.00	-37.03
375.32	S	-48.04	-52.15	6.13	-2.03	-13.00	-35.04
565.44	S	-52.78	-56.15	5.90	-2.53	-13.00	-39.78
750.71	S	-44.93	-47.91	5.83	-2.85	-13.00	-31.93
3760.00	H	---					
5640.00	H	-47.44	-49.27	10.30	-8.47	-13.00	-34.44
7520.00	H	---					
9400.00	H	---					
11280.00	H	---					
13160.00	H	---					
15040.00	H	---					
16920.00	H	---					
18800.00	H	---					

EIRP(dBm) = SG Level(dBm) + Antenna Gain(dBi) + 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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Operation Band :GSM 1900
ARFCN :CH 810 Test Date :2013-11-19
Fundamental Frequency :1909.8 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX HIGH Engineer :Nick
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
62.98	S	-45.33	-37.54	-6.79	-1.00	-13.00	-32.33
191.02	S	-47.65	-50.93	4.77	-1.49	-13.00	-34.65
324.88	S	-47.67	-51.79	6.05	-1.93	-13.00	-34.67
380.17	S	-48.21	-52.28	6.10	-2.03	-13.00	-35.21
625.58	S	-46.54	-49.74	5.85	-2.65	-13.00	-33.54
750.71	S	-41.63	-44.62	5.83	-2.85	-13.00	-28.63
3819.60	H	-51.35	-53.31	8.85	-6.90	-13.00	-38.35
5729.40	H	-41.16	-42.92	10.30	-8.54	-13.00	-28.16
7639.20	H	---					
9549.00	H	---					
11458.80	H	---					
13368.60	H	---					
15278.40	H	---					
17188.20	H	---					
19098.00	H	---					

EIRP(dBm) = SG Level(dBm) + Antenna Gain(dBi) + 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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Operation Band :GSM 1900
ARFCN :CH 810 Test Date :2013-11-19
Fundamental Frequency :1909.8 MHz Temp./Humi. :24deg_C / 54 RH
Operation Mode :TX HIGH Engineer :Nick
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
62.98	S	-45.79	-38.00	-6.79	-1.00	-13.00	-32.79
115.36	S	-50.92	-49.59	-0.07	-1.26	-13.00	-37.92
190.05	S	-43.75	-46.97	4.70	-1.49	-13.00	-30.75
237.58	S	-49.00	-52.88	5.54	-1.66	-13.00	-36.00
375.32	S	-48.62	-52.73	6.13	-2.03	-13.00	-35.62
750.71	S	-44.90	-47.89	5.83	-2.85	-13.00	-31.90
3819.60	H	---					
5729.40	H	-44.55	-46.30	10.30	-8.54	-13.00	-31.55
7639.20	H	---					
9549.00	H	---					
11458.80	H	---					
13368.60	H	---					
15278.40	H	---					
17188.20	H	---					
19098.00	H	---					

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

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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11. FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

11.1. Standard Applicable:

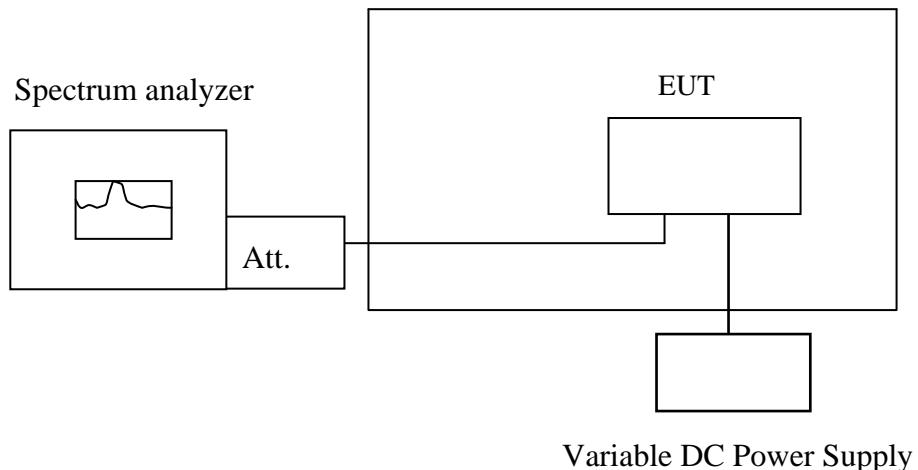
According to FCC §2.1055(a) (1)

Frequency Tolerance: +/-2.5ppm for 850MHz band

+/-2.5ppm for 1900MHz band

11.2. Test Set-up:

Temperature Chamber



Note : Measurement setup for testing on Antenna connector

11.3. 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.

11.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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11.5. Measurement Result:

Reference Frequency: GSM 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vac	Temperature (°C)	(MHz)		
110	50	836600004	4	2091
110	40	836600003	3	2091
110	30	836599999	-1	2091
110	20	836600000	0	2091
110	10	836599998	-2	2091
110	0	836599998	-2	2091
110	-10	836599996	-4	2091
110	-20	836599995	-5	2091
110	-30	836599997	-3	2091

Reference Frequency: GSM 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vac	Temperature (°C)	(MHz)		
110	50	1880000042	42	4700
110	40	1880000042	42	4700
110	30	1880000041	41	4700
110	20	1880000000	0	4700
110	10	1880000036	36	4700
110	0	1880000033	33	4700
110	-10	1880000034	34	4700
110	-20	1880000032	32	4700
110	-30	1880000030	30	4700

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12. Simultaneous Transmission Evaluation

According to 447489 D01, provision 7.2, Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is ≤ 1.0 .

The MPE ratio of each transmitter is ratio of field strength or power density to MPE limit at that frequency.

MPE ratio on GSM850: $0.012902\text{mW/cm}^2 / 0.56\text{mW/cm}^2 = 0.023039$

MPE ratio on GSM1900: $0.003211\text{mW/cm}^2 / 1.0\text{mW/cm}^2 = 0.003211$

Scenario1: GSM850 #1+ GSM850 #2 +...+GSM #k, where k is number of transmitter + antenna collocated within the host = $0.023039 + 0.023039 + 0.023039 + 0.023039 + 0.023039 + 0.023039.. = 0.737257$

Scenario2: GSM1900 #1+GSM1900#2+...+GSM #k, where k is number of transmitter + antenna collocated within the host = $0.003211 + 0.003211 + 0.003211 + 0.003211 + 0.003211 = 0.102752$

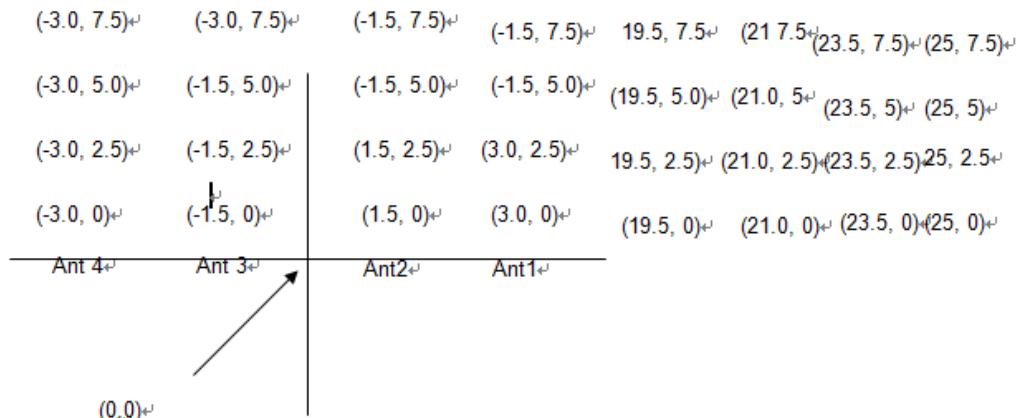
Scenario3: GSM850#1 +GSM1900#2+ GSM850#3+ GSM1900#4+...GSM850#k-1+GMS1900#k, where k is number of transmitter + antenna collocated within the host = 0.42

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All three scenario are less than 1, and therefore the MPE with collocated (transmitter+antenna) is compliant with existing policy of RF exposure.

Location of distribution of transmitter + antenna



~ End of Report ~

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