

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 22 SUBPART H, PART 24 SUBPART E AND INDUSTRY CANADA RSS-132 and RSS-133 REQUIREMENT

OF

Product Name:	OBDtrac
Brand Name:	ORION
Model No.:	BD-100
Model Difference:	N/A
FCC ID:	A6U-BD100
IC:	9765A-BD100
Report No.:	EH/2012/10045
Issue Date:	Apr. 26, 2012
FCC Rule Part:	2 , 22H & 24E
IC Rule Part:	RSS 132, Issue 2 and RSS 133, Issue 5
Prepared for:	Peak Wireless Corporation 11F-1, NO.11, Sec.1, Jhongshan N. Rd. Taipei City Taiwan SGS Taiwan Ltd.
Prepared by:	Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei County, Taiwan.

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VERIFICATION OF COMPLIANCE

Applicant: Peak Wireless Corporation
11F-1, NO.11, Sec.1, Jhongshan N. Rd. Taipei City Taiwan

Product Name: OBDtrac

Brand Name: ORION

Model No.: BD-100

Model Difference: N/A

FCC ID: A6U-BD100

IC: 9765A-BD100

File Number: EH/2012/10045

Date of test: Jan. 31, 2012 ~ Apr. 24, 2012

Date of EUT Received: Jan. 31, 2012

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, Issue 3 of RSS-Gen 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 and IC standards Issue 2 of RSS-132, Issue 5 of RSS-133.

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

Test By:**Date:**

Apr. 26, 2012

*Jimmy / Engineer***Prepared By:****Date:**

Apr. 26, 2012

*Gigi Yeh / Clerk***Approved By:****Date:**

Apr. 26, 2012

Jim Chang / Supervisor

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Version

Version No.	Date	Description
00	Apr. 26, 2012	Initial creation of document

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1. GENERAL PRODUCT INFORMATION

General:

Product Name:	OBDtrac	
Brand Name:	ORION	
Model No.:	BD-100	
Model difference:	N/A	
Power Supply:	3.7Vdc Li-ion battery or 12Vdc by car charger	
	Battery:	Model No.: WW35103PPL, Supplier: Power Tronies

GRPS :

Cellular Phone Standards Frequency Range and Power:	Operating Frequency		Rated Power
	GPRS 850, Class 12	824 MHz– 849MHz	33 dBm
	GPRS 1900, Class 12	1850MHz – 1910MHz	30 dBm
Type of Emission	GPRS 850: 247KGXW, GPRS 1900: 247KGXW		
Hardware Version:	V7		
Software Version:	V13		
IMEI:	356496041824530		

This test report applies for GPRS 850/1900.

Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
GPRS 850	12 Vdc	125
GPRS 1900	12 Vdc	110

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

This submittal(s) (test report) is intended for **FCC ID: A6U-BD100** filing to comply with Section Part 22 subpart H, Part 24 subpart E and Part27 of the FCC CFR 47 Rules and **IC: 9765A-BD100** filing to comply with Issue 2 of RSS-132, Issue 5 of RSS-133.

1.2. 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, issue 2 of RSS-132 and issue 3 of RSS-133..

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

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-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).

1.4. 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 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 and RSS-Gen Issue 3, 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 C63.4:2003.

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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	MY51100003	04/15/2011	04/14/2013
Spectrum Analyzer	Agilent	E4440A	US41160416	03/17/2012	03/16/2014
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
WIDEB. RADIO COMIN. TESTER	R & S	CMW500	101582	07/12/2010	07/11/2012
Temperature Chamber	TERCHY	MHG-120LF	911009	04/16/2012	04/15/2014
DC Block	Mini-Circuits	BLK-18-S+	1	02/28/2012	02/27/2013
Attenuator	Mini-Circuit	BW-S10W2+	002	02/28/2012	02/27/2013
Splitter	Agilent	11636B	N/A	02/28/2012	02/27/2013
DC Power Supply	Agilent	E3640A	MY40005907	07/15/2011	07/14/2013

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ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/15/2011	02/14/2013
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Bilog Antenna	SCHWAZBECK	VULB9160	3158	11/24/2011	11/23/2013
Dipole Antenna	SCHWAZBECK	VHAP	908/909	07/17/2010	07/16/2012
Dipole Antenna	SCHWAZBECK	UHAP	891/892	07/17/2010	07/16/2012
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	184	01/17/2012	01/17/2014
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
RF amplifier	Miteq	AMF-6F-2600 400-40-8P	971576	12/28/2011	12/27/2012
Signal Generator	R&S	SMR40	100210	02/02/2012	02/01/2014
Signal Generator	Agilent	E4438C	MY45093613	07/15/2011	07/14/2013
Pre-Amplifier	Agilent	8447D	1937A02834	01/04/2012	01/03/2013
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2012	01/03/2013
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2012	02/27/2013
Radio Communication Analyzer	R & S	CMU200	102189	08/12/2010	08/11/2012
WIDEB. RADIO COMIN. TESTER	R & S	CMW500	101582	07/12/2010	07/11/2012
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	01/04/2012	01/03/2013
Low Loss Cable	HUBER+SUHNER	966_Rx	3m	01/04/2012	01/03/2013
Filter 800-1000	Micro-Tronics	EWT	M2	05/25/2011	05/24/2013
Filter 1800-2000	Micro-Tronics	EWT	M2	05/25/2011	05/24/2013
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	02/28/2012	02/27/2013
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	02/28/2012	02/27/2013
3m Site NSA	SGS	966 chamber	N/A	07/15/2011	07/14/2012

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2.5. Configuration of Tested System

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

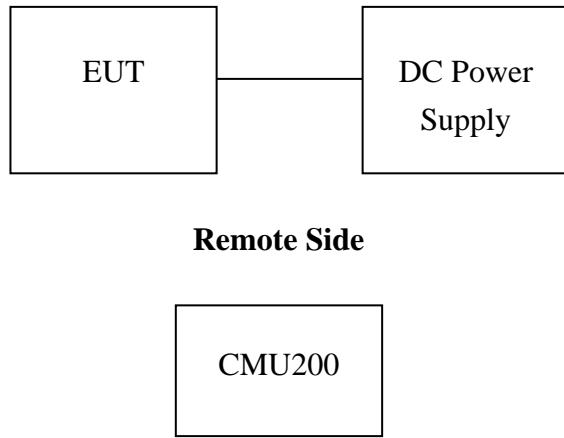


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	Power Cord
1.	DC Power Supply	HILA	DP-3003N	11233K0716024	shielded	Un-shielded
2.	Universal Radio Communication Tester	R&S	CMU200	102189	shielded	Un-shielded

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3. SUMMARY OF TEST RESULTS

FCC Rules	IC Rules	Description Of Test	Result
§2.1046(a)	N/A	RF Power Output	Compliant
§2.1046(a) §22.913(a)(2) §24.232(c)	§4.8 (RSS-Gen Issue 3) §4.4 (RSS-132) §6.4 (RSS-133)	ERP/ EIRP measurement	Compliant
§2.1049(h)	§4.6.1 (RSS-Gen Issue 3) §2.3 (RSS-133)	99% Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a)	§4.9 (RSS-Gen Issue 3) §4.5 (RSS-132) §6.5 (RSS-133)	Out of Band Emissions at Antenna Terminals and Band Edge	Compliant
§2.1053 §22.917(a) §24.238(a)	§4.9 (RSS-Gen Issue 3) §4.5 (RSS-132) §6.5 (RSS-133)	Field Strength of Spurious Radiation	Compliant
§2.1055(a)(1) §22.355 §24.235	§4.7 (RSS-Gen Issue 3) §4.3 (RSS-132) §6.3 (RSS-133)	Frequency Stability vs. Temperature	Compliant
§2.1055(d)(2) §22.355 §24.235	§4.7 (RSS-Gen Issue 3) §4.3 (RSS-132) §6.3 (RSS-133)	Frequency Stability vs. Voltage	Compliant
N/A	§4.10 (RSS-Gen Issue 3) §4.6 (RSS-132) §6.6 (RSS-133)	Receiver Spurious Emissions	Compliant

Max ERP/EIRP measurement result:

	dBm		W
GPRS 850 Band	21.28	ERP	0.134
GPRS 1900 Band	26.19	EIRP	0.416

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 (E2 mode) and lie down position (E2 mode) for GPRS with power adaptor. The worst-case of E2 position for GPRS850/ GPRS1900 were reported.

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5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

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

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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 to 2W.

3GPP Power limitation for HSDPA and HSUPA

Maximum Output Powers for HSDPA

Sub-test in table C.10.1.4	Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
1	+24	+1.7/-3.7	+21	+2.7/-2.7
2	+24	+1.7/-3.7	+21	+2.7/-2.7
3	+23.5	+2.2/-3.7	+20.5	+3.2/-2.7
4	+23.5	+2.2/-3.7	+20.5	+3.2/-2.7

Maximum Output Powers for HSUPA

Sub-test in table C.11.1.3	Power Class 3		Power Class 4	
	Power (dBm)	Tol (dB)	Power (dBm)	Tol (dB)
1	+24	+1.7/-6.7	+21	+2.7/-5.7
2	+22	+3.7/-5.2	+19	+4.7/-4.2
3	+23	+2.7/-5.2	+20	+3.7/-4.2
4	+22	+3.7/-5.2	+19	+4.7/-4.2
5	+24	+1.7/-6.7	+21	+2.7/-5.7

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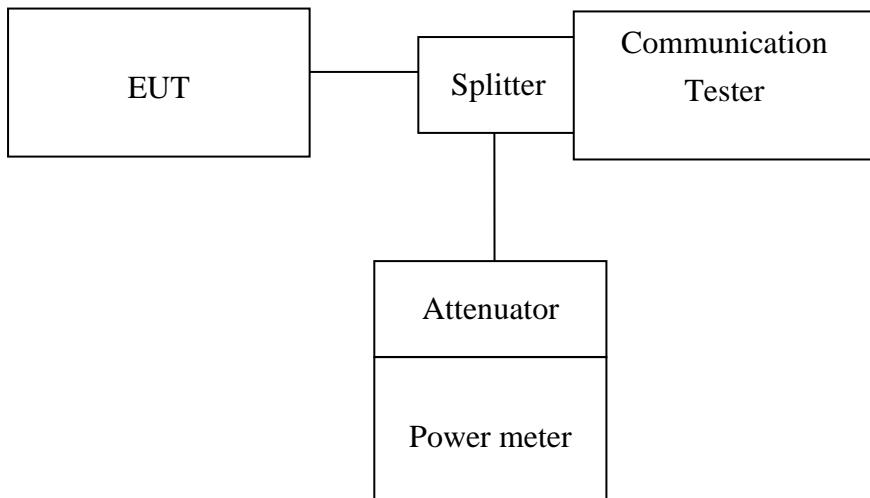
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6.2 Test Set-up:



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. The Procedure of KDB941225 KDB941125 (SAR Measurement Procedures for 3G devices, WCDMA/HSDPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing

6.4 Measurement Equipment Used:

Refer to section 2.4 in this report

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6.5 Measurement Result:

6.5.1 RF Conducted Output Power

6.5.1.1 GPRS (GMSK; 8-PSK)

Result:

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Average Burst Power (dBm)
GPRS 850	824.2	128	32.90	32.50
	836.6	190	32.60	32.20
	848.8	251	32.30	32.00

EUT Mode	Frequency (MHz)	CH	Peak Power (dBm)	Average Burst Power (dBm)
GPRS 1900	1850.2	512	30.10	29.80
	1880.0	661	29.00	28.90
	1909.8	810	28.20	28.10

Cable loss offset Low Band: 1.1 dB

Cable loss offset High Band: 1.7 dB

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6.5.2. Minimum Communications Power Measurement

PCS 1900 band

PCL	0	1	2	3	4	5	6	7	8
Output power (dBm)	28.9	27.4	25.4	23.7	21.7	19.7	17.7	15.7	13.7
<hr/>									
PCL	9	10	11	12	13	14	15		
Output power (dBm)	12.7	9.9	7.9	6	4.2	2.5	0.1		

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

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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.

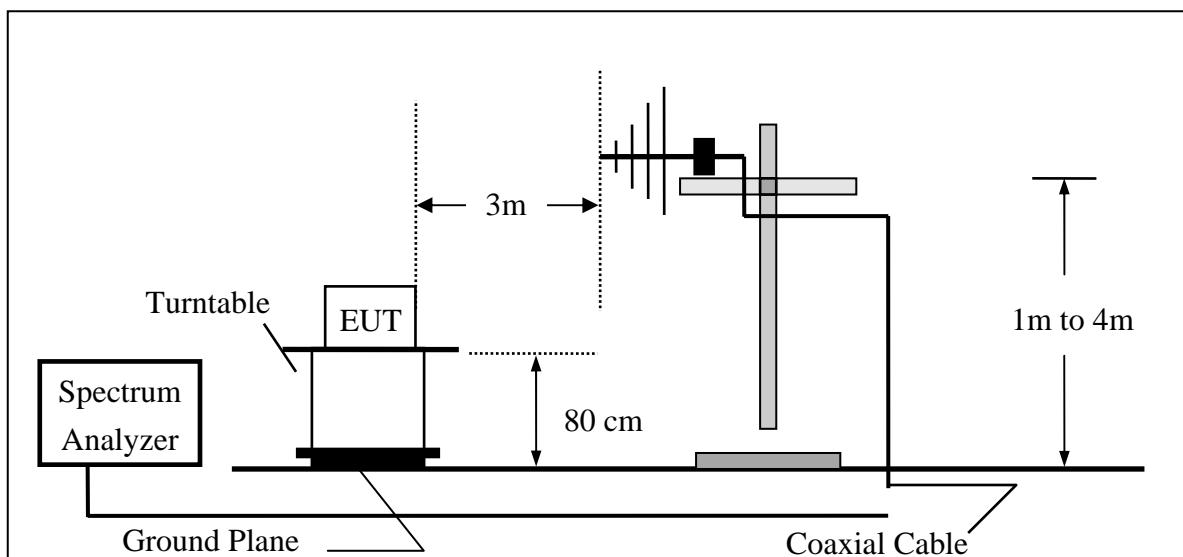
According to IC RSS-133 §6.4

The peak e.i.r.p. for transmitters operating in the band 1850-1910 MHz shall not exceed the limits 2W which given in SRSP-510.

According to issue 2 of RSS 132, section 4.4. The transmitter output power shall not exceed the limits given in SRSP-503.

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

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



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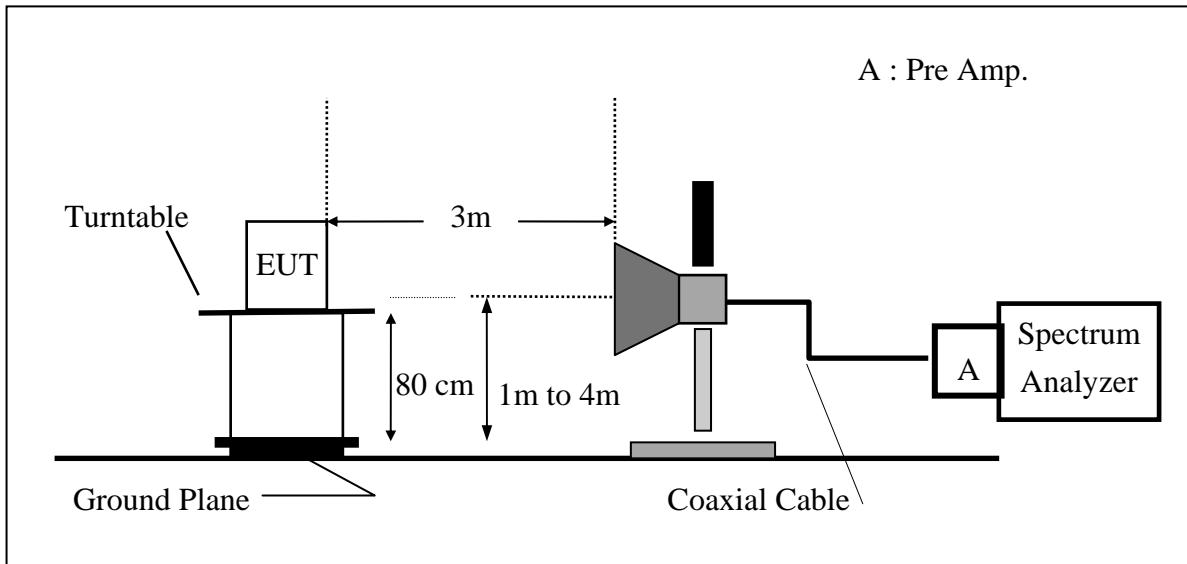
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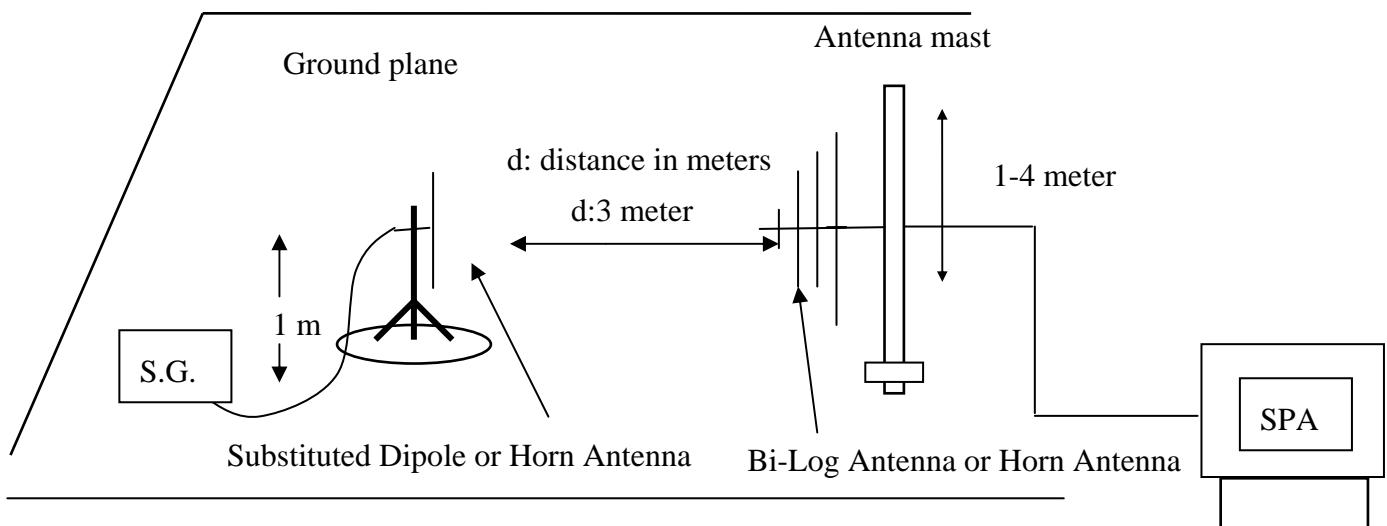
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(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



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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:

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

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

7.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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7.5. Measurement Result:

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
GPRS 850	E2	824.2	128	V	16.26	3.96	-4.22	16.00	38.45
				H	21.54	3.96	-4.22	21.28	38.45
		836.6	190	V	15.08	4.00	-4.24	14.84	38.45
				H	19.82	4.00	-4.24	19.58	38.45
		848.8	251	V	13.66	4.03	-4.33	13.36	38.45
				H	18.86	4.03	-4.33	18.56	38.45

Remark :

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

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
GPRS 1900	E2	1850.2	512	V	25.81	4.17	-5.49	24.50	33.00
				H	27.17	4.51	-5.49	26.19	33.00
		1880.0	661	V	23.54	4.13	-5.56	22.11	33.00
				H	25.41	4.44	-5.56	24.29	33.00
		1909.8	810	V	23.95	4.09	-5.56	22.49	33.00
				H	24.77	4.36	-5.56	23.58	33.00

Remark :

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

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8. 99% OCCUPIED BANDWIDTH MEASUREMENT

8.1. Standard Applicable:

According to §FCC 2.1049.

According to IC RSS-Gen Issue 3 §4.6.1

According to IC RSS-133 §2.3

8.2. Test Set-up:

Refer to section 5.2 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, -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.

8.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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8.5. Measurement Result:

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (KHz)
GPRS 850	824.20	128	247.3737
	836.60	190	243.8551
	848.80	251	246.4538

EUT Mode	Frequency (MHz)	CH	99% Bandwidth (KHz)
GPRS 1900	1850.20	512	246.5378
	1880.00	661	245.3801
	1909.80	810	246.2684

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Figure 8-1: GPRS 850 Channel Low

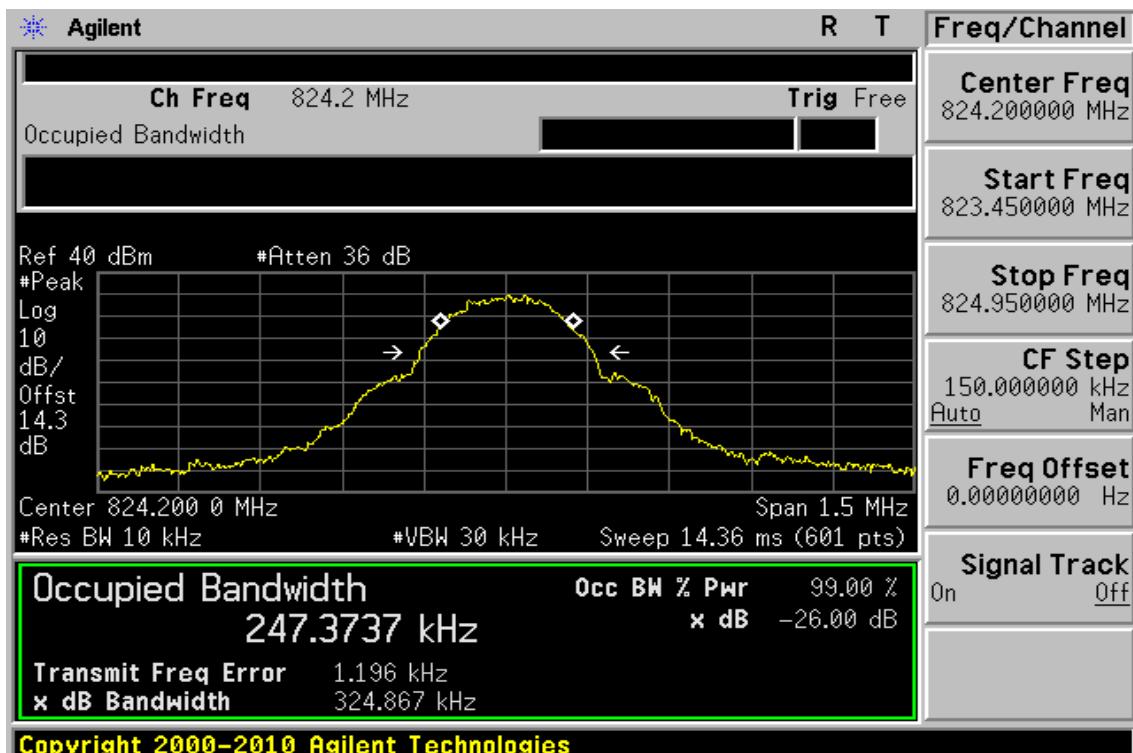
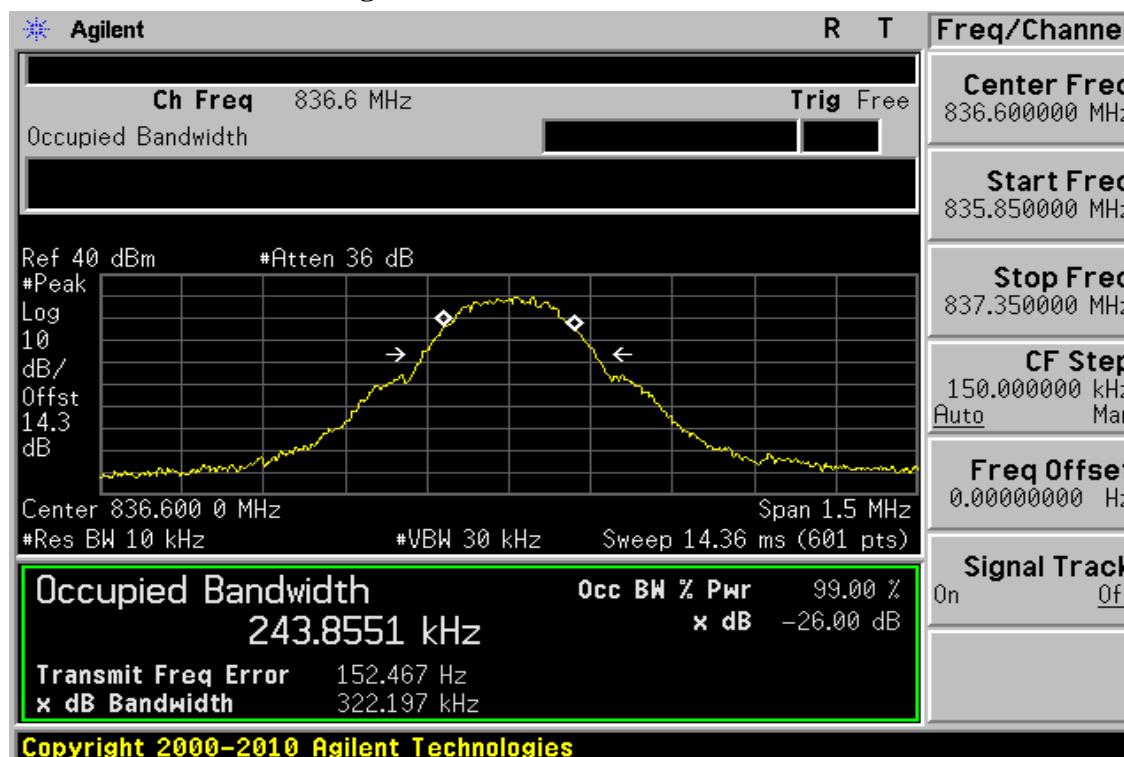


Figure 8-2: GPRS 850 Channel Mid



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Figure 8-3: GPRS 850 Channel High

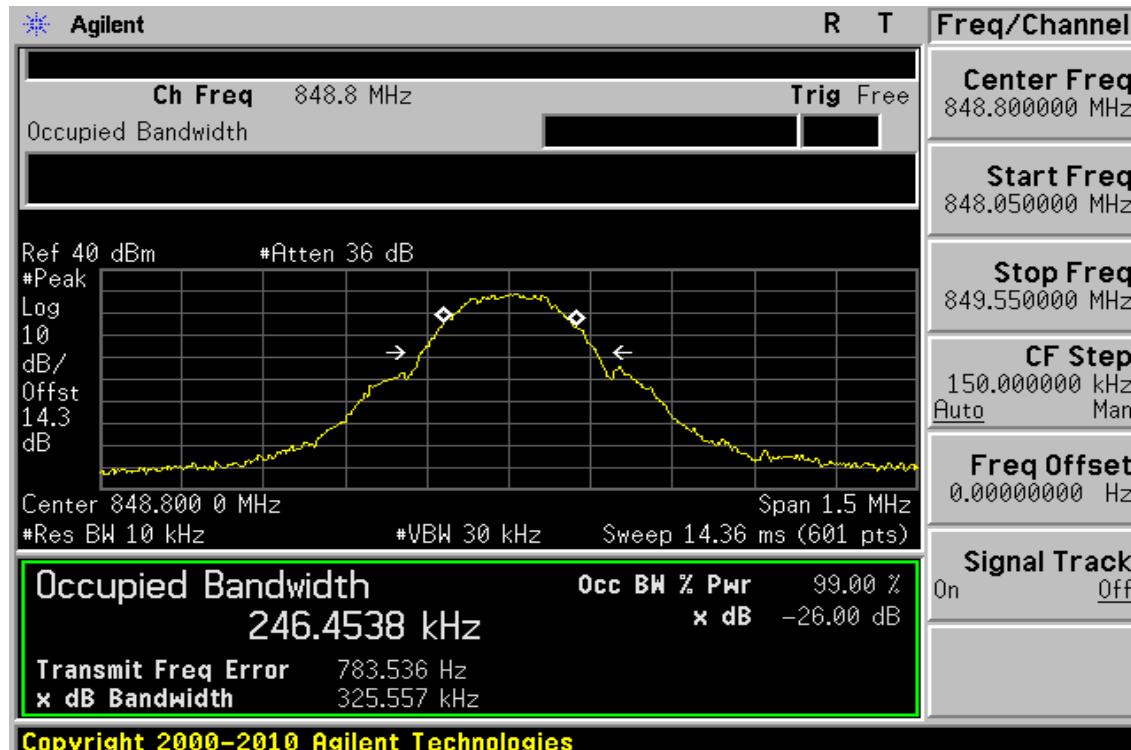
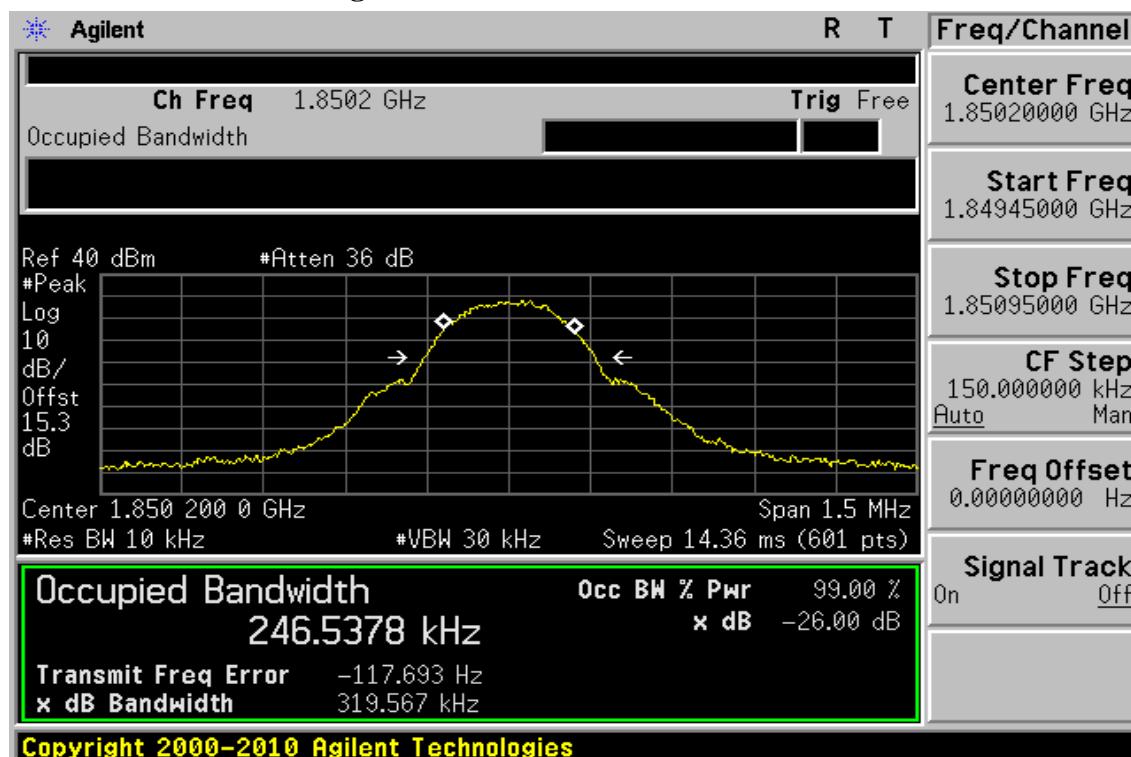


Figure 8-4: GPRS 1900 Channel Low



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Figure 8-5: GPRS 1900 Channel Mid

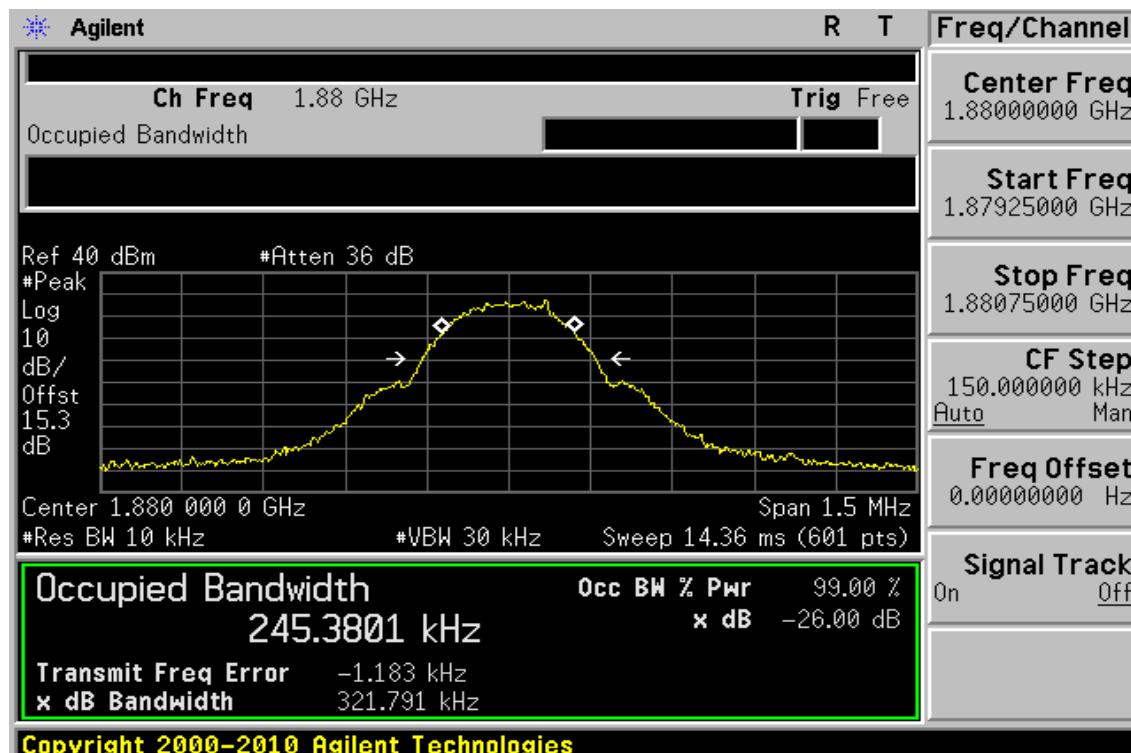
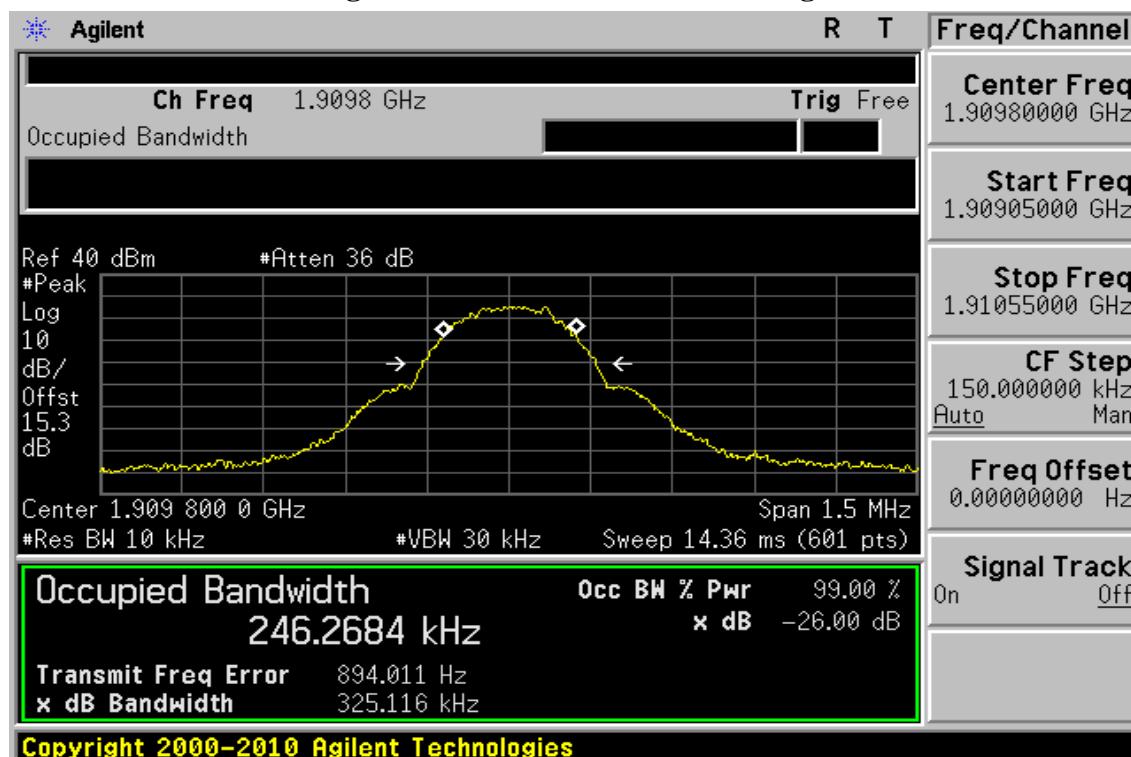


Figure 8-6: GPRS 1900 Channel High



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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)

According to RSS-132 §4.5

4.5.1 Out-of-block Emissions

Mobile and base station equipment with emission bandwidth less than or equal to 4 MHz shall comply with 4.5.1.1. Mobile station equipment with emission bandwidth greater than 4 MHz shall comply with 4.5.1.2. Base station equipment with emission bandwidth greater than 4 MHz shall comply with either 4.5.1.2 or 4.5.1.3.

4.5.1.1 In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least

$43 + 10 \log (P)$, dB, in any 100 kHz bandwidth.

4.5.1.2 In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least

$43 + 10 \log (P)$, dB, in any 1 MHz bandwidth

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According to RSS-133 §6.5

6.5.1 Out-of-Block Emissions

- a. Mobile stations must comply with subsection i. below.

In the first 1.0MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$ dB.

- b. After the first 1.0 MHz (for equipment that complies with a.i. of this subsection) or 1.5 MHz (for equipment that complies with all of this subsection), the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log (P)$, dB, per any MHz of bandwidth.

(Note: If the test result using 1% of the emission bandwidth is used, then power integration over 1.0 MHz is required; alternatively, the spectrum analyzer resolution and video bandwidths can be increased to 1.0 MHz for this measurement).

6.5.2 Out-of-Sub-band Emissions

Outside the sub-bands 1850-1910 MHz and 1930-1990 MHz, the attenuation shall be equal to or greater than the out-of-block emission limits in Section 6.5.1.

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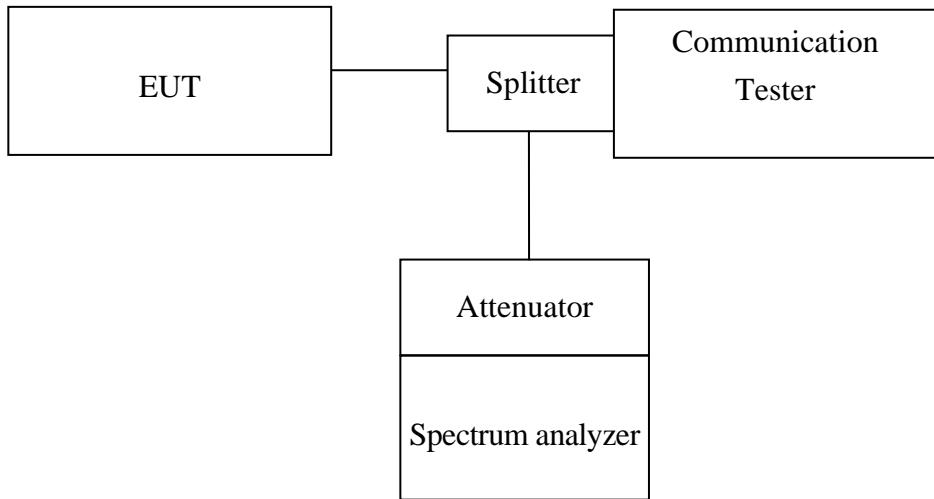
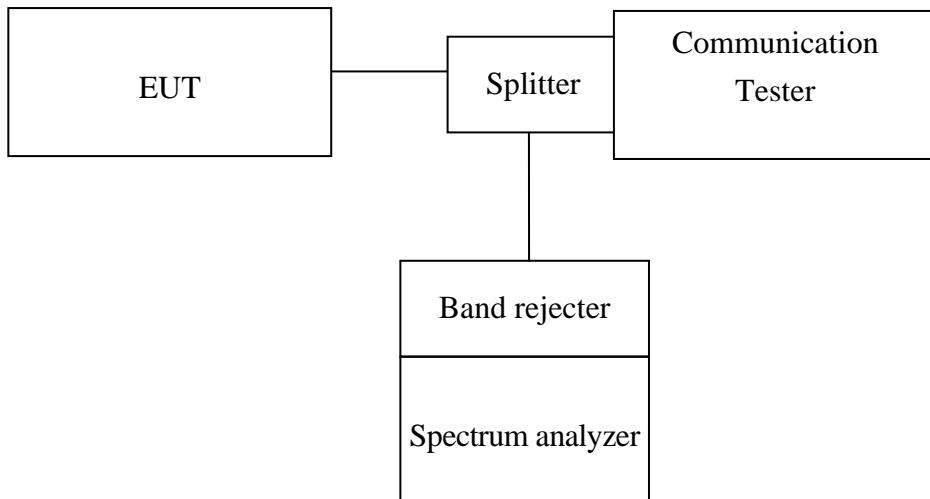
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9.2. Test SET-UP:**Out of band emission****Band Edge**

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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

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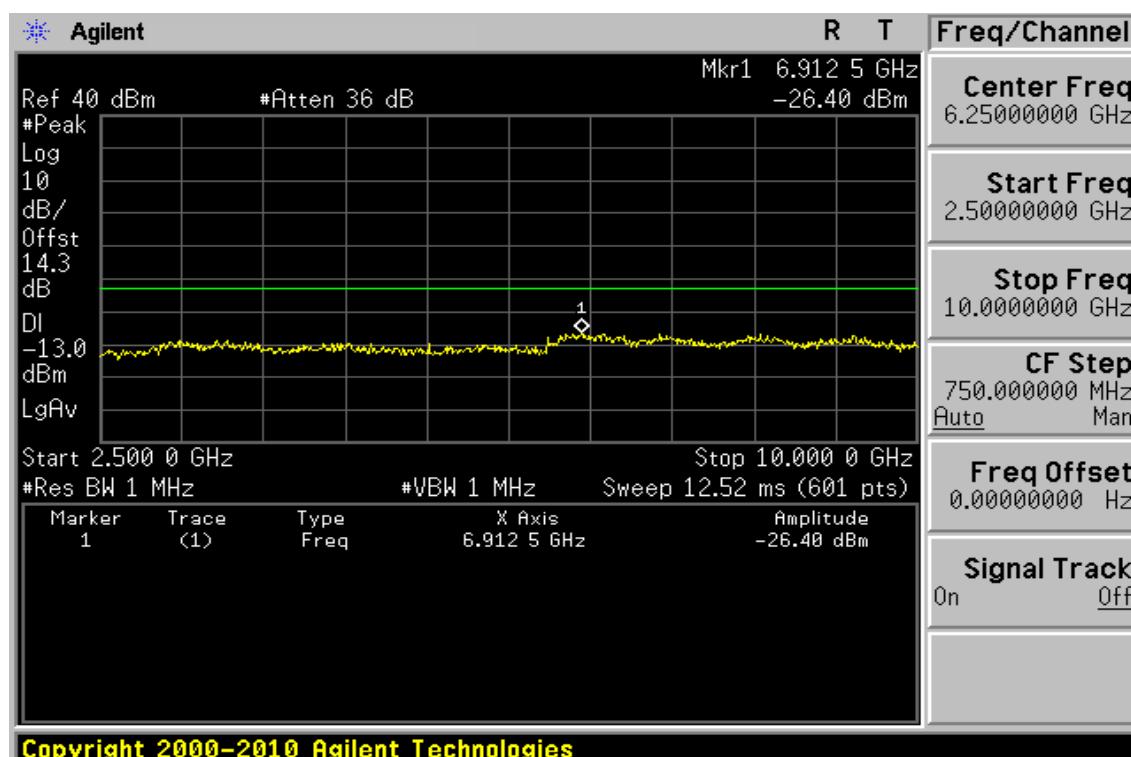
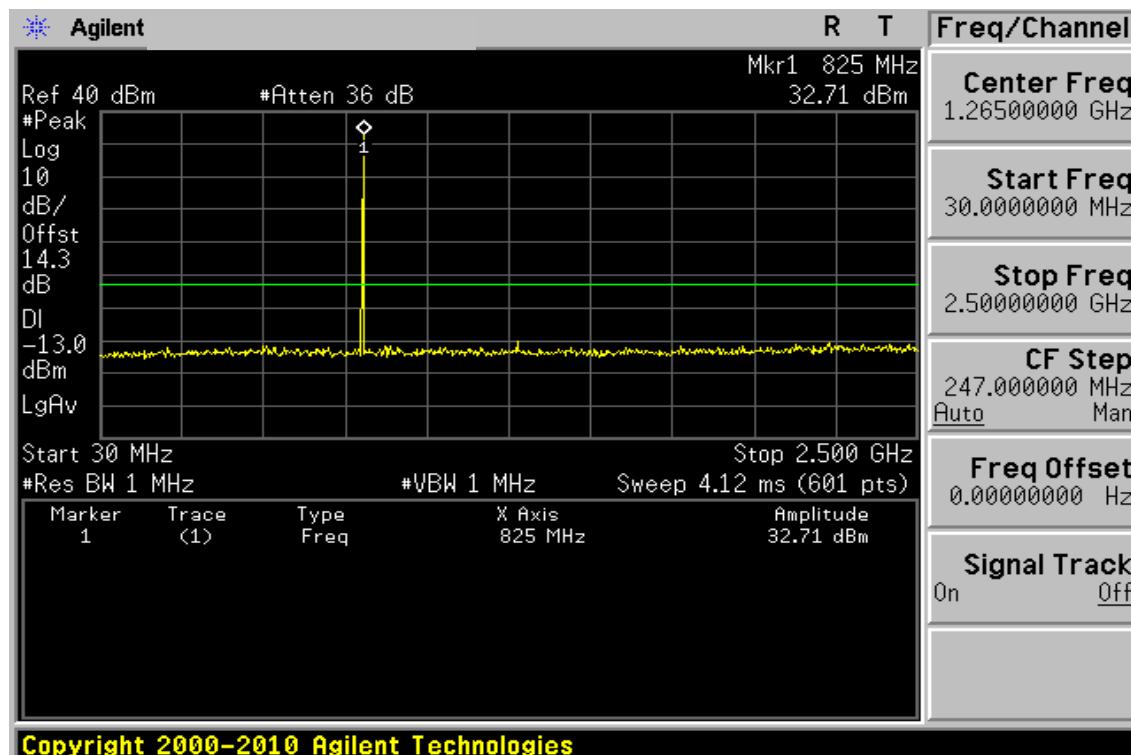
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9.5. Measurement Result:

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

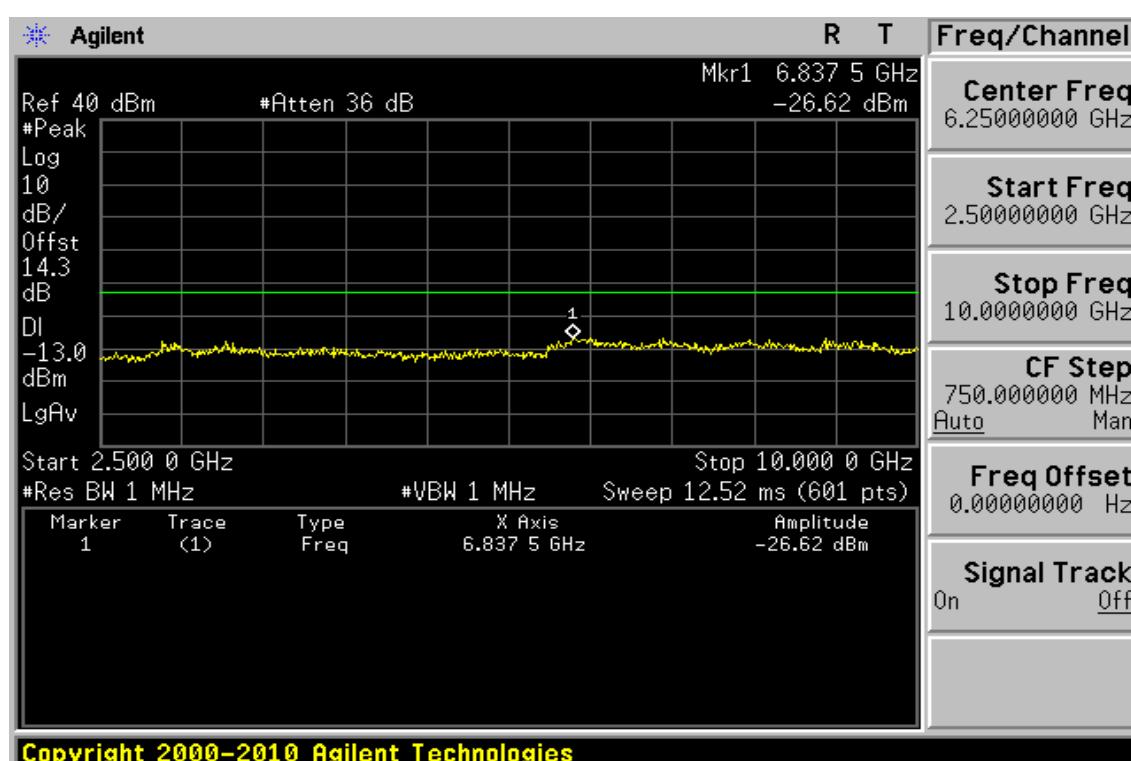
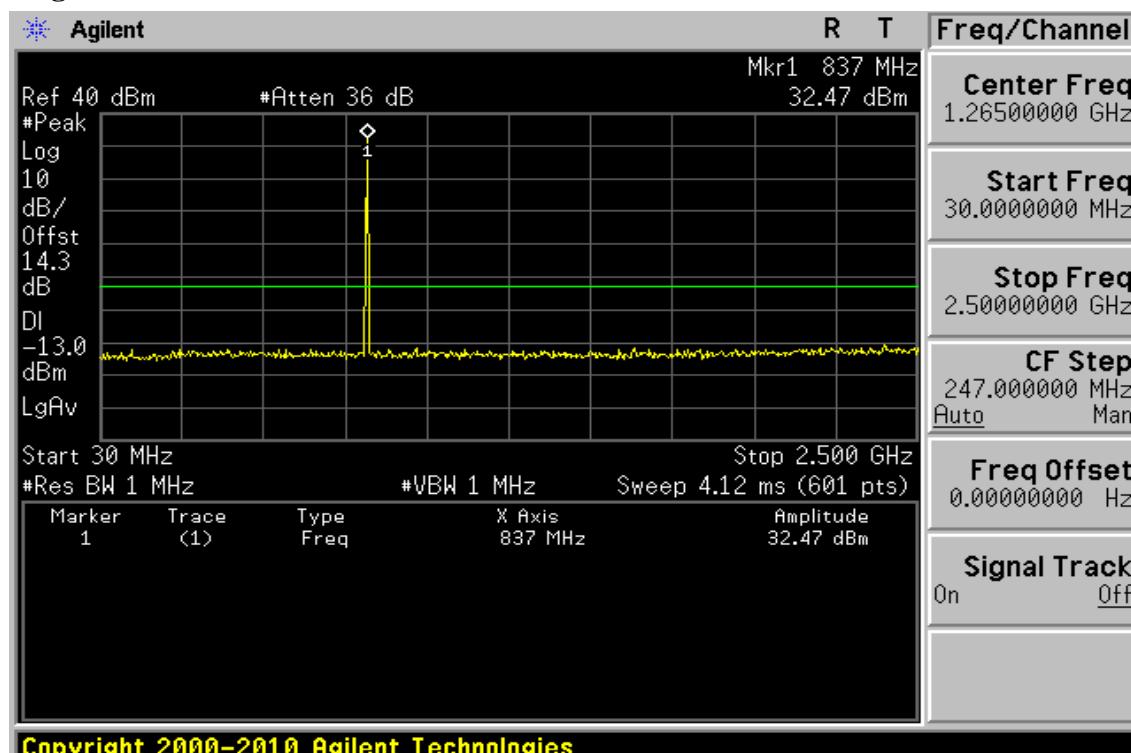


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Figure 9-2: Out of Band emission at antenna terminals – GPRS 850 Channel Mid

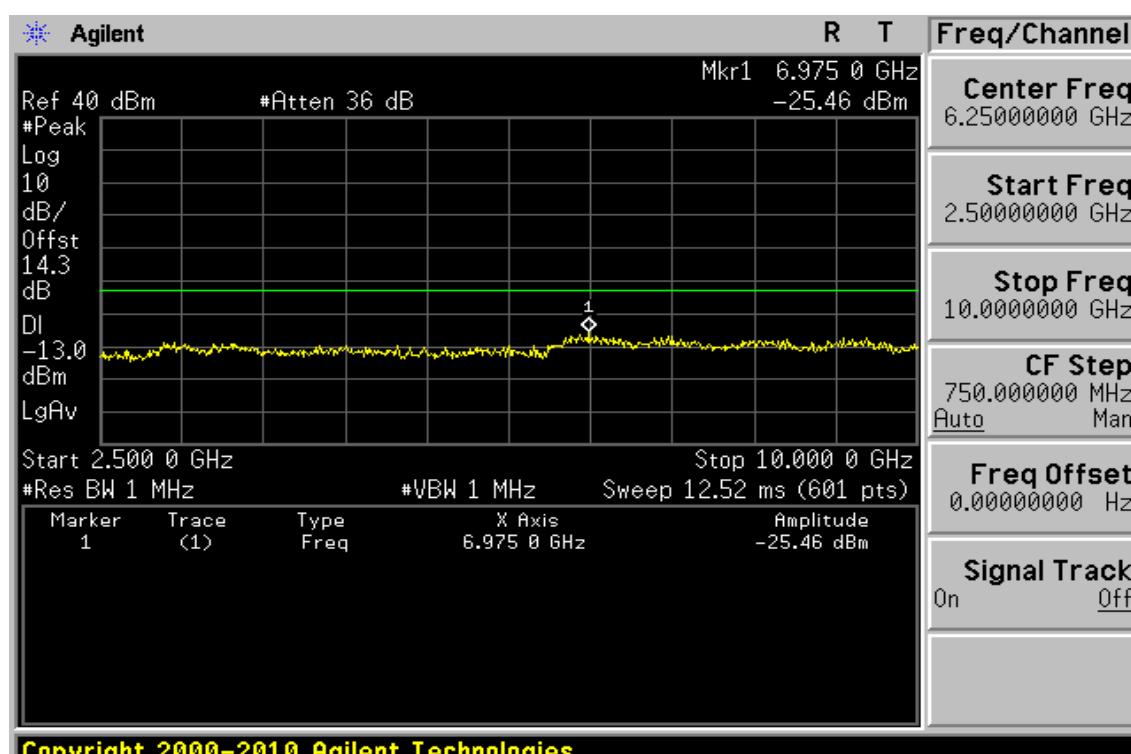
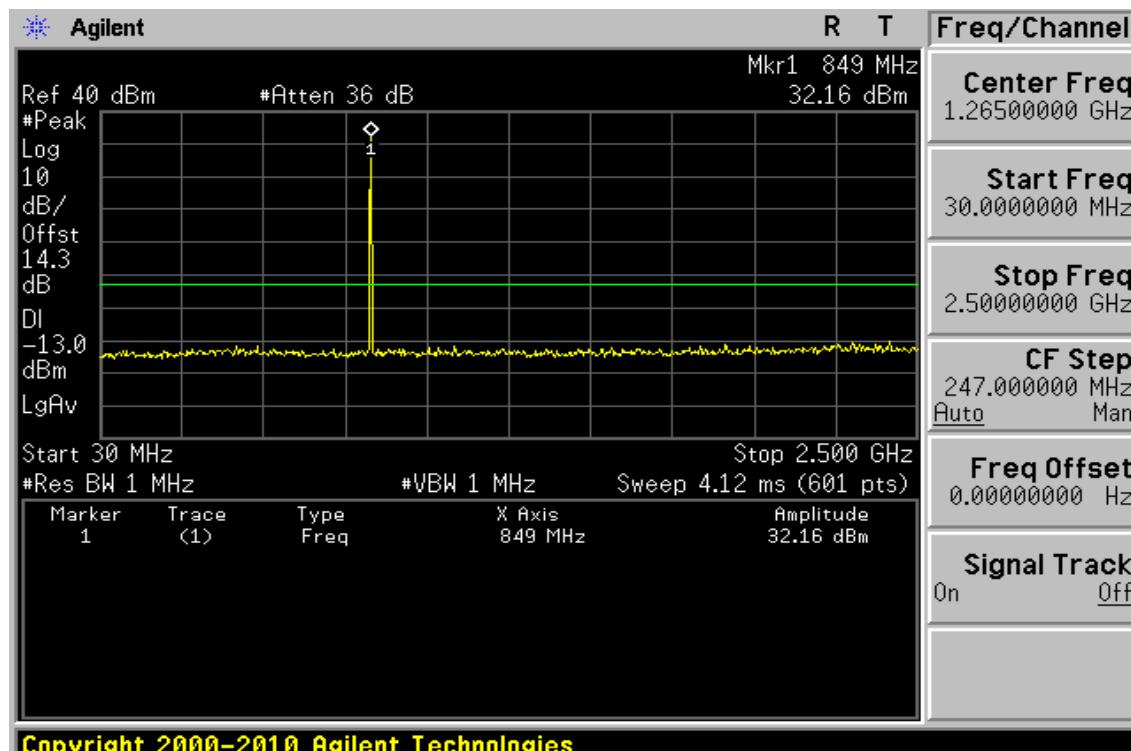


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Figure 9-3: Out of Band emission at antenna terminals – GPRS 850 Channel Highest

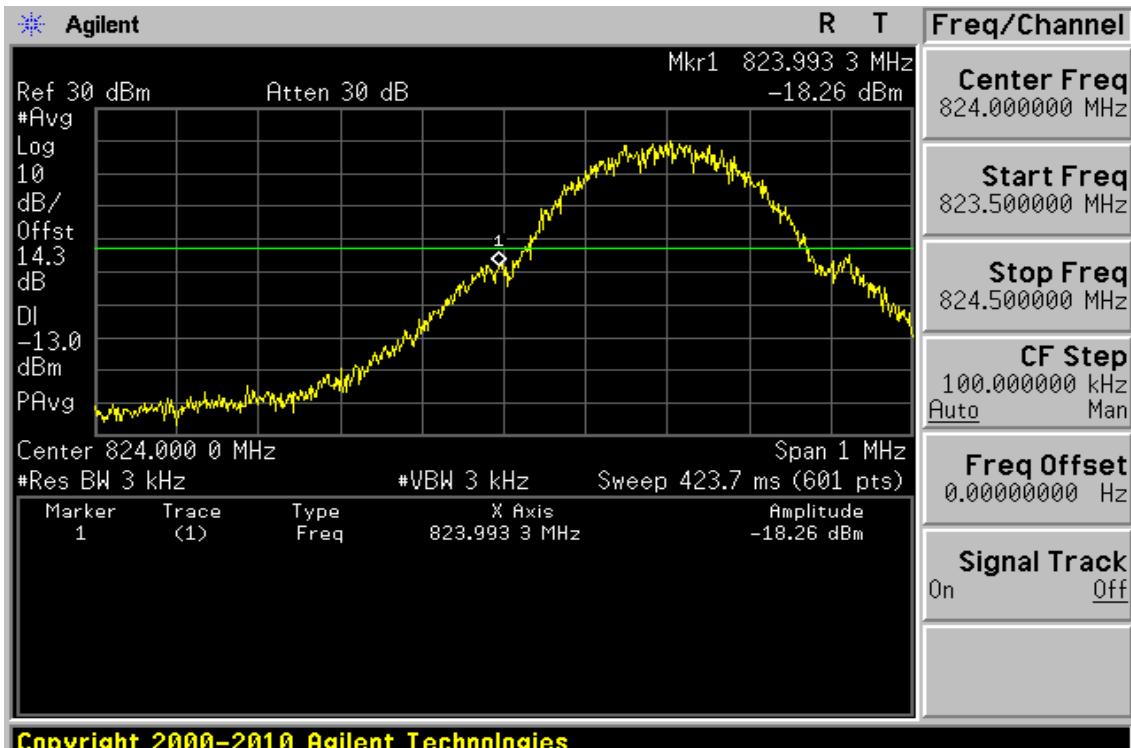


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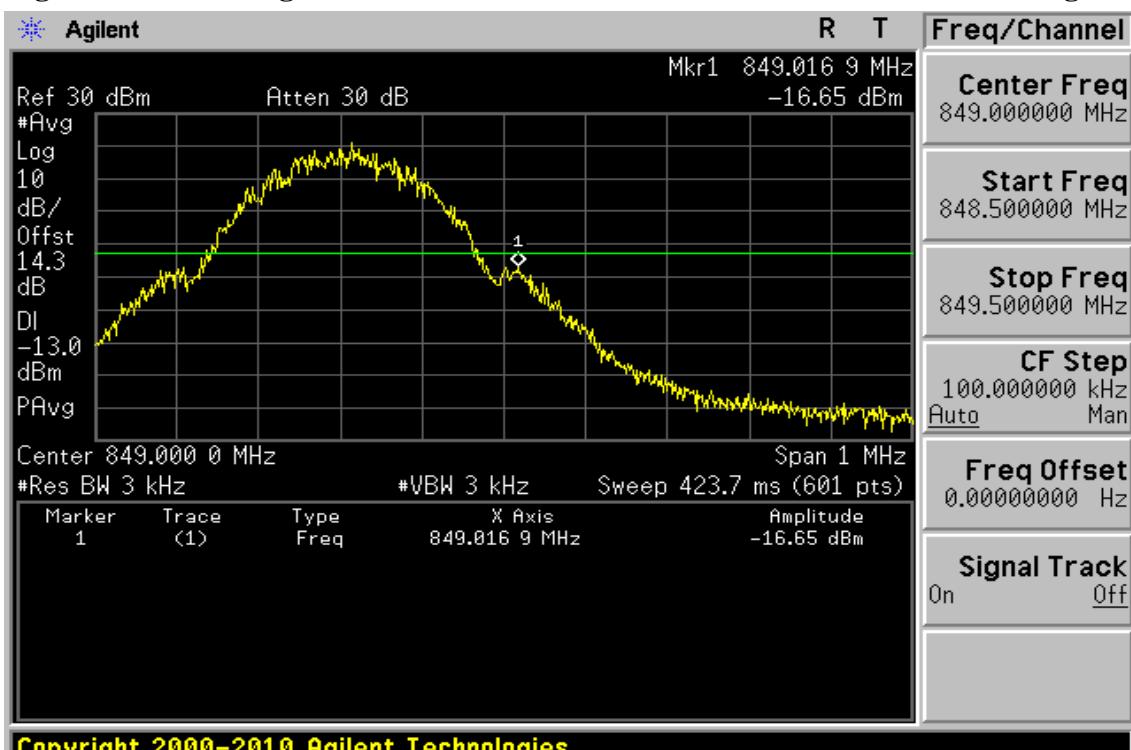
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Figure 9-4: Band edge emission at antenna terminals – GPRS 850 Channel Lowest



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



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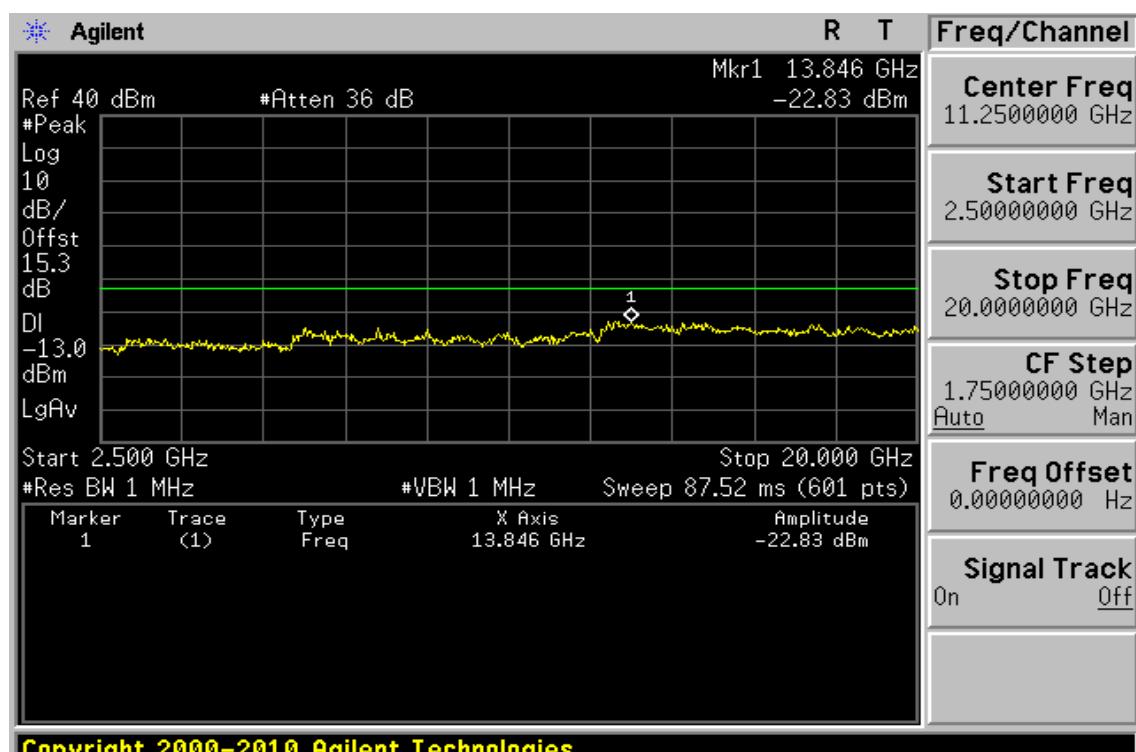
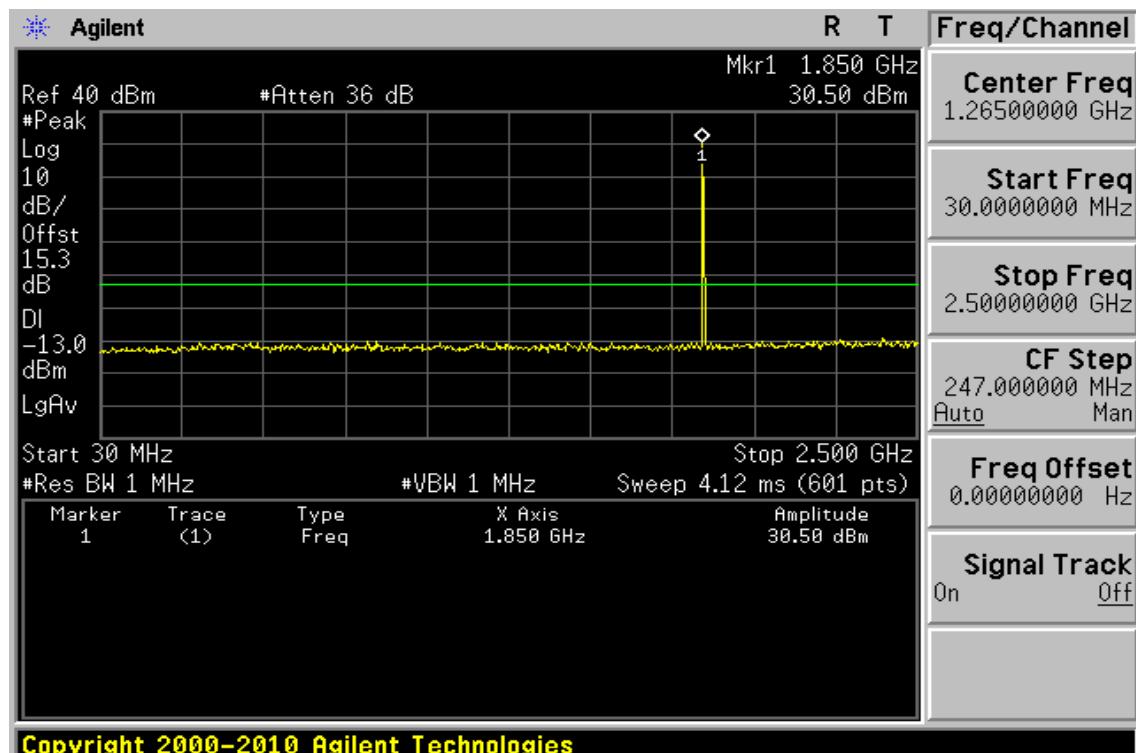
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Figure 9-6: Out of Band emission at antenna terminals – GPRS 1900 Channel Lowest

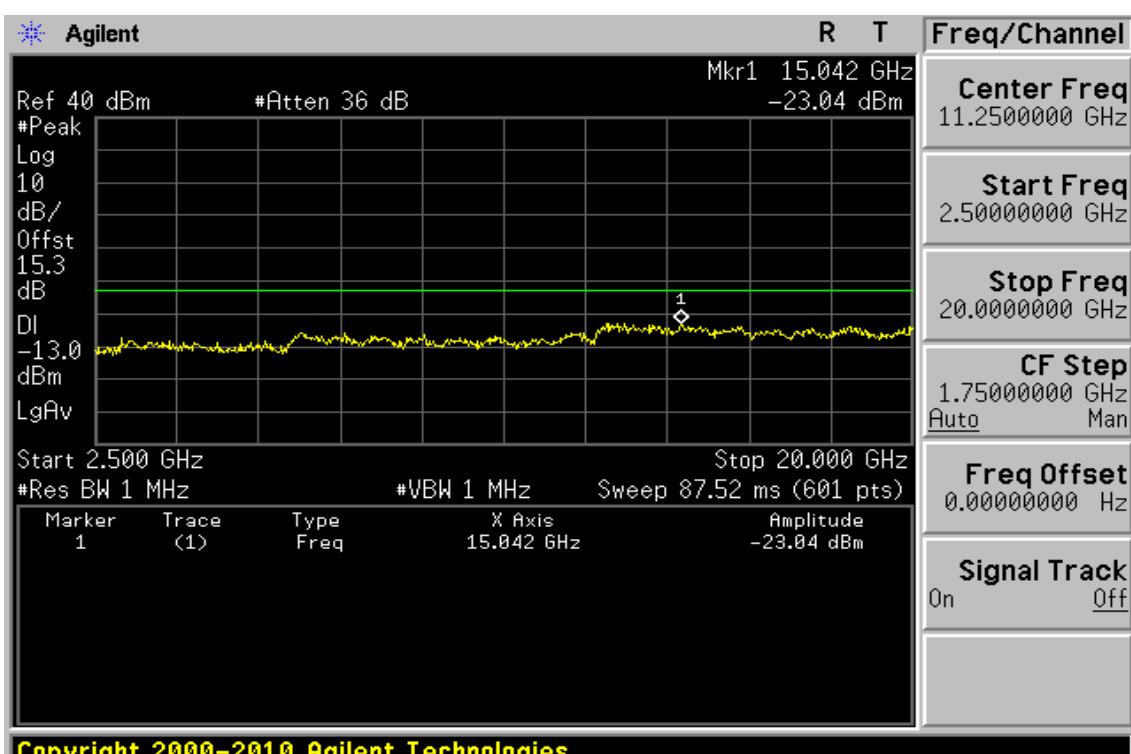
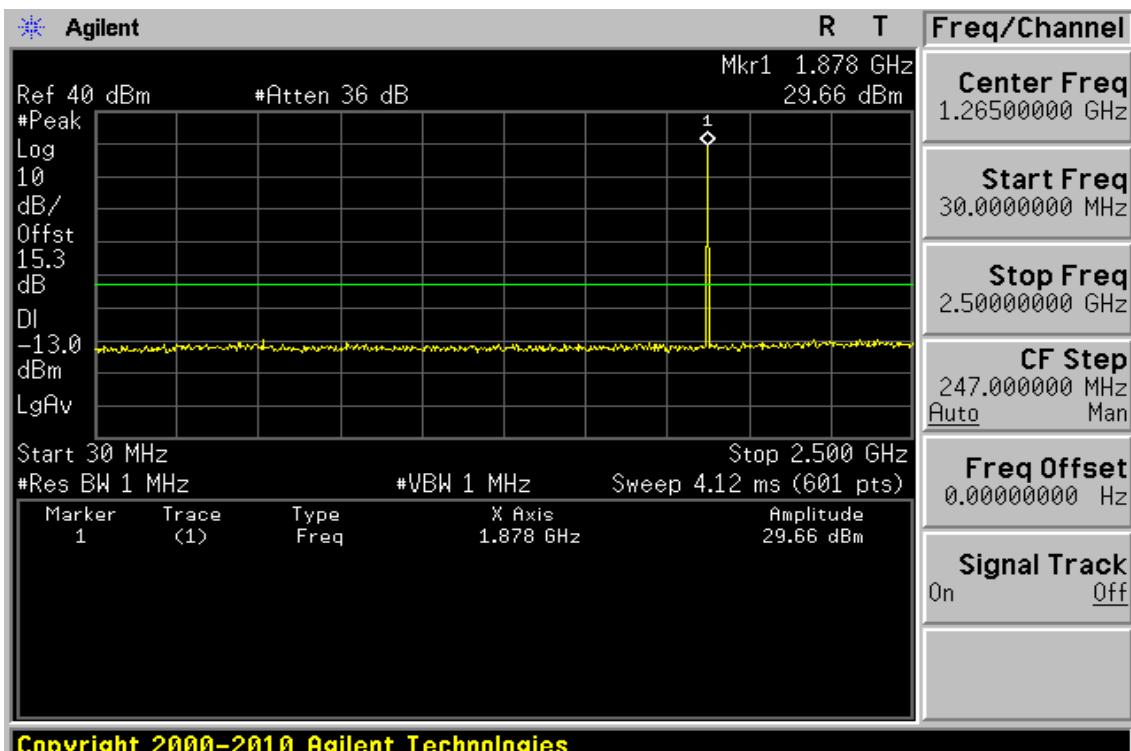


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Figure 9-7: Out of Band emission at antenna terminals – GPRS 1900 Channel Mid

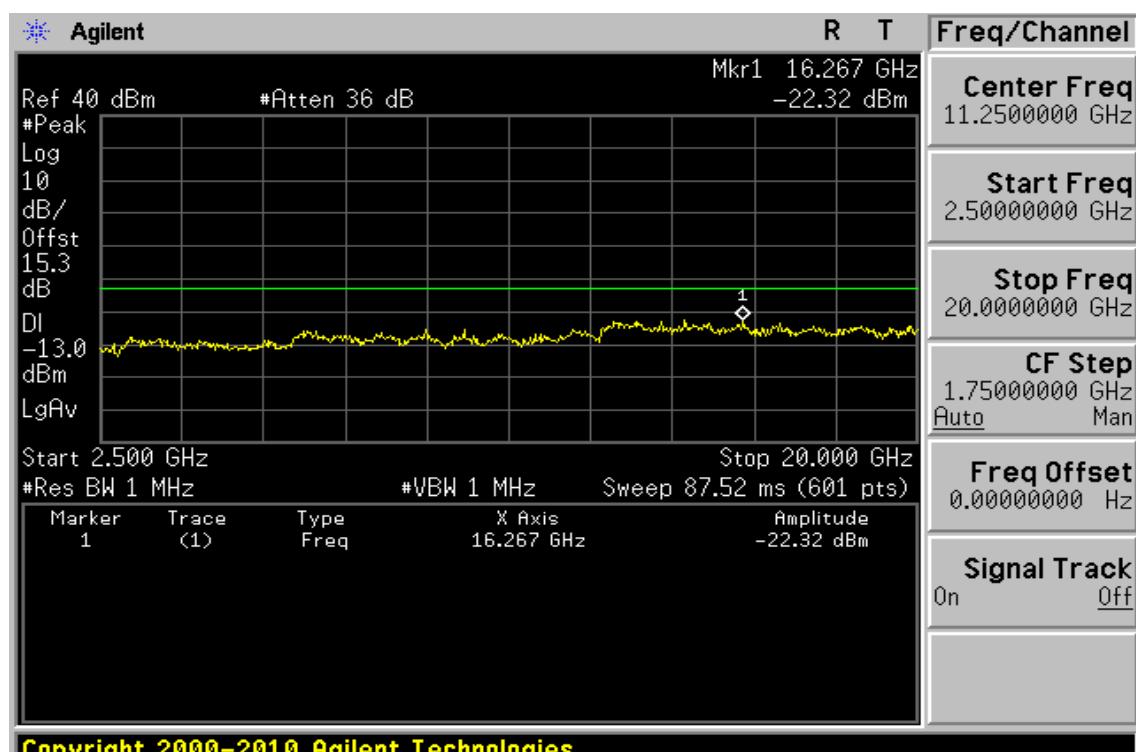
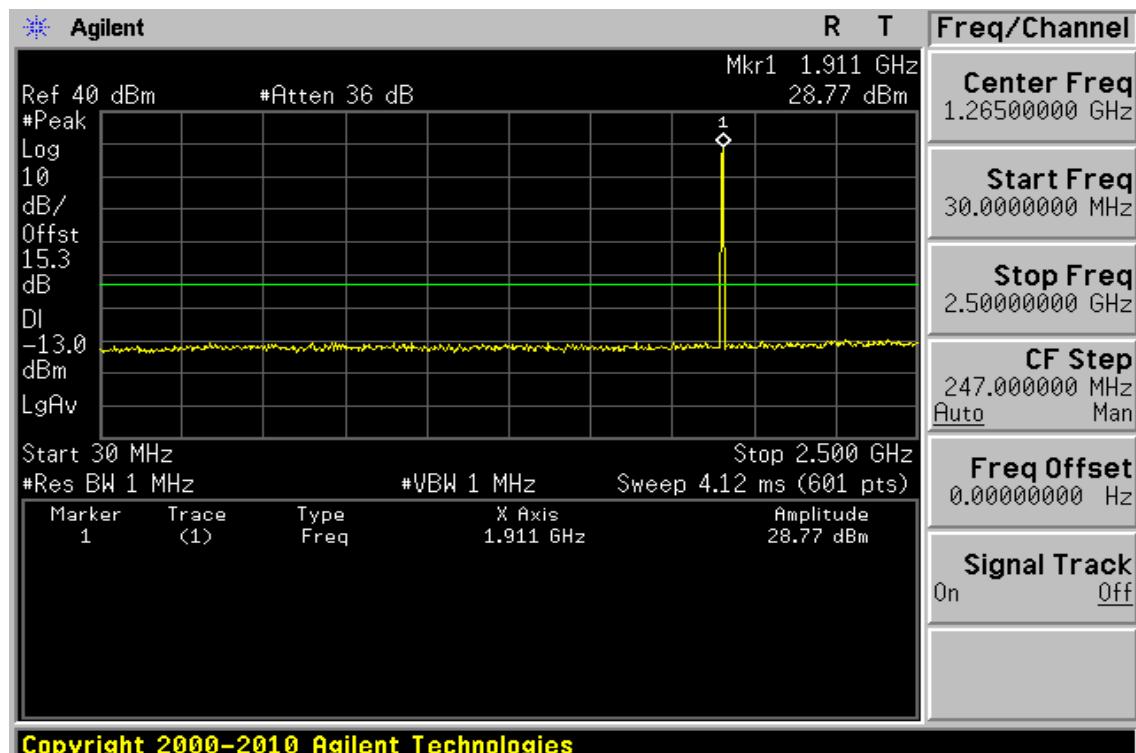


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Figure 9-8: Out of Band emission at antenna terminals – GPRS 1900 Channel Highest



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Figure 9-9: Bad edge emission at antenna terminals – GPRS 1900 Channel Lowest

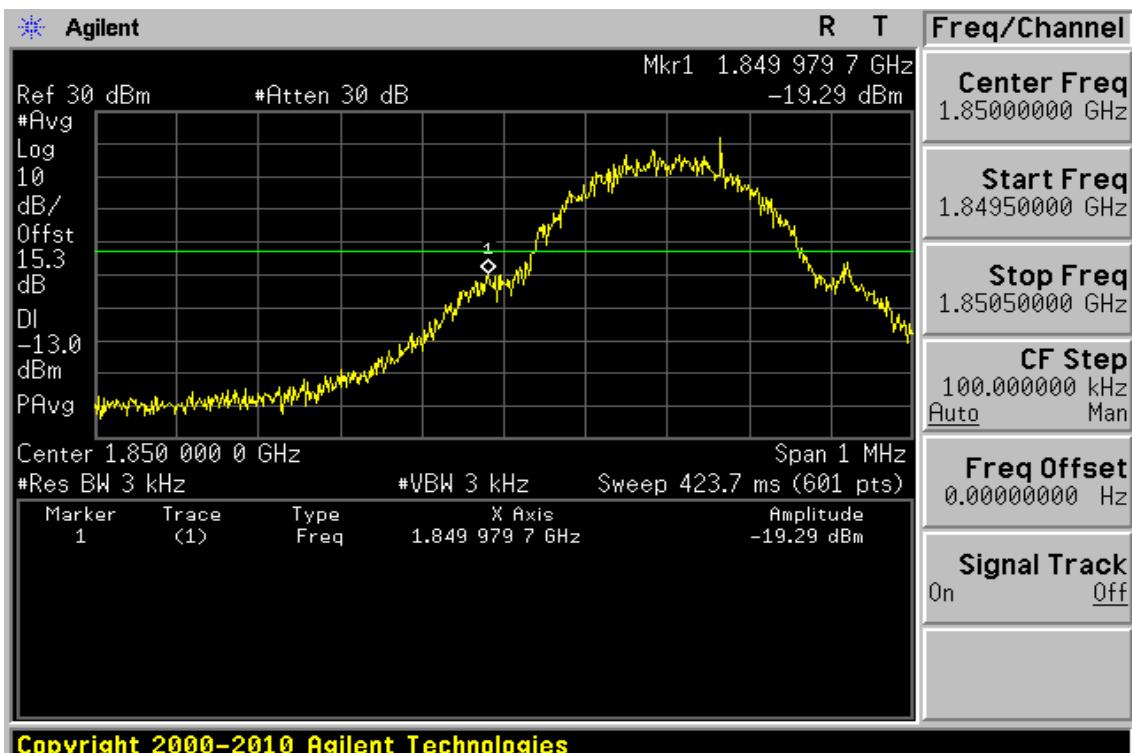
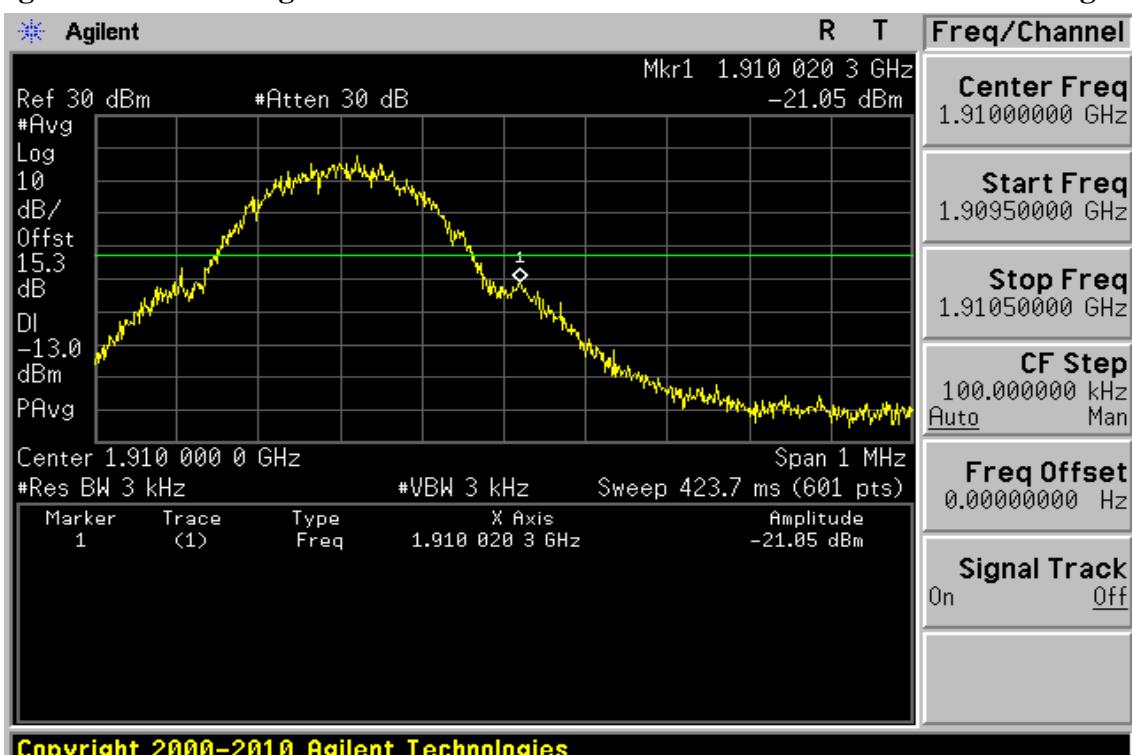


Figure 9-10: Band edge emission at antenna terminals – GPRS 1900 Channel Highest



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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)

According to RSS-132 §4.5

4.5.1 Out-of-block Emissions

Mobile and base station equipment with emission bandwidth less than or equal to 4 MHz shall comply with 4.5.1.1. Mobile station equipment with emission bandwidth greater than 4 MHz shall comply with 4.5.1.2. Base station equipment with emission bandwidth greater than 4 MHz shall comply with either 4.5.1.2 or 4.5.1.3.

4.5.1.1 In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log (P)$, dB, in any 100 kHz bandwidth.

4.5.1.2 In the first 1.0 MHz band immediately outside and adjacent to the licensee's frequency block, the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$, dB. After the first 1.0 MHz, the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log (P)$, dB, in any 1 MHz bandwidth

According to RSS-133 §6.5

6.5.1 Out-of-Block Emissions

a. Mobile stations must comply with subsection i. below.

In the first 1.0MHz band immediately outside and adjacent to the licensee's frequency block. the power of emissions per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in watts) by at least $43 + 10 \log (P)$ dB.

b. After the first 1.0 MHz (for equipment that complies with a.i. of this subsection) or 1.5 MHz (for equipment that complies with all of this subsection), the power of emissions shall be attenuated below the transmitter output power by at least $43 + 10 \log (P)$, dB, per any MHz of bandwidth.

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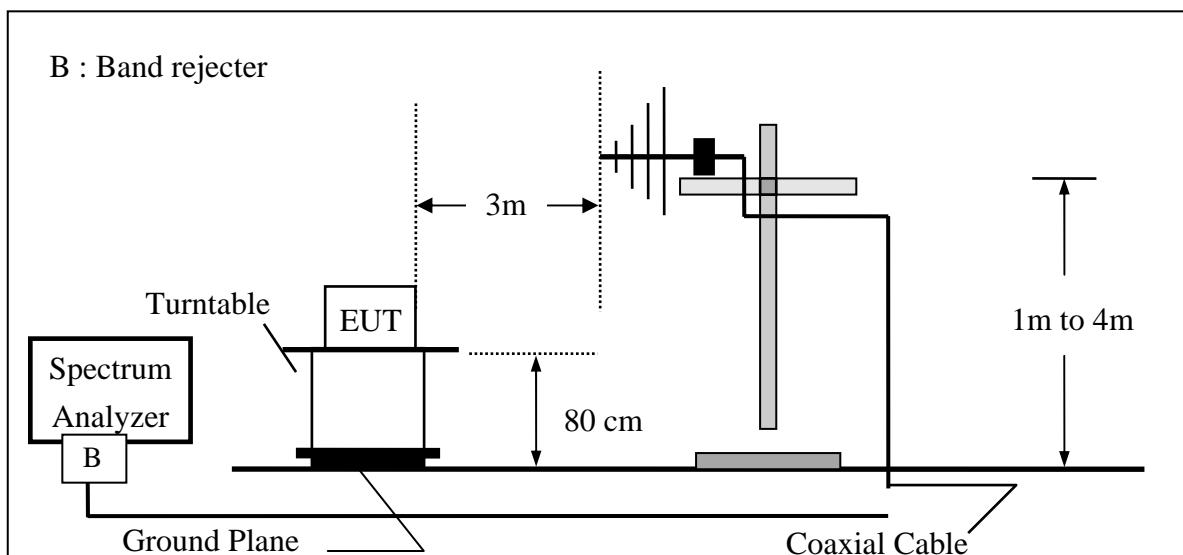
(Note: If the test result using 1% of the emission bandwidth is used, then power integration over 1.0 MHz is required; alternatively, the spectrum analyzer resolution and video bandwidths can be increased to 1.0 MHz for this measurement).

6.5.2 Out-of-Sub-band Emissions

Outside the sub-bands 1850-1910 MHz and 1930-1990 MHz, the attenuation shall be equal to or greater than the out-of-block emission limits in Section 6.5.1.

10.2. EUT Setup (Block Diagram of Configuration):

Radiated Emission Test Set-Up, Frequency Below 1000MHz



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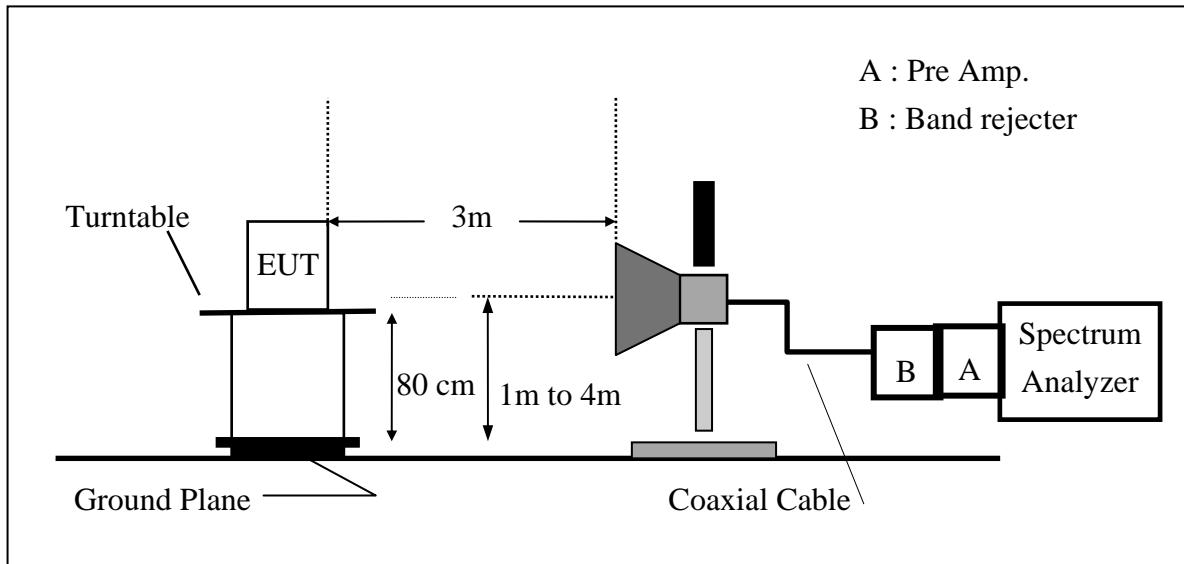
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Radiated Emission Test Set-UP Frequency Over 1 GHz

**10.3. Measurement Procedure:**

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

The frequency range up to tenth harmonic was investigated for each of three fundamental 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.

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

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

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 : GPRS 850 Mode

Operation Band :GPRS 850 Test Date :2012-04-19
ARFCN :CH 128 Temp./Humi. :23.6 deg_C / 67 RH
Fundamental Frequency :824.2 MHz Engineer :Nick
Operation Mode :TX LOW
EUT Pol. :E2 plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna	Cable	Limit	Safe
			Output Level dBm	Gain dBd	Loss dB	dBm	Margin dB
106.63	S	-76.97	-73.21	-1.04	-2.72	-13.00	-63.97
132.82	S	-75.54	-71.86	-0.89	-2.79	-13.00	-62.54
248.25	S	-69.21	-70.51	4.52	-3.23	-13.00	-56.21
341.37	S	-81.86	-83.15	4.73	-3.44	-13.00	-68.86
615.88	S	-75.55	-75.64	4.06	-3.97	-13.00	-62.55
720.64	S	-73.47	-73.37	3.89	-3.98	-13.00	-60.47
1648.40	H	-22.33	-19.71	2.39	-5.36	-13.00	-9.33
2472.60	H	-34.32	-31.80	3.14	-6.15	-13.00	-21.32
3296.80	H	-46.68	-44.80	4.70	-6.83	-13.00	-33.68
4121.00	H	-47.18	-45.65	6.89	-8.55	-13.00	-34.18
4945.20	H	---					
5769.40	H	---					
6593.60	H	---					
7417.80	H	---					
8242.00	H	---					

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

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 :GPRS 850 Test Date :2012-04-19
ARFCN :CH 128 Temp./Humi. :23.6 deg_C / 67 RH
Fundamental Frequency :824.2 MHz Engineer :Nick
Operation Mode :TX LOW
EUT Pol. :E2 plan Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG		Antenna Gain dBd	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
106.63	S	-85.54	-81.78	-1.04	-2.72	-13.00	-72.54	
131.85	S	-76.38	-72.76	-0.83	-2.79	-13.00	-63.38	
245.34	S	-70.52	-71.77	4.48	-3.23	-13.00	-57.52	
288.02	S	-73.91	-75.21	4.52	-3.22	-13.00	-60.91	
331.67	S	-75.52	-76.74	4.67	-3.44	-13.00	-62.52	
720.64	S	-70.59	-70.49	3.89	-3.98	-13.00	-57.59	
1648.40	H	-23.45	-21.11	2.68	-5.36	-13.00	-10.45	
2472.60	H	-43.31	-41.17	3.52	-6.15	-13.00	-30.31	
3296.80	H	-50.81	-48.90	4.68	-6.83	-13.00	-37.81	
4121.00	H	---						
4945.20	H	---						
5769.40	H	---						
6593.60	H	---						
7417.80	H	---						
8242.00	H	---						

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

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 :GPRS 850 Test Date :2012-04-19
ARFCN :CH 190 Temp./Humi. :23.6 deg_C / 67 RH
Fundamental Frequency :836.6 MHz Engineer :Nick
Operation Mode :TX MID
EUT Pol. :E2 plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG		Antenna Gain dBd	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
72.68	S	-85.57	-78.25	-4.72	-2.59	-13.00	-72.57	
106.63	S	-77.21	-73.45	-1.04	-2.72	-13.00	-64.21	
132.82	S	-75.65	-71.97	-0.89	-2.79	-13.00	-62.65	
244.37	S	-67.79	-69.02	4.46	-3.23	-13.00	-54.79	
288.02	S	-75.17	-76.47	4.52	-3.22	-13.00	-62.17	
628.49	S	-74.09	-74.20	4.08	-3.97	-13.00	-61.09	
1673.20	H	-26.81	-24.12	2.33	-5.34	-13.00	-13.81	
2509.80	H	-33.12	-30.68	3.19	-6.13	-13.00	-20.12	
3346.40	H	-47.09	-45.42	4.84	-6.79	-13.00	-34.09	
4183.00	H	-49.53	-48.18	6.93	-8.48	-13.00	-36.53	
5019.60	H	---						
5856.20	H	---						
6692.80	H	---						
7529.40	H	---						
8366.00	H	---						

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

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 :GPRS 850 Test Date :2012-04-19
ARFCN :CH 190 Temp./Humi. :23.6 deg_C / 67 RH
Fundamental Frequency :836.6 MHz Engineer :Nick
Operation Mode :TX MID
EUT Pol. :E2 plan Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG		Antenna Gain dBd	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
131.85	S	-76.06	-72.44	-0.83	-2.79	-13.00	-63.06	
174.53	S	-79.26	-77.91	1.59	-2.93	-13.00	-66.26	
245.34	S	-70.83	-72.08	4.48	-3.23	-13.00	-57.83	
331.67	S	-74.87	-76.09	4.67	-3.44	-13.00	-61.87	
628.49	S	-75.78	-75.88	4.08	-3.97	-13.00	-62.78	
732.28	S	-71.72	-71.32	3.74	-4.14	-13.00	-58.72	
1673.20	H	-26.02	-23.67	2.66	-5.34	-13.00	-13.02	
2509.80	H	-39.81	-37.74	3.55	-6.13	-13.00	-26.81	
3346.40	H	-46.83	-45.13	4.81	-6.79	-13.00	-33.83	
4183.00	H	---						
5019.60	H	---						
5856.20	H	---						
6692.80	H	---						
7529.40	H	---						
8366.00	H	---						

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

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 :GPRS 850 Test Date :2012-04-19
ARFCN :CH 251 Temp./Humi. :23.6 deg_C / 67 RH
Fundamental Frequency :848.8 MHz Engineer :Nick
Operation Mode :TX HIGH
EUT Pol. :E2 plan Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG	Antenna Gain dBd	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm				
107.60	S	-76.57	-72.80	-1.05	-2.72	-13.00	-63.57
133.79	S	-75.57	-71.82	-0.95	-2.79	-13.00	-62.57
248.25	S	-69.01	-70.31	4.52	-3.23	-13.00	-56.01
588.72	S	-75.25	-75.50	4.15	-3.90	-13.00	-62.25
641.10	S	-71.69	-71.81	4.10	-3.98	-13.00	-58.69
692.51	S	-75.03	-75.11	4.15	-4.07	-13.00	-62.03
1697.60	H	-28.29	-25.50	2.29	-5.40	-13.00	-15.29
2546.40	H	-35.43	-32.81	3.30	-6.24	-13.00	-22.43
3395.20	H	-49.55	-48.02	4.98	-6.85	-13.00	-36.55
4244.00	H	-52.88	-51.56	6.41	-7.84	-13.00	-39.88
5092.80	H	---					
5941.60	H	---					
6790.40	H	---					
7639.20	H	---					
8488.00	H	---					

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

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 :GPRS 850
ARFCN :CH 251
Fundamental Frequency :848.8 MHz
Operation Mode :TX HIGH
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	ERP dBm	SG		Antenna Gain dBd	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
131.85	S	-76.24	-72.62	-0.83	-2.79	-13.00	-63.24	
244.37	S	-70.12	-71.35	4.46	-3.23	-13.00	-57.12	
288.02	S	-71.72	-73.02	4.52	-3.22	-13.00	-58.72	
338.46	S	-75.79	-77.06	4.71	-3.44	-13.00	-62.79	
641.10	S	-76.54	-76.66	4.10	-3.98	-13.00	-63.54	
744.89	S	-70.92	-70.28	3.59	-4.23	-13.00	-57.92	
1697.60	H	-28.77	-26.35	2.65	-5.40	-13.00	-15.77	
2546.40	H	-39.66	-37.40	3.66	-6.24	-13.00	-26.66	
3395.20	H	-49.10	-47.50	4.92	-6.85	-13.00	-36.10	
4244.00	H	---						
5092.80	H	---						
5941.60	H	---						
6790.40	H	---						
7639.20	H	---						
8488.00	H	---						

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

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 :GPRS 1900
ARFCN :CH 512
Fundamental Frequency :1850.2 MHz
Operation Mode :TX LOW
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
107.60	S	-80.67	-79.05	1.10	-2.72	-13.00	-67.67	
154.16	S	-77.63	-75.97	1.27	-2.93	-13.00	-64.63	
244.37	S	-69.41	-72.79	6.61	-3.23	-13.00	-56.41	
330.70	S	-79.30	-82.67	6.81	-3.44	-13.00	-66.30	
528.58	S	-78.10	-81.12	6.79	-3.77	-13.00	-65.10	
630.43	S	-75.54	-77.80	6.24	-3.97	-13.00	-62.54	
3700.40	H	-38.93	-39.67	7.40	-6.98	-13.00	-25.93	
5550.60	H	-34.16	-35.00	8.99	-8.37	-13.00	-21.16	
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 :GPRS 1900
ARFCN :CH 512
Fundamental Frequency :1850.2 MHz
Operation Mode :TX LOW
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
105.66	S	-84.58	-82.98	1.11	-2.72	-13.00	-71.58	
130.88	S	-77.59	-76.18	1.38	-2.79	-13.00	-64.59	
244.37	S	-70.08	-73.46	6.61	-3.23	-13.00	-57.08	
288.02	S	-72.36	-75.81	6.67	-3.22	-13.00	-59.36	
331.67	S	-72.23	-75.61	6.82	-3.44	-13.00	-59.23	
623.64	S	-78.88	-81.13	6.22	-3.97	-13.00	-65.88	
3700.40	H	-48.18	-48.43	6.92	-6.98	-13.00	-35.18	
5550.60	H	-44.61	-44.73	8.27	-8.37	-13.00	-31.61	
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 :GPRS 1900
ARFCN :CH 661
Fundamental Frequency :1880 MHz
Operation Mode :TX MID
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
106.63	S	-77.09	-75.48	1.11	-2.72	-13.00	-64.09	
132.82	S	-75.90	-74.37	1.26	-2.79	-13.00	-62.90	
244.37	S	-69.05	-72.44	6.61	-3.23	-13.00	-56.05	
288.02	S	-73.57	-77.02	6.67	-3.22	-13.00	-60.57	
331.67	S	-78.85	-82.23	6.82	-3.44	-13.00	-65.85	
601.33	S	-75.80	-78.06	6.18	-3.92	-13.00	-62.80	
3760.00	H	-41.78	-42.23	7.42	-7.12	-13.00	-28.78	
5640.00	H	-36.81	-37.81	9.01	-8.26	-13.00	-23.81	
7520.00	H	---						
9400.00	H	---						
11280.00	H	---						
13160.00	H	---						
15040.00	H	---						
16920.00	H	---						
18800.00	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 :GPRS 1900
ARFCN :CH 661
Fundamental Frequency :1880 MHz
Operation Mode :TX MID
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
106.63	S	-84.60	-82.99	1.11	-2.72	-13.00	-71.60	
130.88	S	-76.74	-75.34	1.38	-2.79	-13.00	-63.74	
174.53	S	-79.02	-79.82	3.74	-2.93	-13.00	-66.02	
244.37	S	-70.33	-73.72	6.61	-3.23	-13.00	-57.33	
288.02	S	-69.67	-73.13	6.67	-3.22	-13.00	-56.67	
349.13	S	-71.89	-75.40	6.93	-3.43	-13.00	-58.89	
3760.00	H	-51.55	-51.44	6.85	-7.12	-13.00	-38.55	
5640.00	H	-46.52	-46.82	8.30	-8.26	-13.00	-33.52	
7520.00	H	---						
9400.00	H	---						
11280.00	H	---						
13160.00	H	---						
15040.00	H	---						
16920.00	H	---						
18800.00	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 :GPRS 1900
ARFCN :CH 810
Fundamental Frequency :1909.8 MHz
Operation Mode :TX HIGH
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :VERTICAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
70.74	S	-85.74	-79.81	-3.34	-2.59	-13.00	-72.74	
106.63	S	-77.91	-76.30	1.11	-2.72	-13.00	-64.91	
132.82	S	-75.92	-74.39	1.26	-2.79	-13.00	-62.92	
154.16	S	-77.57	-75.90	1.27	-2.93	-13.00	-64.57	
244.37	S	-68.17	-71.55	6.61	-3.23	-13.00	-55.17	
331.67	S	-78.54	-81.91	6.82	-3.44	-13.00	-65.54	
3819.60	H	-44.44	-45.07	7.51	-7.20	-13.00	-31.44	
5729.40	H	-41.50	-42.28	9.03	-8.44	-13.00	-28.50	
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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Operation Band :GPRS 1900
ARFCN :CH 810
Fundamental Frequency :1909.8 MHz
Operation Mode :TX HIGH
EUT Pol. :E2 plan
Test Date :2012-04-19
Temp./Humi. :23.6 deg_C / 67 RH
Engineer :Nick
Measurement Antenna Pol. :HORIZONTAL

Freq. MHz	Note F/H/E/S	EIRP dBm	SG		Antenna Gain dBi	Cable Loss dB	Limit dBm	Safe Margin dB
			Output Level dBm	SG Output Level dBm				
106.63	S	-84.18	-82.57	1.11	-2.72	-13.00	-71.18	
131.85	S	-74.81	-73.34	1.32	-2.79	-13.00	-61.81	
244.37	S	-67.12	-70.50	6.61	-3.23	-13.00	-54.12	
288.02	S	-71.63	-75.08	6.67	-3.22	-13.00	-58.63	
331.67	S	-72.33	-75.71	6.82	-3.44	-13.00	-59.33	
599.39	S	-78.69	-80.96	6.19	-3.92	-13.00	-65.69	
3819.60	H	-48.59	-48.76	7.05	-7.20	-13.00	-35.59	
5729.40	H	-45.56	-45.63	8.32	-8.44	-13.00	-32.56	
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

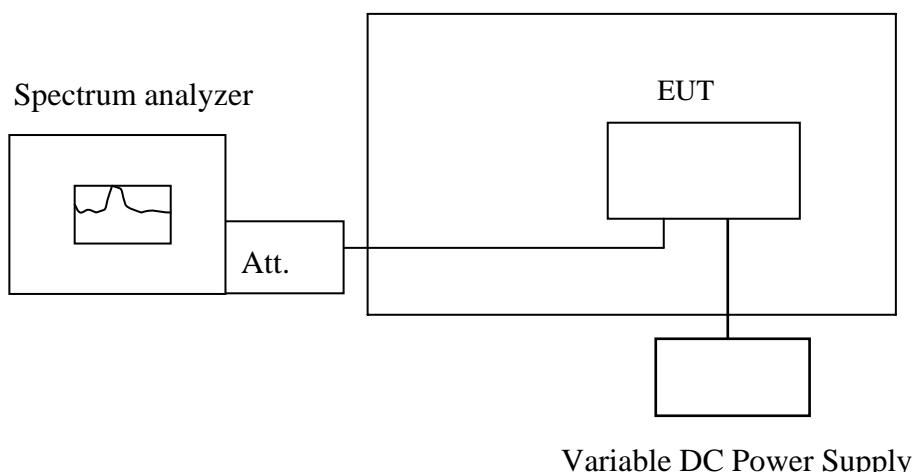
+/-2.5ppm for 1900MHz band

According to RSS-133 §6.3, RSS-132 §4.3

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations

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 25oC operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30oC. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10oC increased per stage until the highest temperature of +50oC reached.

11.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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11.5. Measurement Result:

Reference Frequency: GPRS 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
12	-30	836.599945	25.00	2091
12	-20	836.599949	21.00	2091
12	-10	836.599951	19.00	2091
12	0	836.599948	22.00	2091
12	10	836.599955	15.00	2091
12	20	836.599968	2.00	2091
12	30	836.599970	0.00	2091
12	40	836.599967	3.00	2091
12	50	836.599966	4.00	2091

Reference Frequency: GPRS 1900Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
12	-30	1879.999977	-8.00	4700
12	-20	1879.999979	-10.00	4700
12	-10	1879.999974	-5.00	4700
12	0	1879.999975	-6.00	4700
12	10	1879.999976	-7.00	4700
12	20	1879.999970	-1.00	4700
12	30	1879.999969	0.00	4700
12	40	1879.999972	-3.00	4700
12	50	1879.999971	-2.00	4700

Note: The battery is rated 12V dc.

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12. FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

12.1. Standard Applicable:

According to FCC §2.1055(a) (1)

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

+/-2.5ppm for 1900MHz band

According to RSS-133 §6.3, RSS-132 §4.3

The carrier frequency shall not depart from the reference frequency in excess of ± 2.5 ppm for mobile stations.

12.2. Test Set-up:

Refer to section 10.2 in this report

12.3. 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 (+/- 15%) and endpoint, record the maximum frequency change.

12.4. Measurement Equipment Used:

Refer to section 2.4 in this report

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12.5. Measurement Result:

Reference Frequency: GPRS Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm = 2091 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
30.0	25.00	836.599965	2.00	2091.00
12.0	25.00	836.599967	0.00	2091.00
10.0	25.00	836.599972	-5.00	2091.00
6 (End Point)	25.00	836.599963	4.00	2091.00

Reference Frequency: GPRS 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm = 4700 Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
30.0	25	1879.999965	4.00	4700
12.0	25	1879.999969	0.00	4700
10.0	25	1879.999971	-2.00	4700
6 (End Point)	25	1879.999966	3.00	4700

Note: The battery is rated 12V dc.

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13. Maximum Permissible Exposure (MPE)

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

This submittal(s) (test report) is intended to comply with Section Part 22, subpart H and Part 24, subpart E of the FCC CFR 47 Rules. And RSS-102 issue 4 For 47 CFR 1.1310 Radio frequency Radiation Exposure requirement.

13.2. Special Accessories

Not available for this EUT intended for grant.

13.3. Equipment Modifications

Not available for this EUT intended for grant.

13.4. Limitation

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-15000	/	/	1.0	30

F = frequency in MHz

* = Plane-wave equipment power density

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Averaging Time (minutes)
0.003-1	280	2.19	-	6
1-10	280/f	2.19/f	-	6
10-30	28	2.19/f	-	6
30-300	28	0.073	2*	6
300-1500	1.585 f ^{0.5}	0.0042 f ^{0.5}	f/150	6
1500-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/f ^{1.2}

Note: f is frequency in MHz.

* Power density limit is applicable at frequencies greater than 100 MHz.

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13.5. Maximum Permissible Exposure (MPE) Evaluation

In this application we seek approval to the BD-100. Based on the FCC OET Bulletin 65 Supplement C and 47 CFR §2.1091, we have concluded that the MC55i module will comply with the FCC rules on RF exposure for mobile devices in cellular band and PCS band. The following analysis will demonstrate such compliance. The analysis will be done in two US bands.

Operation in cellular band (824 – 849 MHz)

The ERP of BD-100 in cellular band is 21.28dBm max at GPRS/GPRS mode. The resulted power density at a distance of 20 cm can be deducted as follows:

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
GPRS 850	E2	824.2	128	V	16.26	3.96	-4.22	16.00	38.45
				H	21.54	3.96	-4.22	21.28	38.45
		836.6	190	V	15.08	4.00	-4.24	14.84	38.45
				H	19.82	4.00	-4.24	19.58	38.45
		848.8	251	V	13.66	4.03	-4.33	13.36	38.45
				H	18.86	4.03	-4.33	18.56	38.45

$$\text{ERP} = 21.28 \text{ dBm} = 134.27 \text{ mW}$$

$$\text{Power Density} = \text{ERP} * \text{Duty Cycle} / (4 \pi R^2)$$
$$= 134.27 * 0.25 / (4 * \pi * 20^2) = 0.0066 \text{ mW/cm}^2$$

where Duty Cycle is 0.25 for GPRS operation (class 12) and R is 20 cm.

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

$$\text{MPE limit} = 824 / 1500 = 0.55 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore BD-100 in cellular band is compliant with the FCC rules on RF exposure.

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Operation in PCS band (1850 – 1910 MHz)

The EIRP of BD-100 in PCS band is 26.19 dBm. max. The resulted EIRP can be expressed as follows:

EUT				Measurement					
Operation Band	Pol.	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
GPRS 1900	E2	1850.2	512	V/H	dBm	dBd	dB	dBm	dBm
				V	25.81	4.17	-5.49	24.50	33.00
				H	27.17	4.51	-5.49	26.19	33.00
		1880.0	661	V	23.54	4.13	-5.56	22.11	33.00
				H	25.41	4.44	-5.56	24.29	33.00
		1909.8	810	V	23.95	4.09	-5.56	22.49	33.00
				H	24.77	4.36	-5.56	23.58	33.00

$$\text{EIRP} = 26.19 \text{ dBm} = 415.91 \text{ mW}$$

$$\text{Power Density} = \text{EIRP} * \text{Duty Cycle} / (4 \pi R^2)$$

$$= 415.91 * 0.25 / (4 * \pi * 20^2) = 0.0206 \text{ mW/cm}^2$$

where Duty Cycle is 0.25 for GPRS operation (class 12) and R is 20 cm.

The MPE limit for General Population/Uncontrolled Exposure is shown in the FCC OET Bulletin 65 Supplement C and can be calculated as follows:

$$\text{MPE limit} = 1.0 \text{ mW/cm}^2$$

As we can see the resulted power density is below the MPE limit, therefore BD-100 in PCS band is compliant with the FCC rules on RF exposure.

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