FCC 47 CFR PART 22 SUBPART H AND PART 24 SUBPART E

TEST REPORT

For

Cradle

Model: 8400 GPRS Cradle

Trade Name: CIPHERLAB

Issued to

Cipherlab Co., Ltd.
12F, 333 Dunhua S. Rd., Sec.2, Taipei, Taiwan R.O.C.

Issued by

Compliance Certification Services Inc.
No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,
Taipei Hsien 248, Taiwan (R.O.C.)
http://www.ccsemc.com.tw
service@ccsrf.com

Testing Laboratory
1309

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION

Applicant: Cipherlab Co., Ltd.
12F, 333 Dunhua S. Rd., Sec.2, Taipei, Taiwan R.O.C.

Equipment Under Test: Cradle

Trade Name: CIPHERLAB

Model Number: 8400 GPRS Cradle

Date of Test: August 22 ~ 26, 2009

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 22 Subpart H & Part 24 Subpart E	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in TIA/EIA-603-C: 2004 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rule FCC PART 22 Subpart H and PART 24 Subpart E.

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

Approved by:

Rex Lai
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Gina Lo
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	Cradle
Trade Name	CIPHERLAB
Model Number	8400 GPRS Cradle
Model Discrepancy	N/A
Module Trade Name	SIEMENS
Module Model Number	MC75i
Power Supply	Model Number: STD-05030V I/P: 100-240VAC, 47 - 63Hz, 0.48A MAX O/P: 5VDC, 3A, 15W MAX
Frequency Range	TX: 824 ~ 849 MHz / 1850 ~ 1910 MHz RX: 869 ~ 894 MHz / 1930 ~ 1990 MHz
Transmit Power (ERP & EIRP Power)	GPRS 850: 11.40 dBm GPRS 1900: 7.27 dBm EGPRS 850: 11.62 dBm EGPRS 1900: 22.35 dBm
Frequency Range	GPRS / EDGE: 850: 824 ~ 849 MHz GPRS / EDGE: 1900: 1850 ~ 1910 MHz
Modulation Technique	GPRS: GMSK EDGE: 8PSK
Type of Emission	GPRS 850MHz: 248KGXW--- GPRS 1900MHz: 247KG7W--- EPRS 850MHz: 250KGXW--- EPRS 1900MHz: 250KG7W---
Antenna Gain	Gain: 3 dBi
Antenna Type	Dipole Antenna

Remark:

1. *The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.*
2. *This submittal(s) (test report) is intended for FCC ID: **Q3N-8400GC** filing to comply with Part 22 and Part 24 of the FCC 47 CFR Rules.*

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures document on chapter 13 of ANSI C63.4: 2003, TIA/EIA-603-C: 2004 and FCC CFR 47, Part 2, PART 22 SUBPART H AND PART 24 SUBPART E

3.1EUT CONFIGURATION

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

3.2EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

3.3GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2003.

3.4DESCRIPTION OF TEST MODES

The EUT (model: 8400 GPRS Cradle) had been tested under operating condition.

EUT staying in continuous transmitting mode was programmed.

GPRS / EGPRS 850:

Channel Low (CH128), Channel Mid (CH190) and Channel High (CH251) were chosen for full testing.

GPRS / EGPRS 1900:

Channel Low (CH512), Channel Mid (CH661) and Channel High (CH810) were chosen for full testing.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

4. INSTRUMENT CALIBRATION

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

4.2MEASUREMENT EQUIPMENT USED

Equipment Used for Emissions Measurement

Remark: *Each piece of equipment is scheduled for calibration once a year.*

Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	MY43360131	02/23/2010
Power Meter	Agilent	E4416A	GB41291611	04/05/2010
Power Sensor	Agilent	E9327A	US40441097	06/18/2010
Temp. / Humidity Chamber	Terchy	MHG-150LF	930619	08/05/2010
DC Power Source	Agilent	E3640A	MY40001774	01/09/2010

3M Semi Anechoic Chamber				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	E4446A	US42510252	09/10/2009
Test Receiver	Rohde & Schwarz	ESCI	100064	11/30/2009
Switch Controller	TRC	Switch Controller	SC94050010	05/02/2010
4 Port Switch	TRC	4 Port Switch	SC94050020	05/02/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	06/18/2010
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/27/2010
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: IC 2324G-1/-2	10/17/2010 11/04/2010
Reject Filter	Micro-Tronics	HPM13194	003	04/23/2010
S.G.	HP	83630B	3844A01022	04/16/2010
Substituted Dipole	Schwazbeck	VHAP/UHAP	998 +999/ 981+982	06/08/2010
Substituted Horn	EMCO	3115	00022257	12/16/2009
Test S/W	LABVIEW (V 6.1)			

Powerline Conducted Emissions Test Site				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	11/18/2009
Two-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/10/2010
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W	LABVIEW (V 6.1)			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/- 2.81
3M Semi Anechoic Chamber / 30MHz ~ 1GHz	+/-3.7046
3M Semi Anechoic Chamber / Above 1GHz	+/-3.0958

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

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

5.3TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada IC 2324G-1 IC 2324G-2

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

6. SETUP OF EQUIPMENT UNDER TEST

6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	Notebook PC	DELL	PP05L	7T390 A03	E2K5HCKT	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
2.	Scanner	CIPHERLAB	8400	N/A	Q3N-8400	N/A	N/A
3.	SIM Card	R&S	N/A	N/A	N/A	N/A	N/A
4.	Universal Radio Communication Tester (Remote)	R&S	CMU200	1100.000.8.02	N/A	N/A	Unshielded, 1.8m

Remark:

1. *All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
2. *Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*

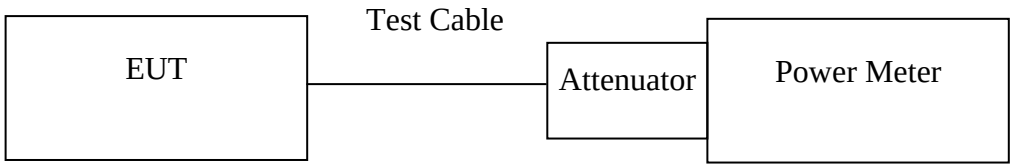
7. FCC PART 22 & 24 REQUIREMENTS

7.1PEAK POWER

LIMIT

According to FCC §2.1046.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST 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.

TEST RESULTS

No non-compliance noted.

Test Data

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
GPRS 850 (Class 12)	128	824.20	32.14	1.63682
	190	836.60	31.89	1.54525
	251	848.80	31.91	1.55239
EDGE 850 (Class 12)	128	824.20	26.52	0.44875
	190	836.60	26.19	0.41591
	251	848.80	26.03	0.40087

Test Mode	CH	Frequency (MHz)	Peak Power (dBm)	Output Power W
GPRS 1900 (Class 12)	512	1850.20	28.70	0.74131
	661	1880.00	28.51	0.70958
	810	1910.00	28.53	0.71285
EDGE 1900 (Class 12)	512	1850.20	24.91	0.30974
	661	1880.00	24.78	0.30061
	810	1910.00	24.76	0.29923

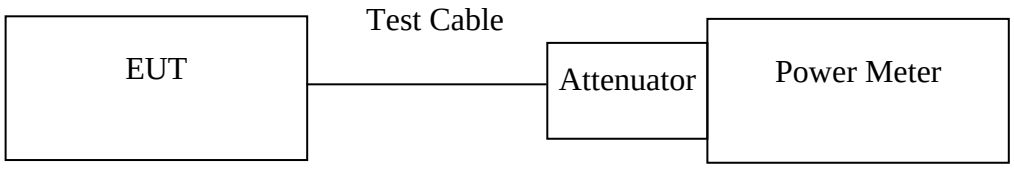
Remark: *The value of factor includes both the loss of cable and external attenuator*

7.2AVERAGE POWER

LIMIT

For reporting purposes only.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST 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.

TEST RESULTS

No non-compliance noted.

TEST RESULTS

No non-compliance noted.

Test Data

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GPRS 850 (Class 12)	128	824.20	32.03	1.59588
	190	836.60	31.72	1.48594
	251	848.80	31.52	1.41906
EGPRS 850 (Class 12)	128	824.20	26.38	0.43451
	190	836.60	26.10	0.40738
	251	848.80	25.91	0.38994

Remark: *The value of factor includes both the loss of cable and external attenuator*

Test Mode	CH	Frequency (MHz)	AVG Power (dBm)	Output Power W
GPRS 1900 (Class 12)	512	1850.20	28.55	0.71614
	661	1880.00	28.42	0.69502
	810	1910.00	28.41	0.69343
EGPRS 1900 (Class 12)	512	1850.20	24.79	0.30130
	661	1880.00	24.69	0.29444
	810	1910.00	24.67	0.29309

Remark: *The value of factor includes both the loss of cable and external attenuator*

7.1ERP & EIRP MEASUREMENT

LIMIT

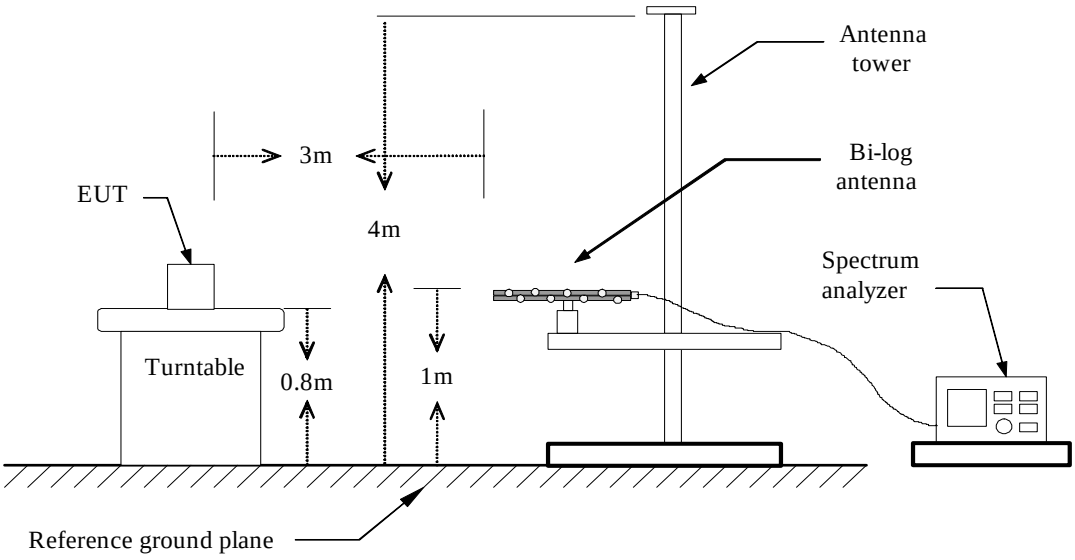
According to FCC §2.1046

FCC 22.913(a): The Effective Radiated Power (ERP) of mobile transmitters must not exceed 7 Watts.

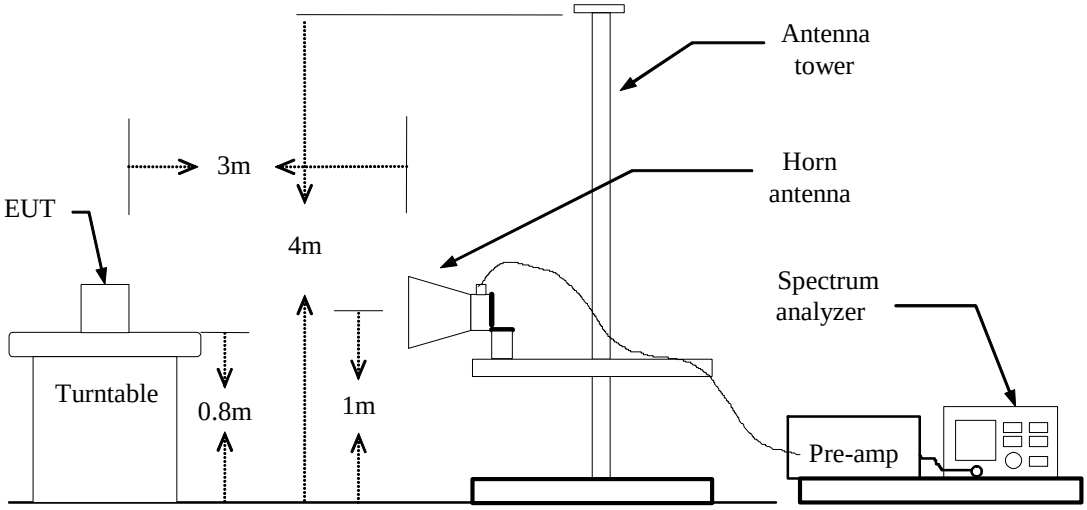
FCC 24.232(b): The equivalent Isotropic Radiated Power (EIRP) must not exceed 2 Watts.

Test Configuration

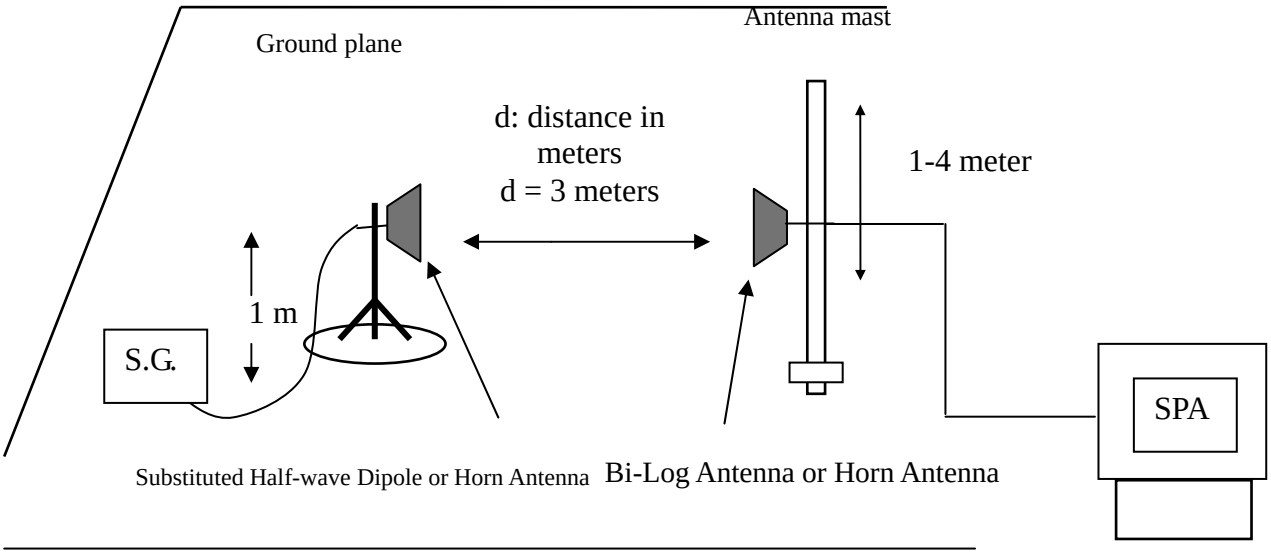
Below 1 GHz



Above 1 GHz



For Substituted Method Test Set-UP



TEST PROCEDURE

The EUT was placed on an 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 of the EUT, the resolution bandwidth was set to 3MHz and the average bandwidth was set to 3MHz. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824-849MHz, and EIRP in frequency band 1851.25 –1910MHz were measured using a substitution method. The EUT was replaced by half-wave dipole (824-849MHz) or horn antenna (1851.25-1910MHz) connected to a signal generator. The spectrum analyzer reading was recorded and ERP/EIRP was calculated as follows:

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

TEST RESULTS

No non-compliance noted.

GPRS 850 TEST DATA (CLASS 12)

Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
128	824.20	V	-24.88	34.62	9.74	38.50	-28.76
	824.20	H	-23.68	34.65	10.97	38.50	-27.53
190	836.60	V	-25.16	34.53	9.37	38.50	-29.13
	836.60	H	-24.30	34.63	10.33	38.50	-28.17
251	848.80	V	-23.24	34.64	***11.40**	38.50	-27.10
	848.80	H	-23.82	34.75	10.93	38.50	-27.57

GPRS 1900 TEST DATA (CLASS 12)

Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
512	1850.20	V	-33.90	41.17	***7.27**	33.00	-25.73
	1850.20	H	-37.84	40.79	2.95	33.00	-30.05
661	1880.00	V	-34.48	41.23	6.76	33.00	-26.24
	1880.00	H	-38.24	41.15	2.90	33.00	-30.10
810	1909.80	V	-34.84	41.30	6.47	33.00	-26.53
	1909.80	H	-39.23	41.38	2.15	33.00	-30.85

EGPRS 850 TEST DATA (CLASS 12)

Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
128	824.20	V	-24.71	34.62	9.90	38.50	-28.60
	824.20	H	-23.36	34.65	11.28	38.50	-27.22
190	836.60	V	-25.06	34.53	9.47	38.50	-29.03
	836.60	H	-24.21	34.63	10.42	38.50	-28.08
251	848.80	V	-23.02	34.64	***11.62**	38.50	-26.88
	848.80	H	-23.69	34.75	11.06	38.50	-27.44

EGPRS 1900 TEST DATA (CLASS 12)

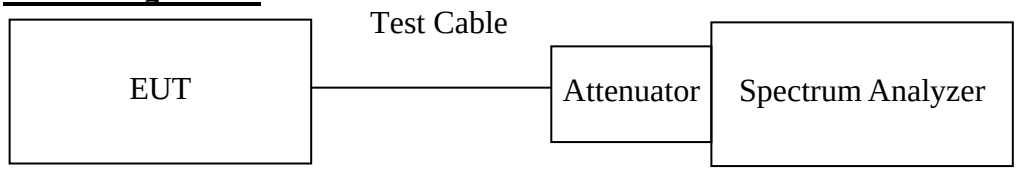
Channel	Frequency (MHz)	Antenna Pol.	Reading level (dBuV)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
512	1850.20	V	-18.99	41.17	22.18	33.00	-10.82
	1850.20	H	-25.01	40.79	15.78	33.00	-17.22
661	1880.00	V	-19.10	41.23	22.13	33.00	-10.87
	1880.00	H	-24.64	41.14	16.51	33.00	-16.49
810	1909.80	V	-18.95	41.30	***22.35**	33.00	-10.65
	1909.80	H	-25.80	41.38	15.57	33.00	-17.43

7.2OCCUPIED BANDWIDTH MEASUREMENT

LIMIT

According to §FCC 2.1049.

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST 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 is set to 3 times the 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.

TEST RESULTS

No non-compliance noted

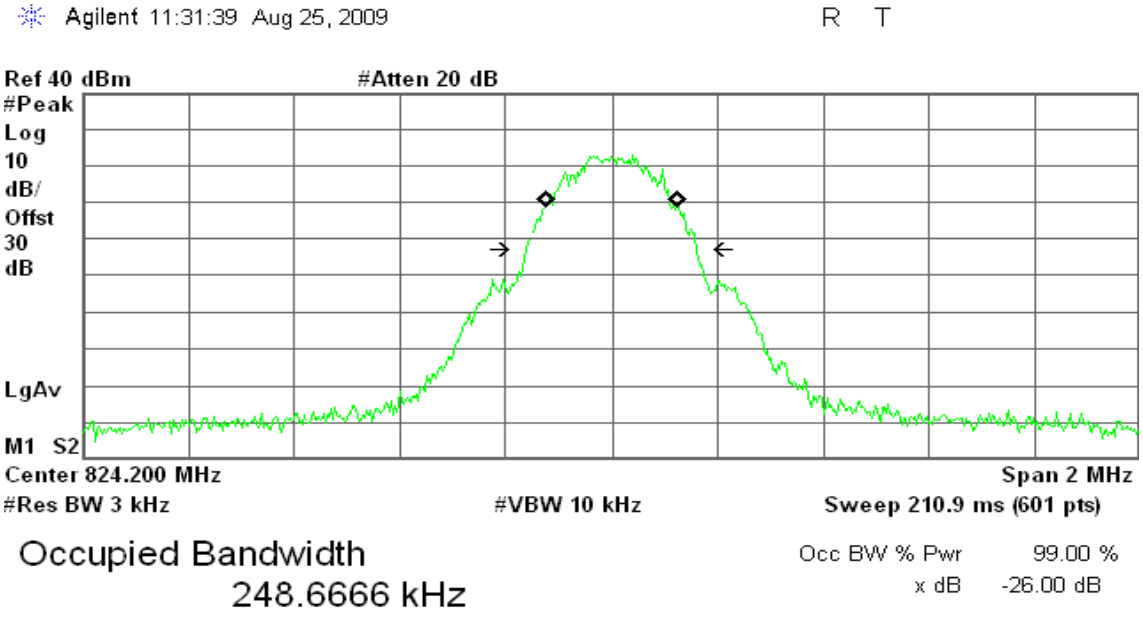
Test Data

Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GPRS 850 (Class 12)	128	824.20	248.6666
	190	836.60	245.2438
	251	848.80	243.5989
EGPRS 850 (Class 12)	128	824.20	245.6930
	190	836.60	245.8050
	251	848.80	250.6307

Test Mode	CH	Frequency (MHz)	99% Bandwidth (kHz)
GPRS 1900 (Class 12)	512	1850.20	246.8057
	661	1880.00	247.8340
	810	1909.80	247.7835
EGPRS 1900 (Class 12)	512	1850.20	250.8875
	661	1880.00	245.7380
	810	1909.80	248.8530

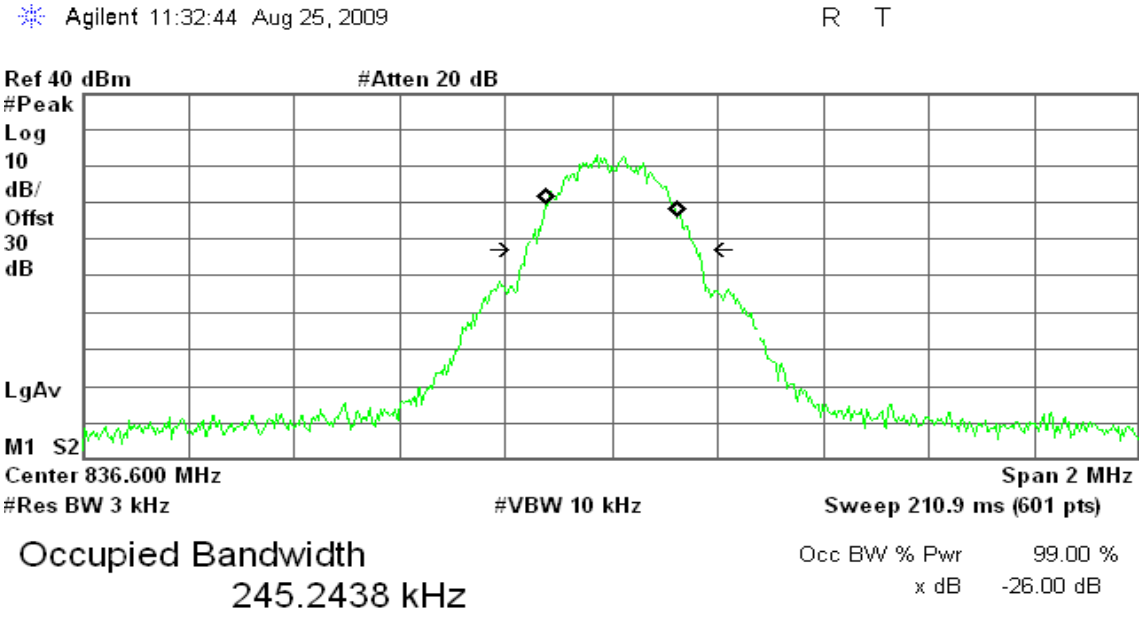
Test Plot

GPRS 850 (CH Low)



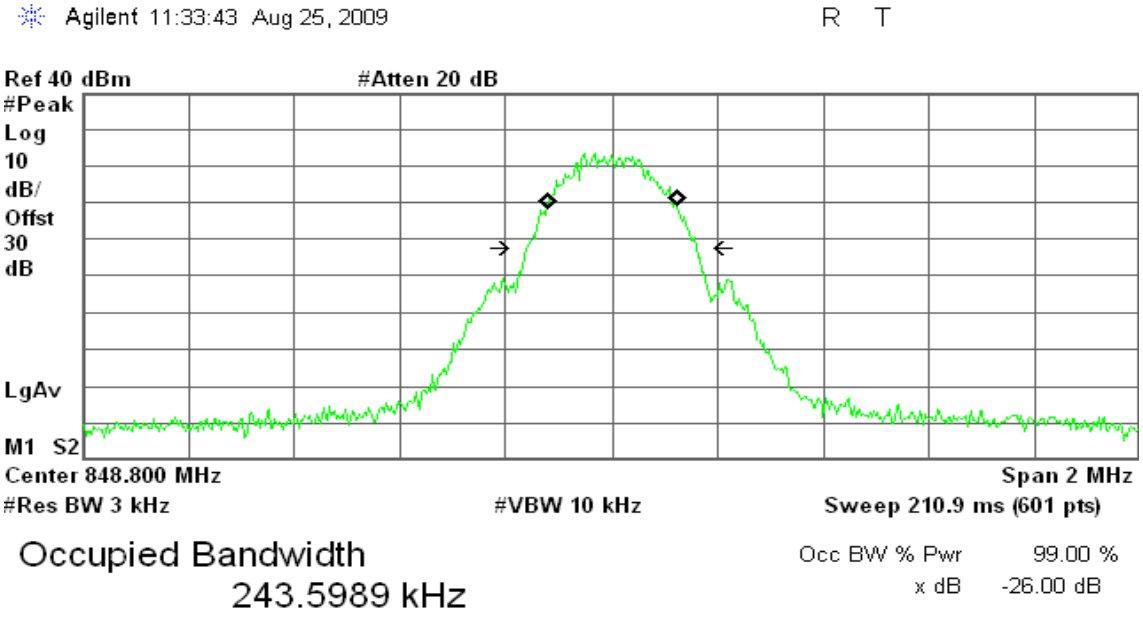
Transmit Freq Error	404.784 Hz
x dB Bandwidth	319.752 kHz

GPRS 850 (CH Mid)



Transmit Freq Error	695.602 Hz
x dB Bandwidth	321.084 kHz

GPRS 850 (CH High)

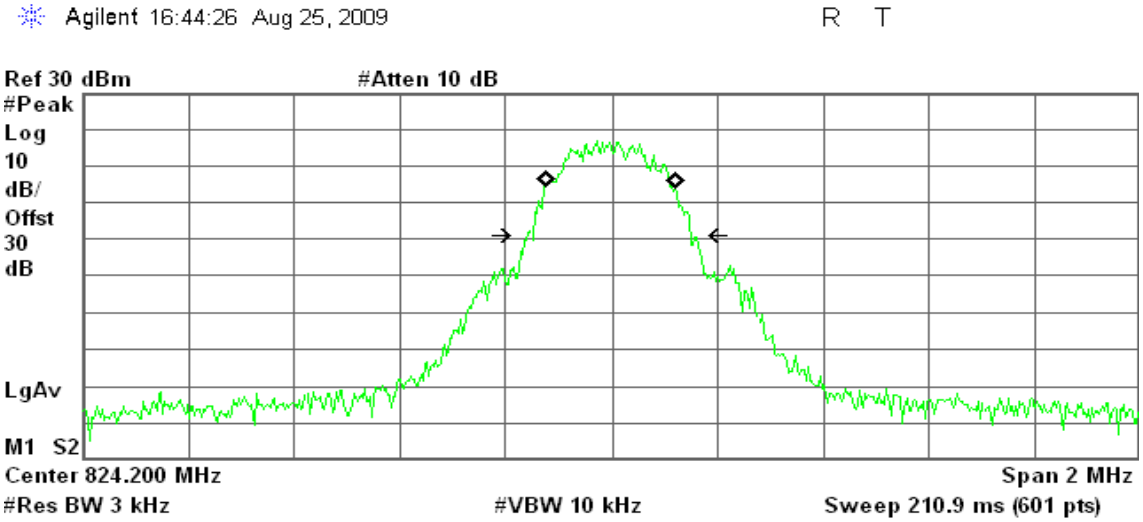


Occupied Bandwidth
243.5989 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error	422.860 Hz
x dB Bandwidth	319.800 kHz

EGPRS 850 (CH Low)

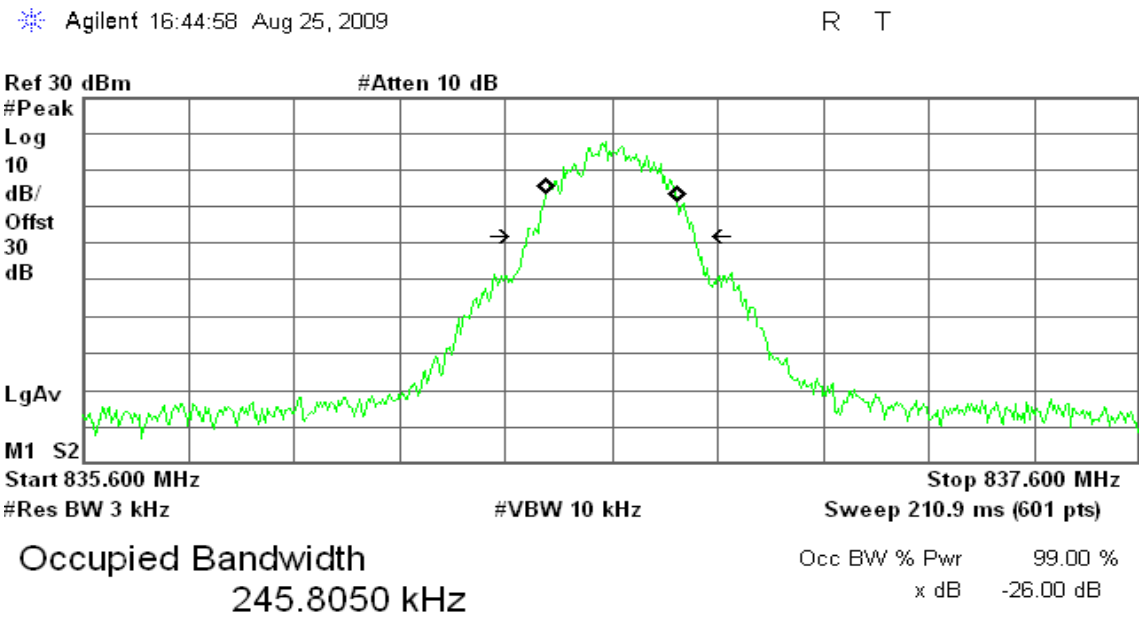


Occupied Bandwidth
245.6930 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

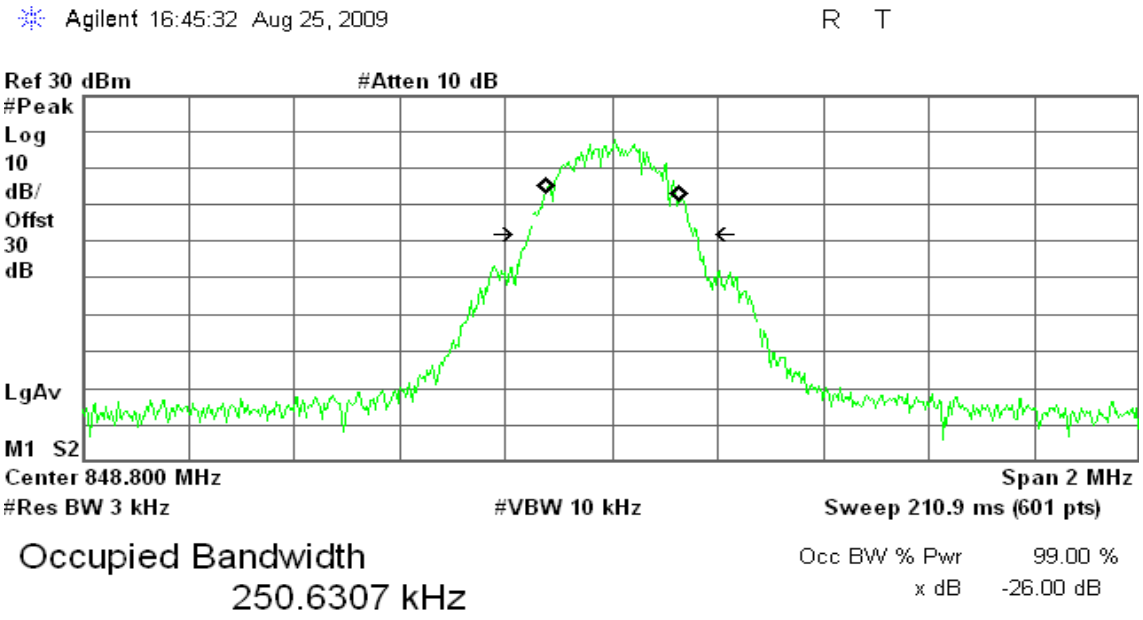
Transmit Freq Error	-1.779 kHz
x dB Bandwidth	306.978 kHz

EGPRS 850 (CH Mid)



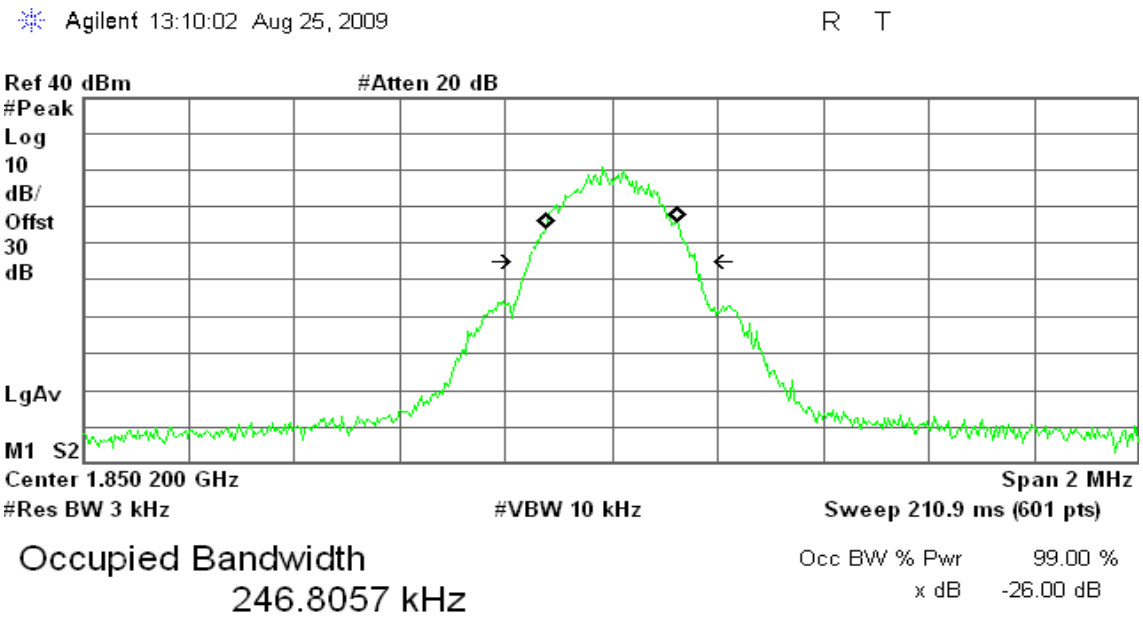
Transmit Freq Error	1.105 kHz
x dB Bandwidth	314.971 kHz

EGPRS 850(CH High)



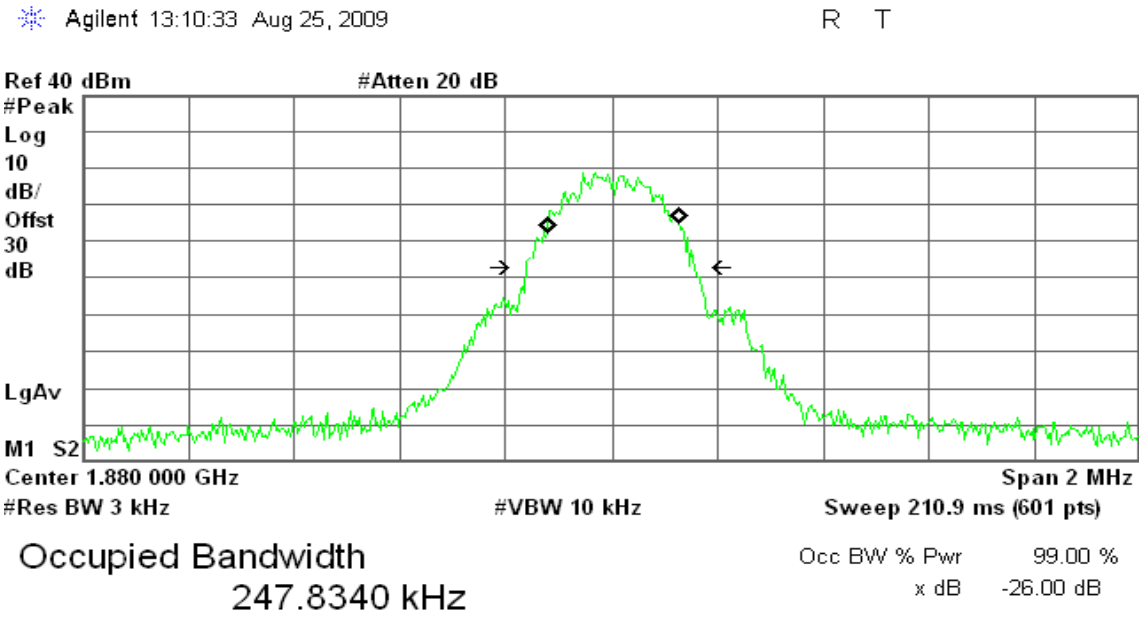
Transmit Freq Error	1.272 kHz
x dB Bandwidth	316.423 kHz

GPRS 1900 (CH Low)



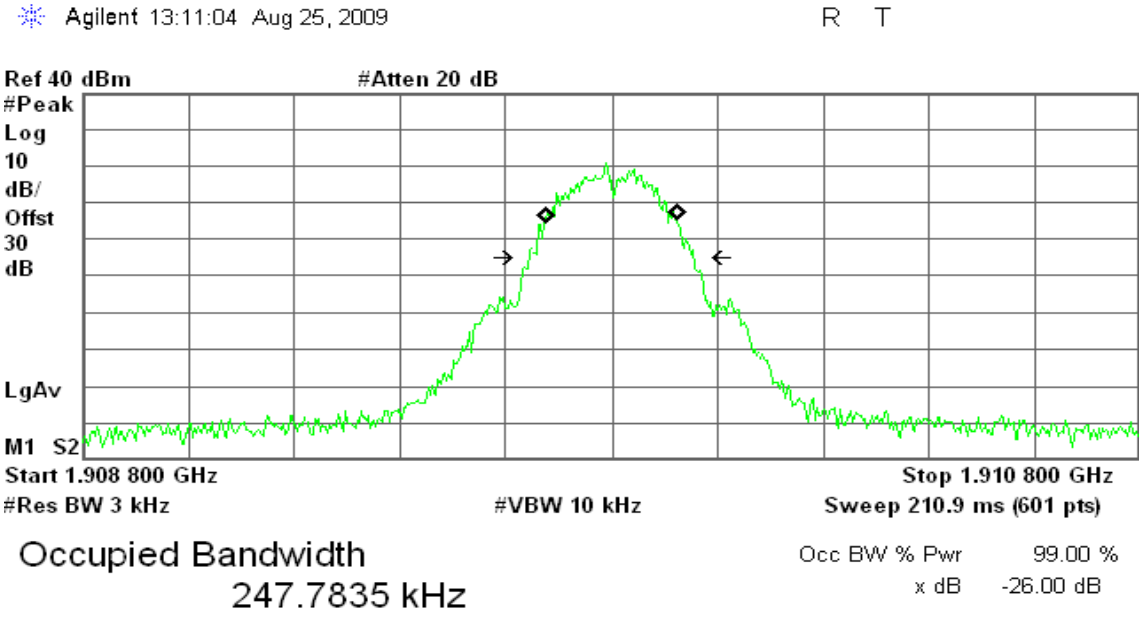
Transmit Freq Error	924.713 Hz
x dB Bandwidth	314.175 kHz

GPRS 1900 (CH Mid)



Transmit Freq Error	3.345 kHz
x dB Bandwidth	317.651 kHz

GPRS 1900 (CH High)

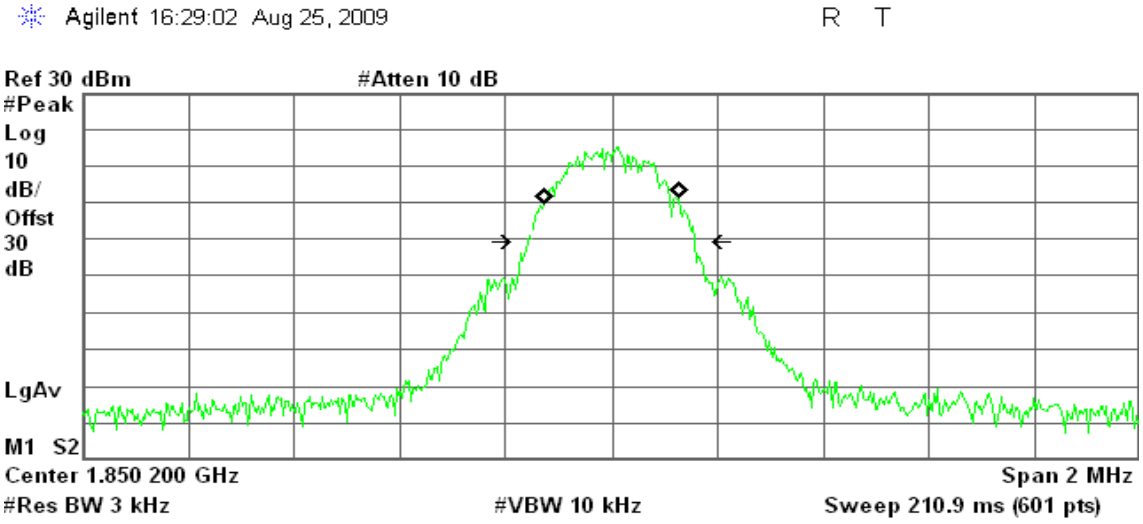


Occupied Bandwidth
247.7835 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -966.445 Hz
x dB Bandwidth 309.826 kHz

EGPRS 1900 (CH Low)

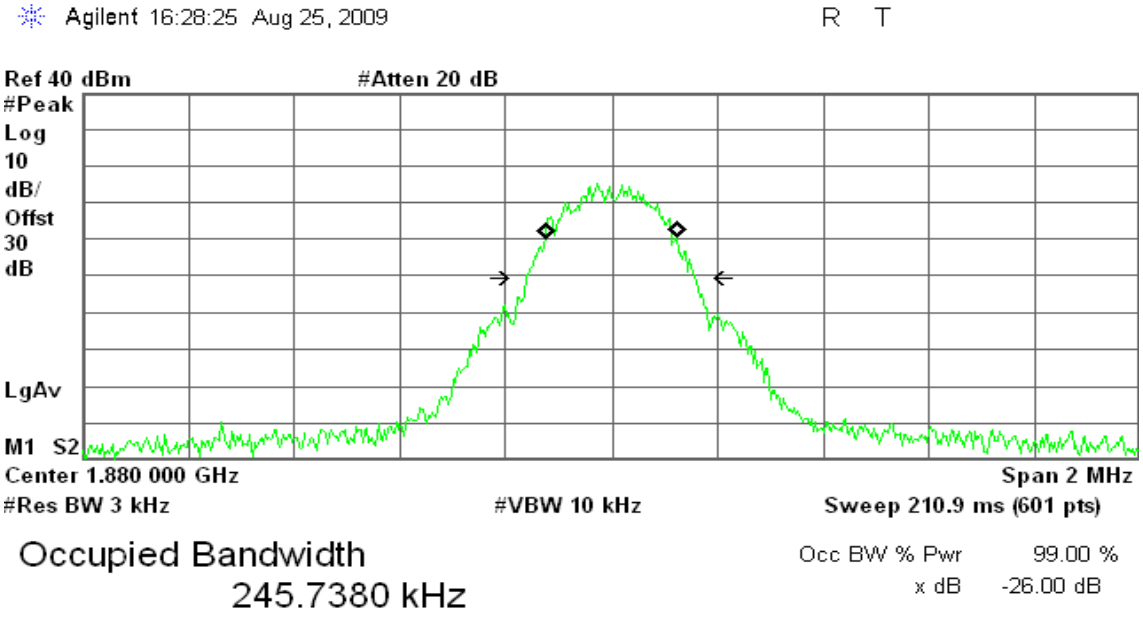


Occupied Bandwidth
250.8875 kHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

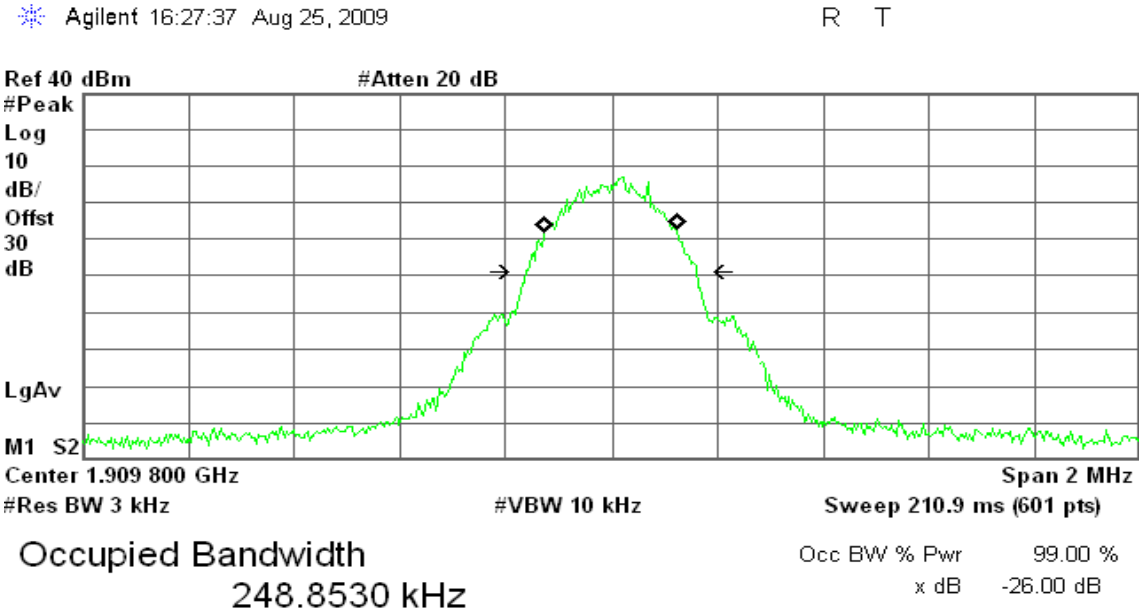
Transmit Freq Error 157.472 Hz
x dB Bandwidth 313.594 kHz

EGPRS 1900 (CH Mid)



Transmit Freq Error	-893.735 Hz
x dB Bandwidth	319.339 kHz

EGPRS 1900 (CH High)



Transmit Freq Error	-745.046 Hz
x dB Bandwidth	322.623 kHz

7.3OUT OF BAND EMISSION AT ANTENNA TERMINALS

LIMIT

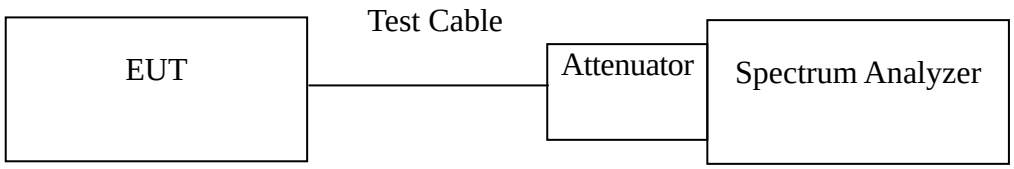
According to FCC §2.1051, FCC §22.917, FCC §24.238(a).

Out of Band Emissions: The mean power of emission must be attenuated below the mean power of the non-modulated carrier (P) on any frequency twice or more than twice the fundamental frequency by at lease 43 + 10 log P dB.

Mobile Emissions in Base Frequency Range: The mean power of any emissions appearing in the base station frequency range from cellular mobile transmitters operated must be attenuated to a level not exceed –80 dBm at the transmit antenna connector.
Band Edge Requirements: In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at lease 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the Out of band Emission

Test Configuration

Out of band emission at antenna terminals:



TEST 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 (824 MHz and 849 MHz /1850MHz and 1910MHz): 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.

TEST RESULTS

No non-compliance noted.

Test Data

Mode	CH	Location	Description
GPRS 850 (Class 12)	128	Figure 7-1	Conducted spurious emissions, 30MHz - 20GHz
	190	Figure 7-2	Conducted spurious emissions, 30MHz - 20GHz
	251	Figure 7-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GPRS 1900 (Class 12)	512	Figure 8-1	Conducted spurious emissions, 30MHz - 20GHz
	661	Figure 8-2	Conducted spurious emissions, 30MHz - 20GHz
	810	Figure 8-3	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
GPRS 850 (Class 12)	128	Figure 9-1	Band Edge emissions
	251	Figure 9-2	Band Edge emissions

Mode	CH	Location	Description
GPRS 1900 (Class 12)	512	Figure 10-1	Band Edge emissions
	810	Figure 10-2	Band Edge emissions

Mode	CH	Location	Description
EDGE 850 (Class 12)	128	Figure 11-1	Conducted spurious emissions, 30MHz - 20GHz
	190	Figure 11-2	Conducted spurious emissions, 30MHz - 20GHz
	251	Figure 11-3	Conducted spurious emissions, 30MHz - 20GHz
EDGE 1900 (Class 12)	512	Figure 11-4	Conducted spurious emissions, 30MHz - 20GHz
	661	Figure 11-5	Conducted spurious emissions, 30MHz - 20GHz
	810	Figure 11-6	Conducted spurious emissions, 30MHz - 20GHz

Mode	CH	Location	Description
EDGE 850 (Class 12)	128	Figure 12-1	Band Edge emissions
	251	Figure 12-2	Band Edge emissions
EDGE 1900 (Class 12)	512	Figure 12-3	Band Edge emissions
	810	Figure 12-4	Band Edge emissions

Test Plot

GPRS 850

Figure 7-1: Out of Band emission at antenna terminals – GPRS CH Low

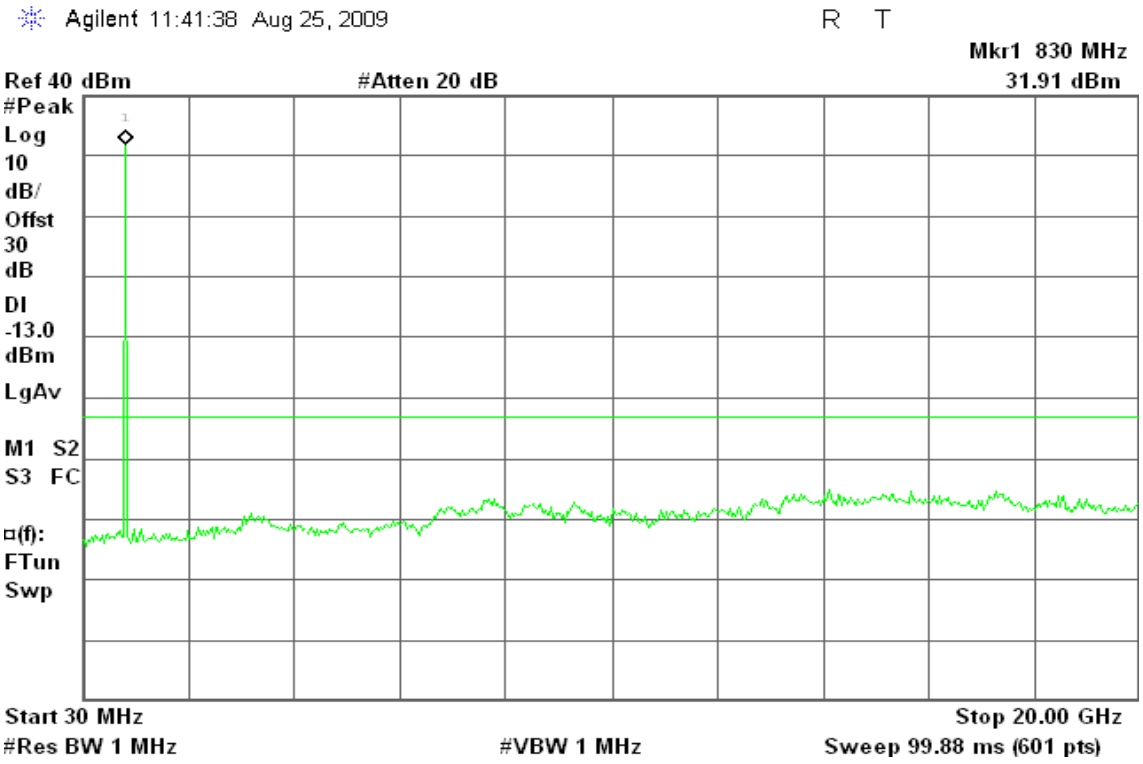


Figure 7-2: Out of Band emission at antenna terminals – GPRS CH Mid

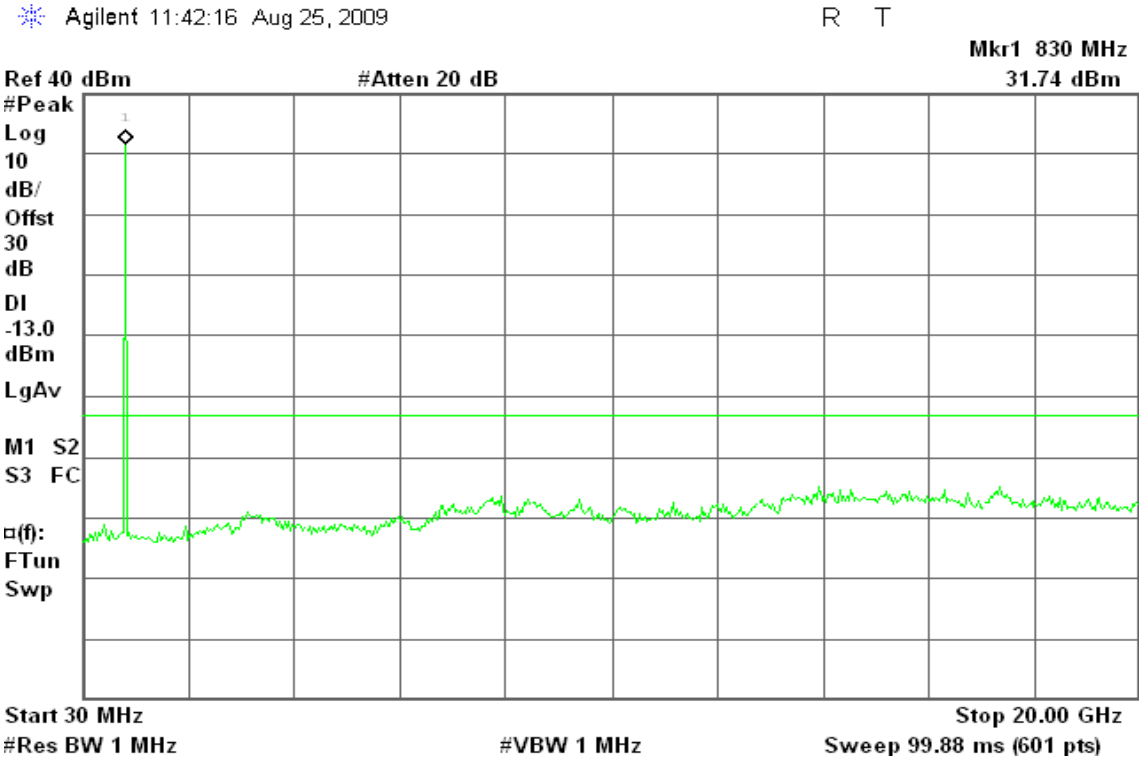
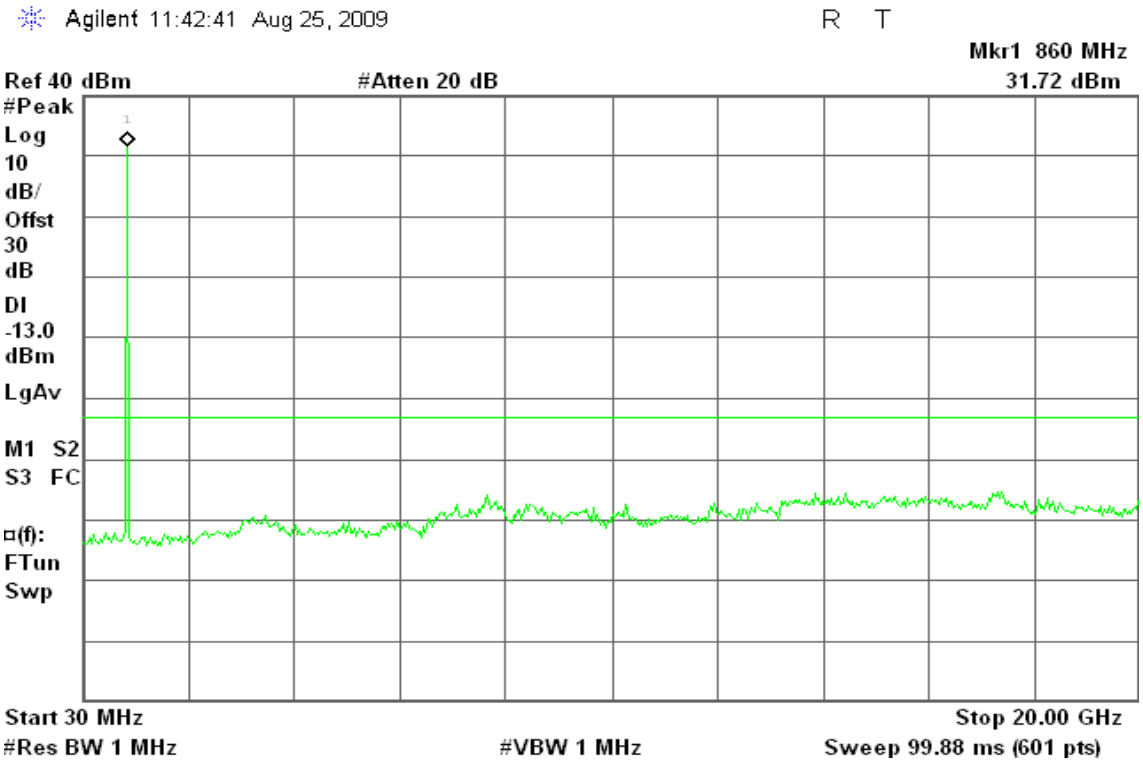


Figure 7-3: Out of Band emission at antenna terminals – GPRS CH High



GPRS 1900

Figure 8-1: Out of Band emission at antenna terminals – GPRS CH Low

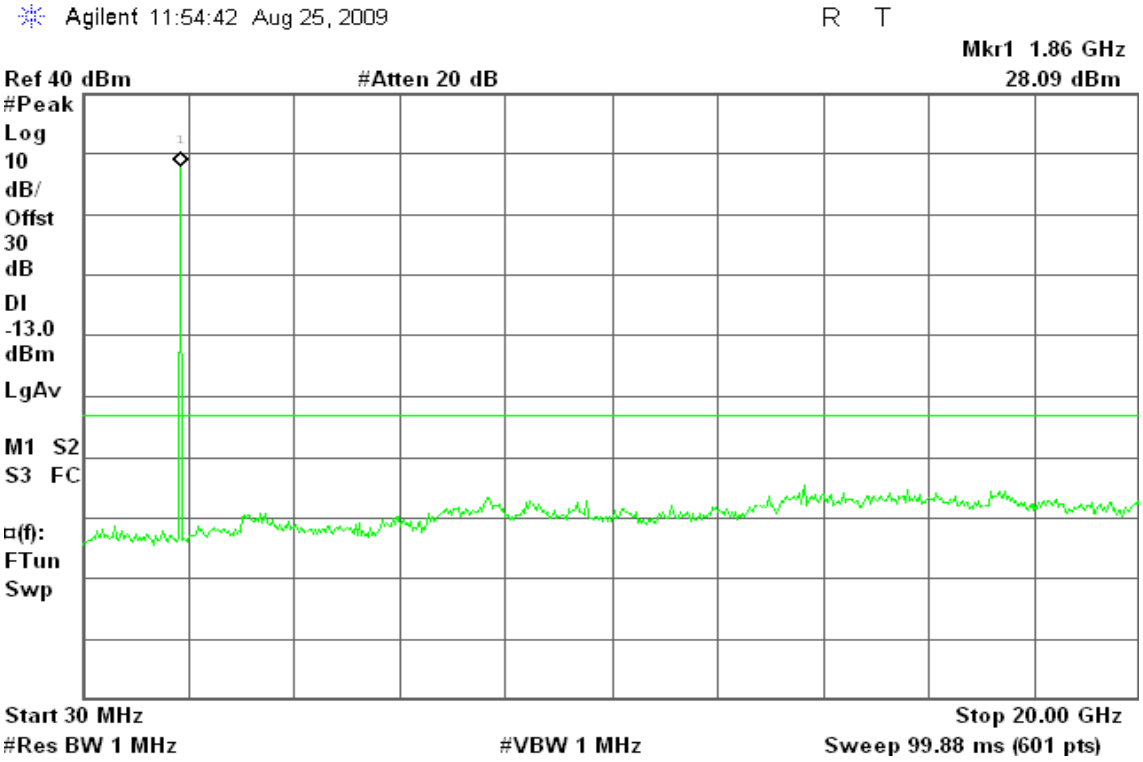


Figure 8-2: Out of Band emission at antenna terminals – GPRS CH Mid

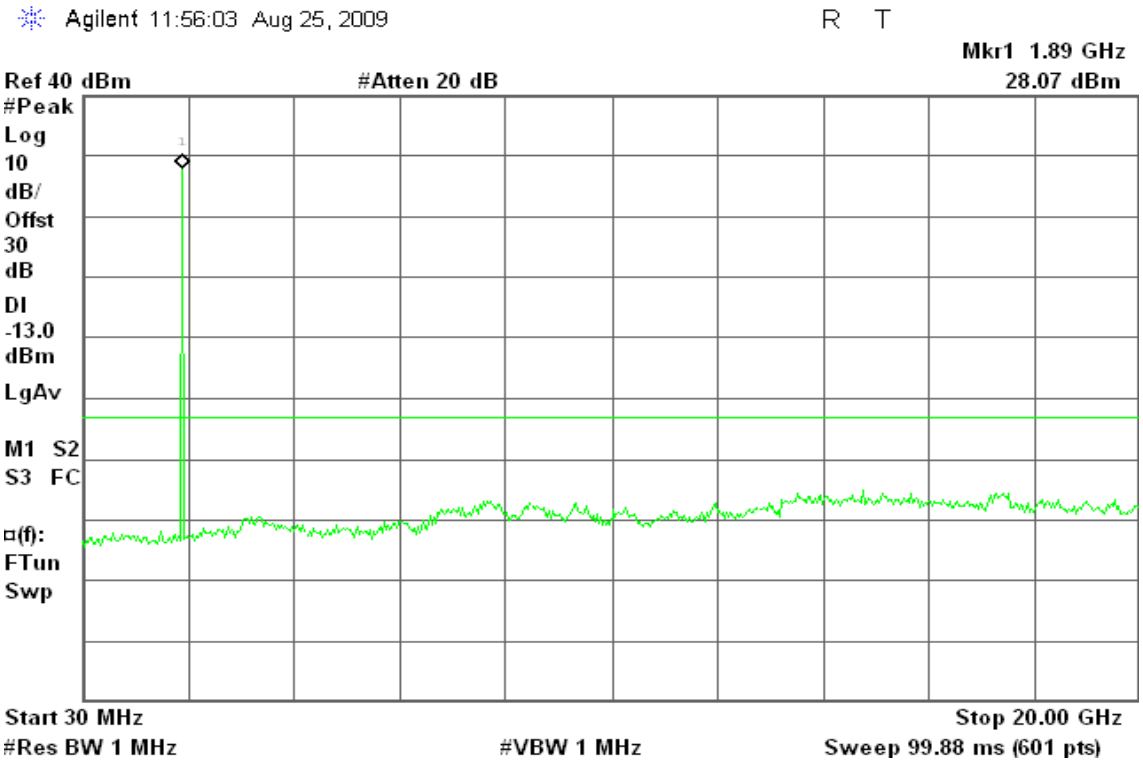
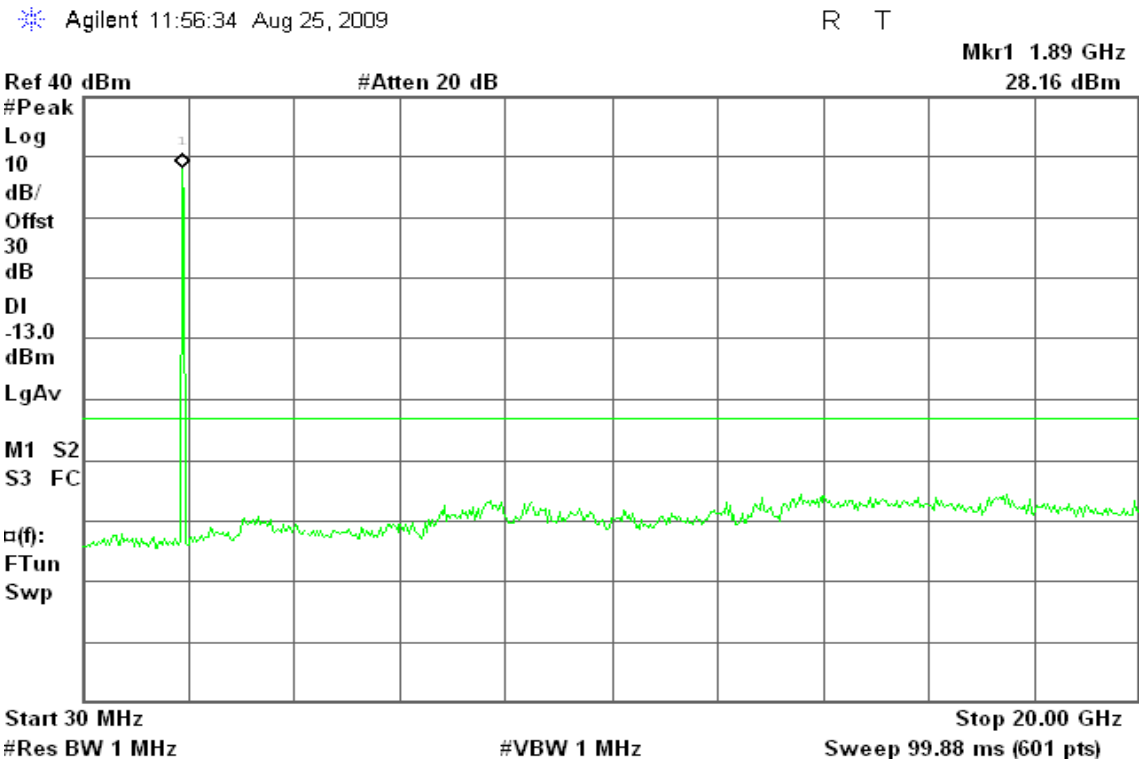


Figure 8-3: Out of Band emission at antenna terminals – GPRS CH High



GPRS 850

Figure 9-1: Band Edge emissions – GPRS CH Low

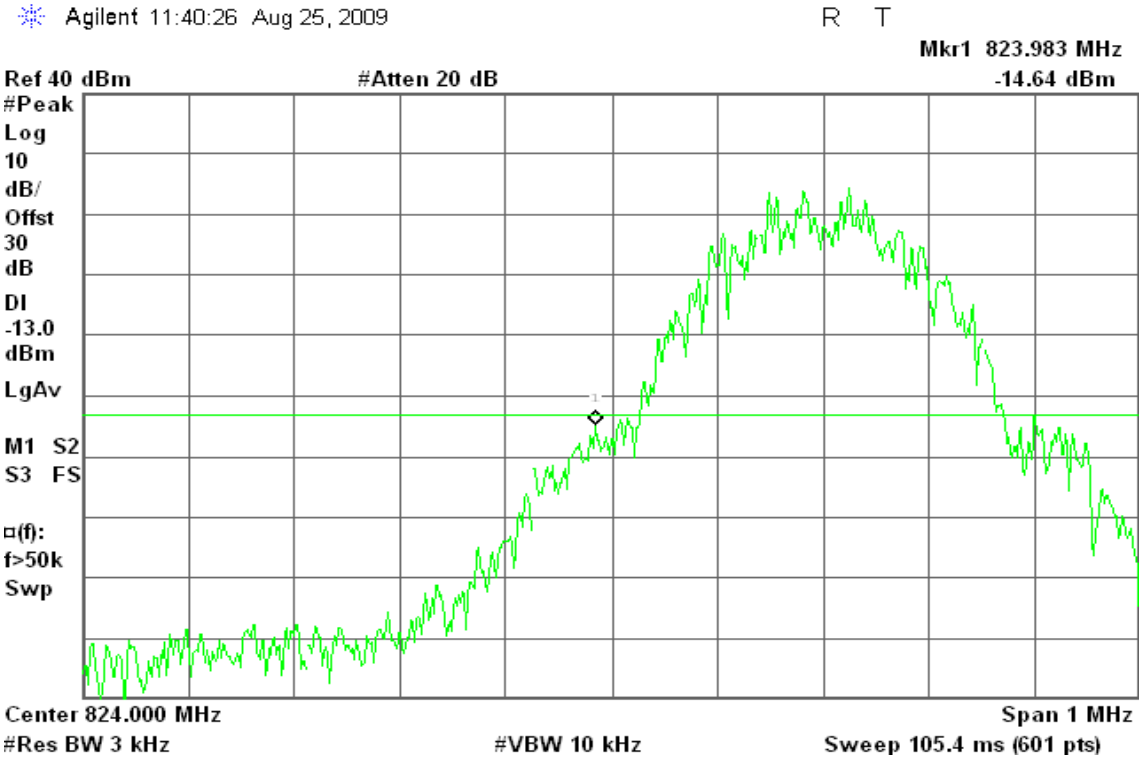
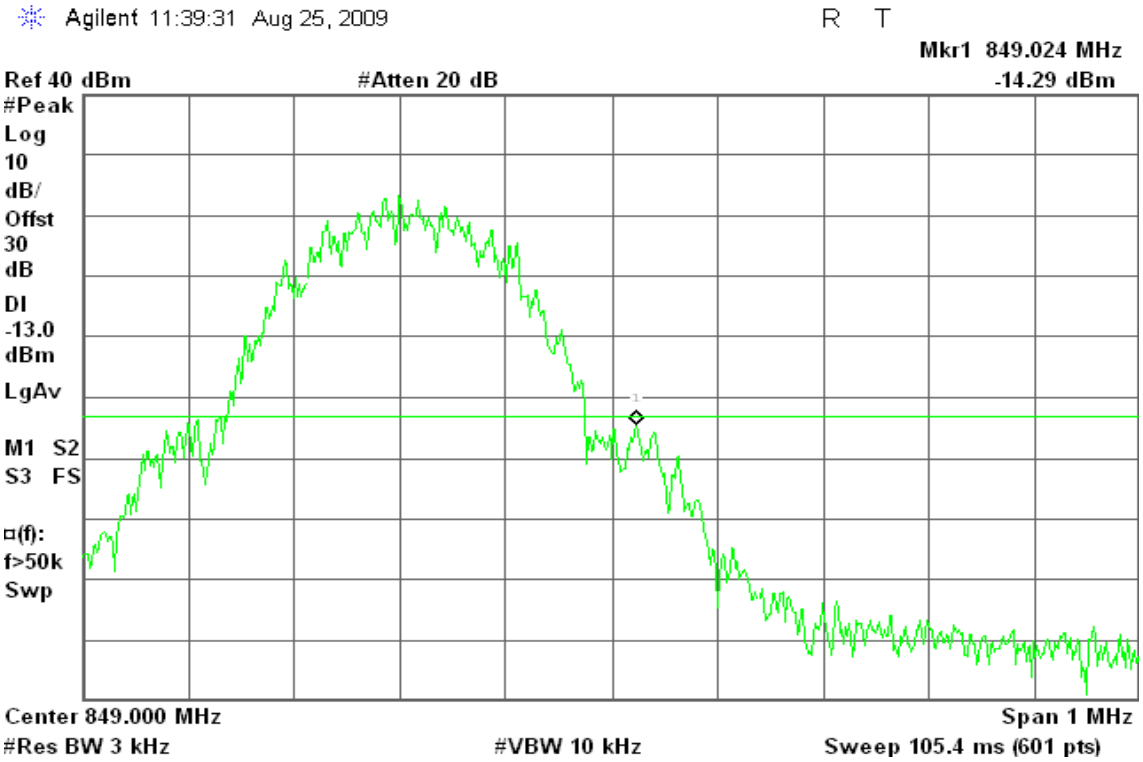


Figure 9-2: Band Edge emissions –GPRS CH High



GPRS 1900

Figure 10-1: Band Edge emissions – GPRS CH Low

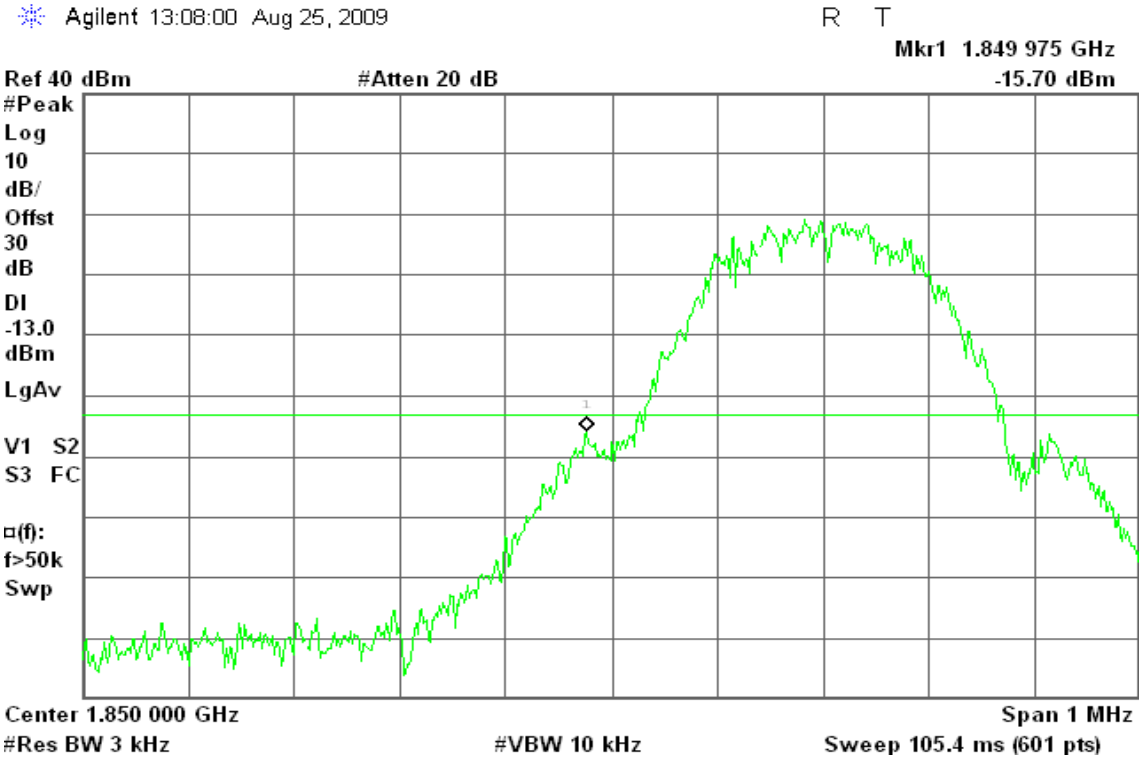
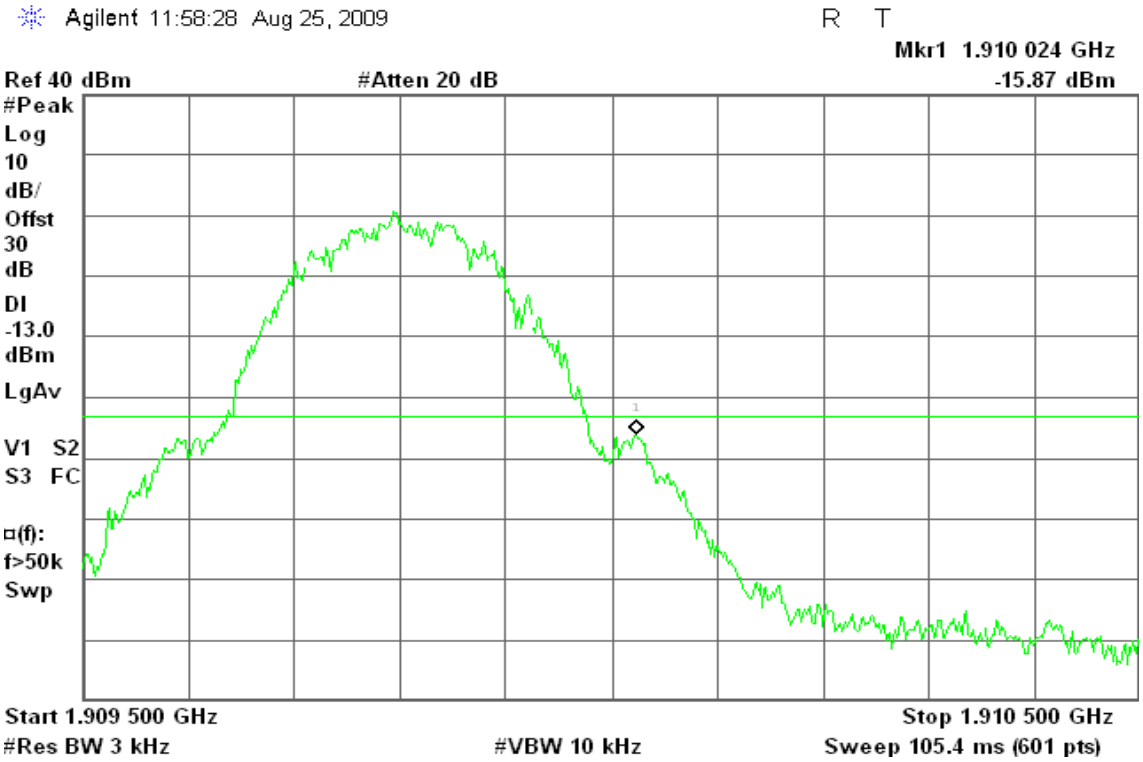


Figure 10-2: Band Edge emissions – GPRS CH High



EDGE 850

Figure 11-1: Out of Band emission at antenna terminals –EDGE CH Low

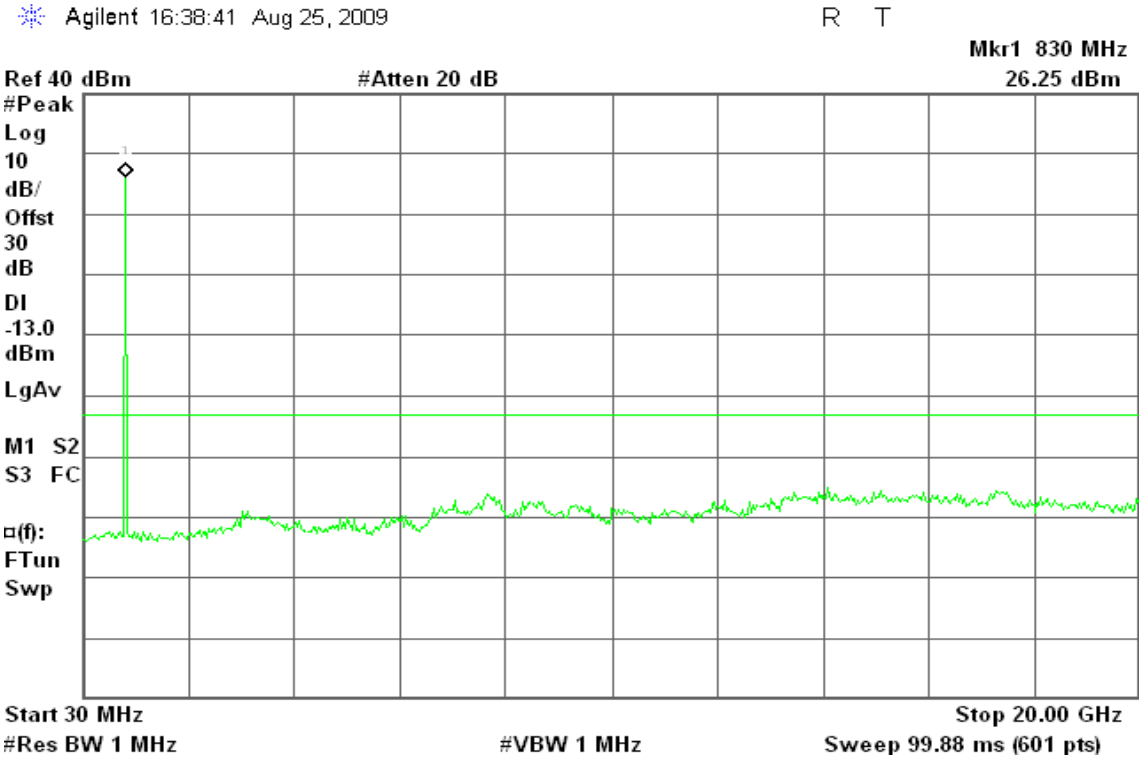


Figure 11-2: Out of Band emission at antenna terminals –EDGE CH Mid

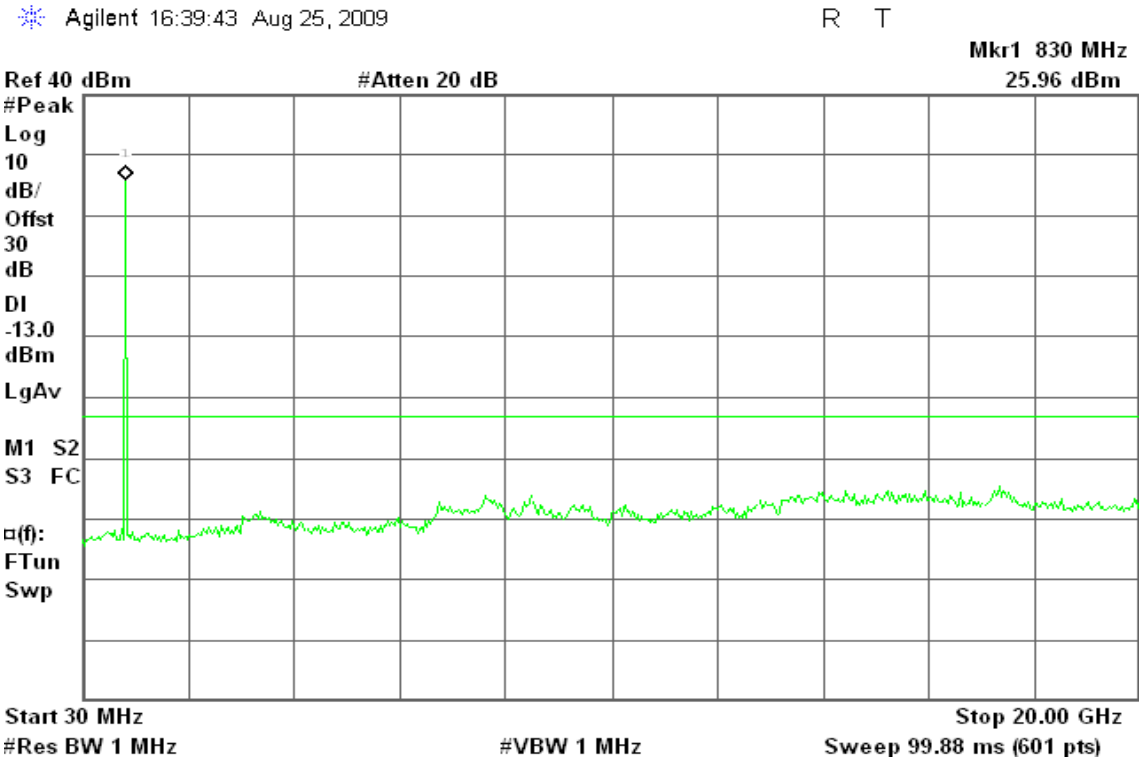
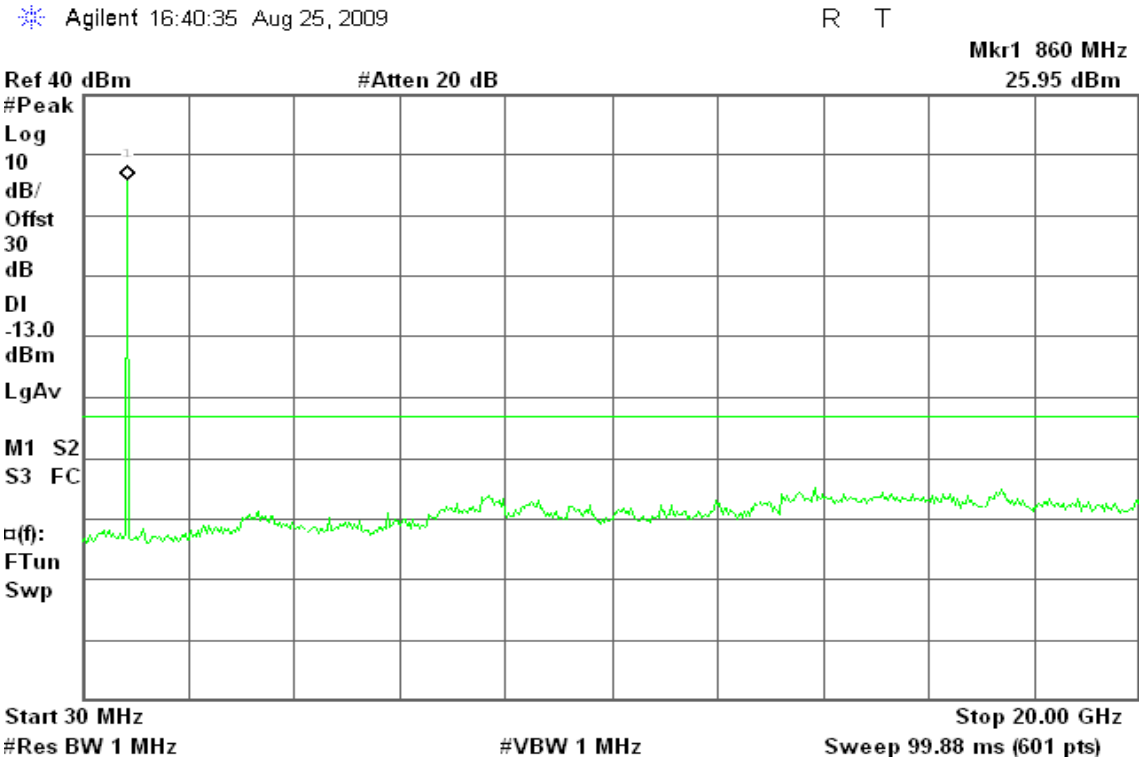


Figure 11-3: Out of Band emission at antenna terminals –EDGE CH High



EDGE 1900

Figure 11-4: Out of Band emission at antenna terminals –EDGE CH Low

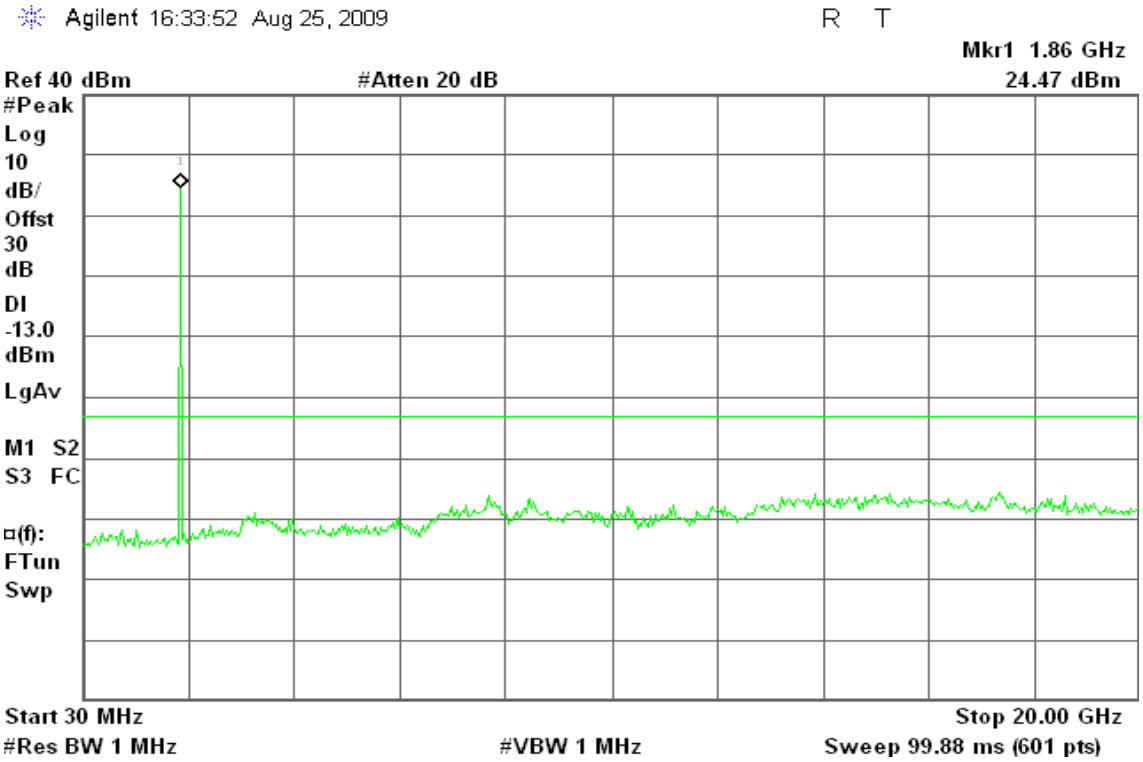


Figure 11-5: Out of Band emission at antenna terminals –EDGE CH Mid

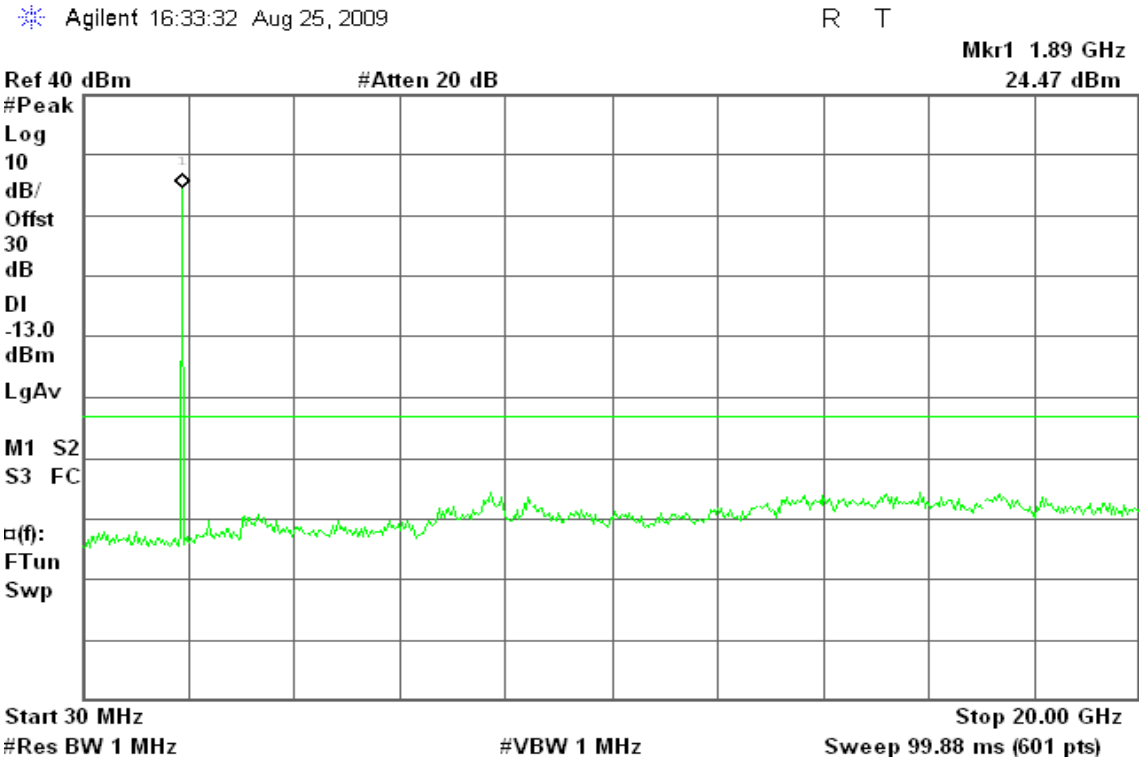
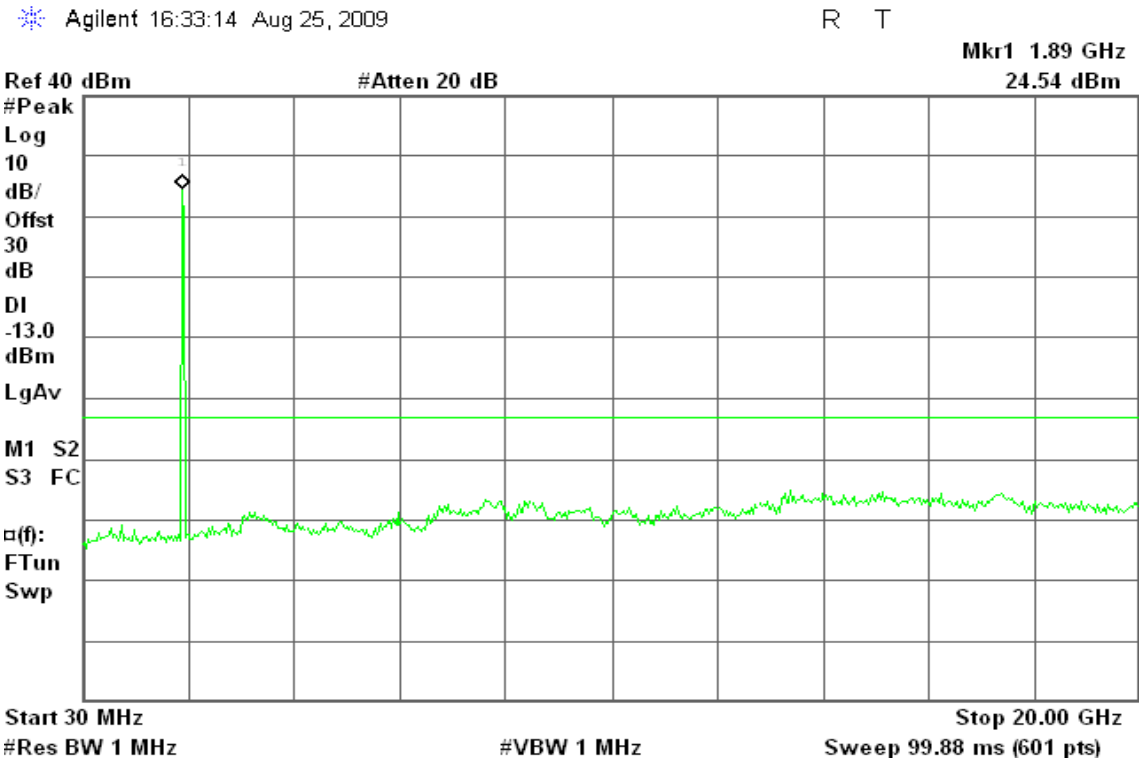


Figure 11-6: Out of Band emission at antenna terminals –EDGE CH High



EDGE 850

Figure 12-1: Band Edge emissions – EDGE CH Low

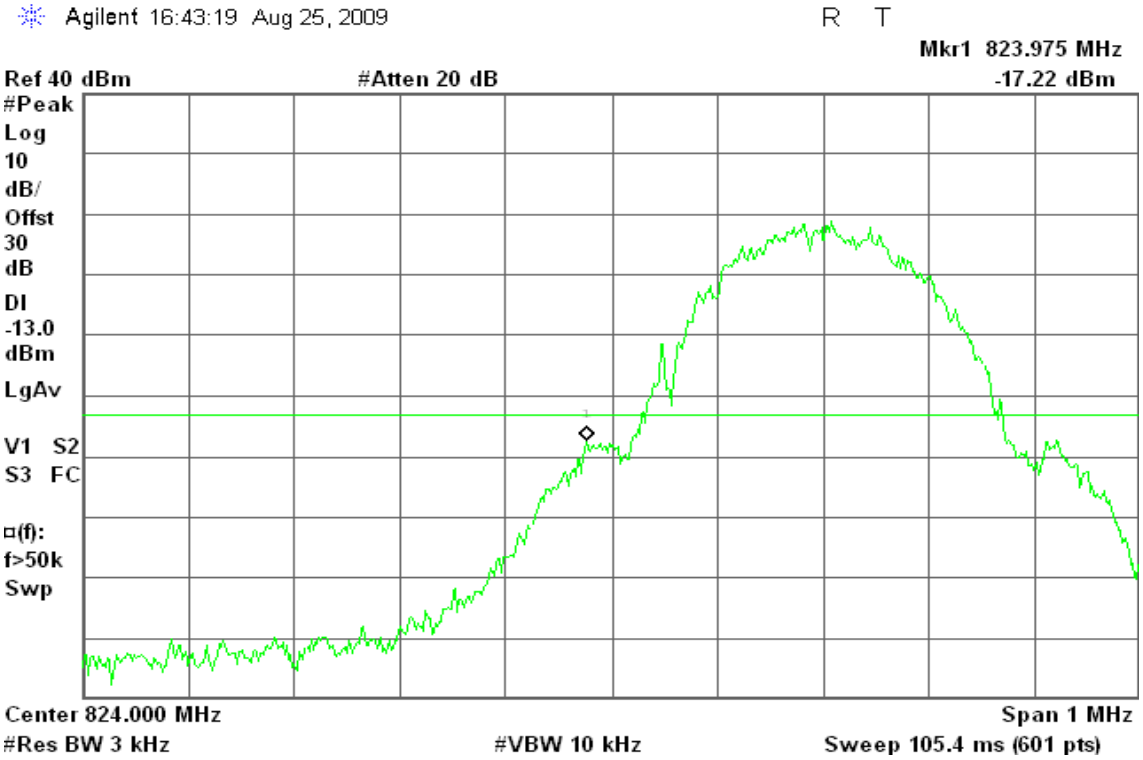
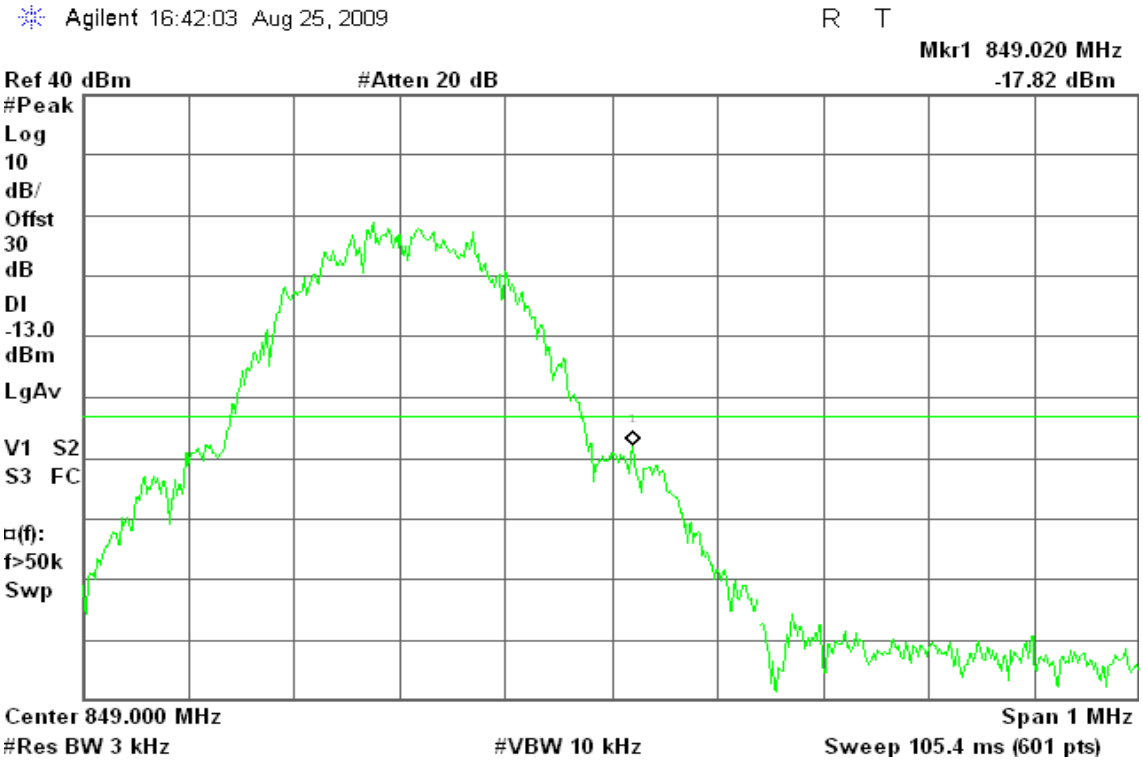


Figure 12-2: Band Edge emissions – EDGE CH High



EDGE 1900

Figure 12-3: Band Edge emissions – EDGE CH Low

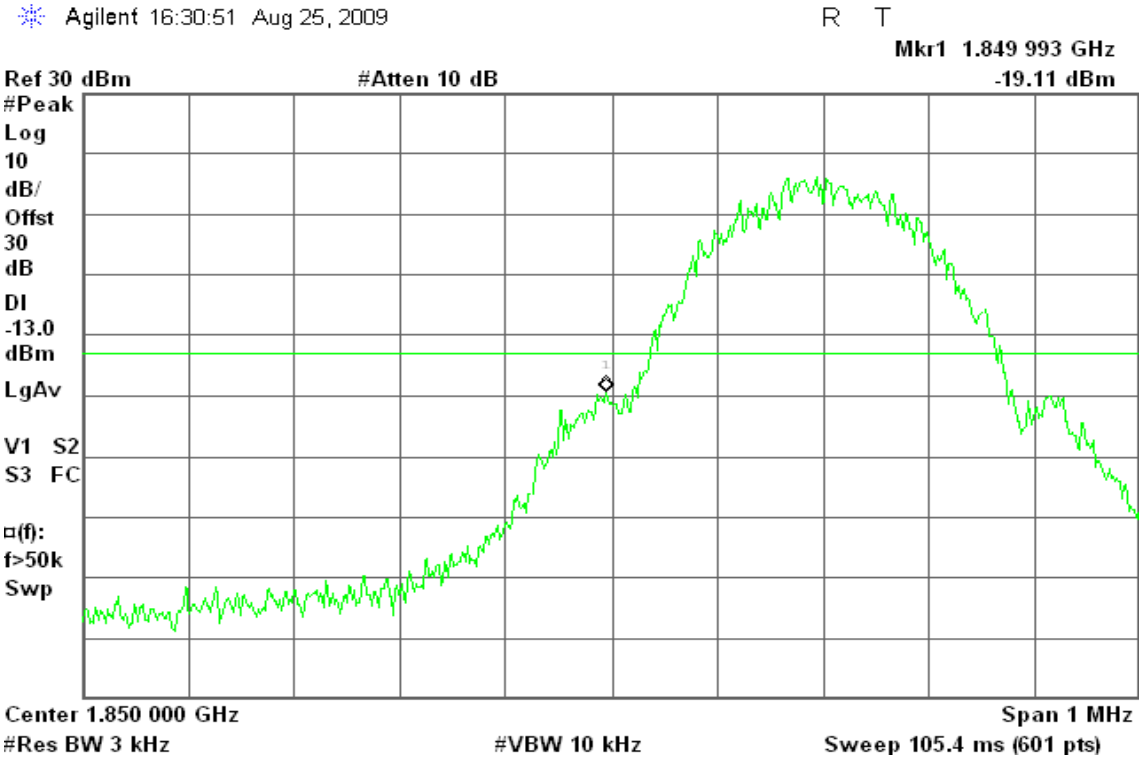
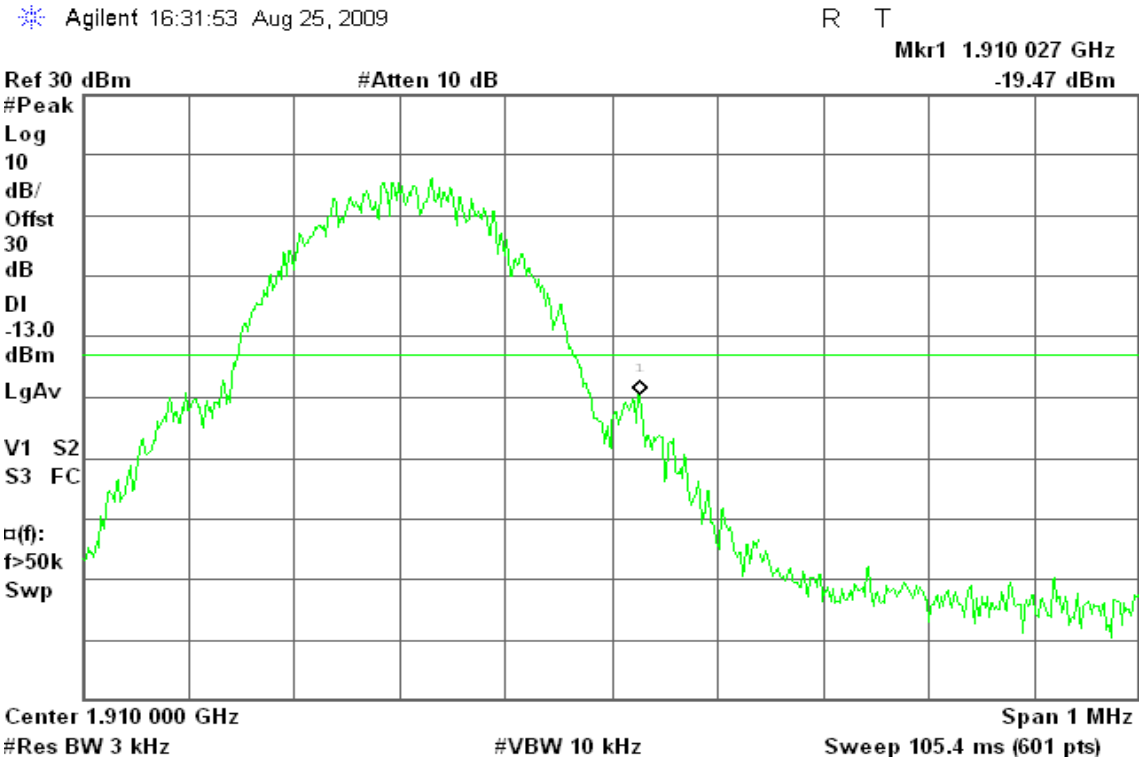


Figure 12-4: Band Edge emissions – EDGE CH High



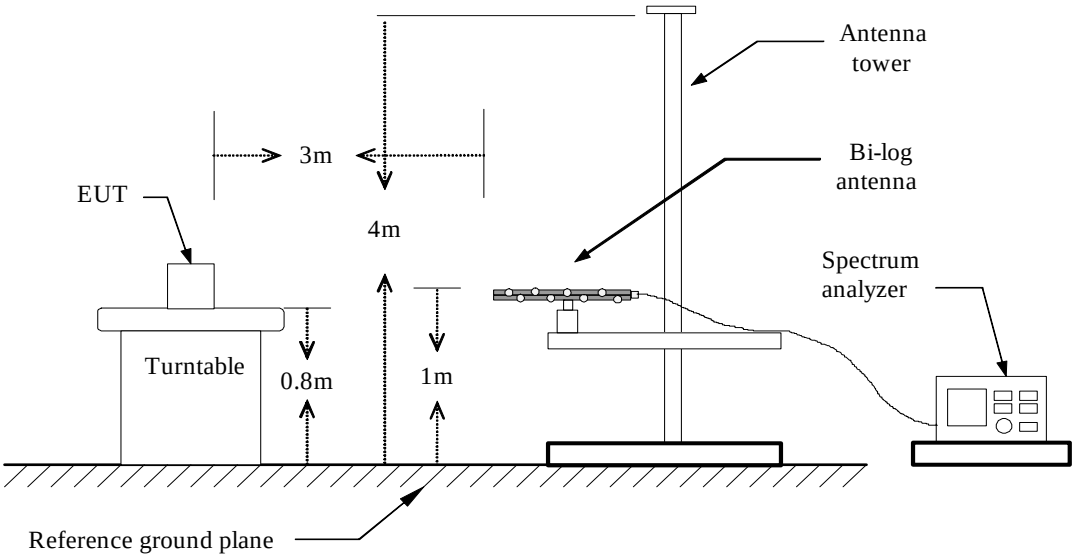
7.4FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

LIMIT

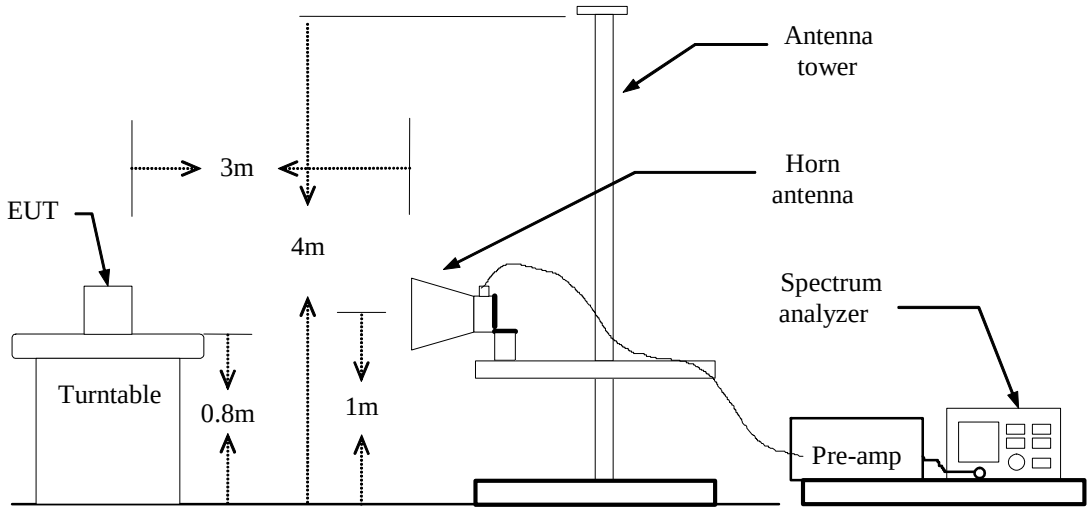
According to FCC §2.1053

Test Configuration

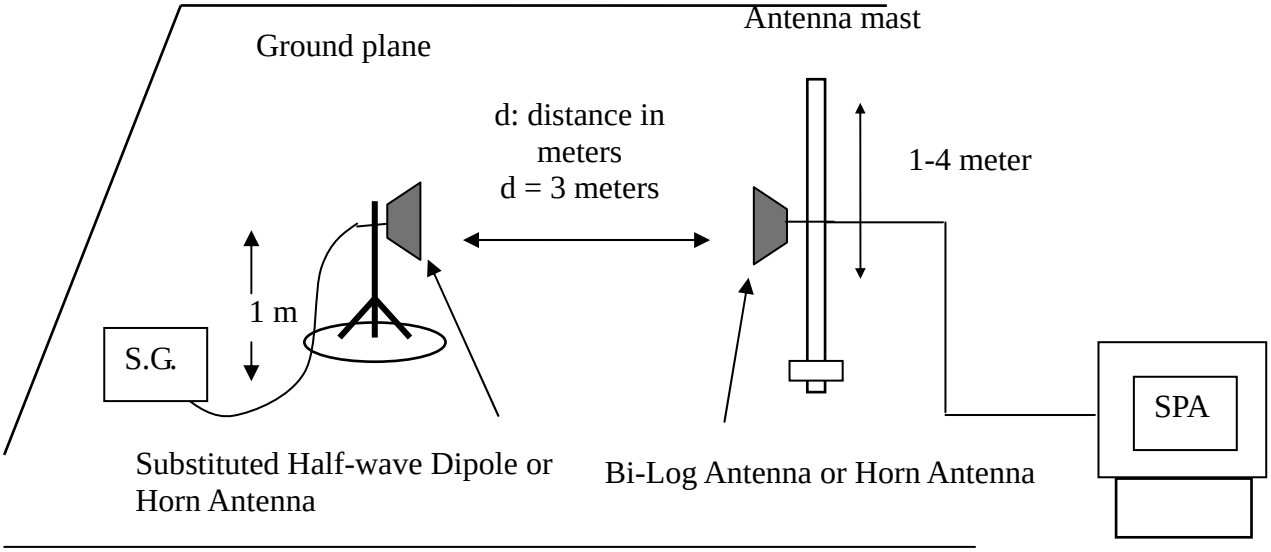
Below 1 GHz



Above 1 GHz



Substituted Method Test Set-up



TEST PROCEDURE

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

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

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 (dB)

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

TEST RESULTS

Refer to the attached tabular data sheets.

Radiated Spurious Emission Measurement Result / Below 1GHz

Operation Mode: GPRS 850 / TX / CH 128 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
35.82	V	-55.99	-14.35	-70.34	-13.00	-57.34
118.27	V	-54.43	-13.44	-67.87	-13.00	-54.87
399.57	V	-60.45	-11.22	-71.67	-13.00	-58.67
408.30	V	-60.42	-10.85	-71.27	-13.00	-58.27
512.09	V	-59.94	-8.19	-68.13	-13.00	-55.13
869.05	V	-64.63	-4.12	-68.75	-13.00	-55.75
45.52	H	-63.86	-11.23	-75.09	-13.00	-62.09
99.84	H	-51.06	-17.49	-68.55	-13.00	-55.55
120.21	H	-60.12	-13.57	-73.69	-13.00	-60.69
197.81	H	-65.89	-12.80	-78.68	-13.00	-65.68
407.33	H	-62.99	-10.63	-73.61	-13.00	-60.61
512.09	H	-60.25	-8.20	-68.45	-13.00	-55.45

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 850 / TX / CH 190 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
35.82	V	-55.42	-14.35	-69.77	-13.00	-56.77
119.24	V	-56.74	-13.20	-69.95	-13.00	-56.95
130.88	V	-50.84	-12.34	-63.17	-13.00	-50.17
452.92	V	-62.00	-9.78	-71.78	-13.00	-58.78
548.95	V	-65.78	-7.96	-73.74	-13.00	-60.74
967.02	V	-61.91	-3.05	-64.96	-13.00	-51.96
45.52	H	-64.16	-11.23	-75.39	-13.00	-62.39
120.21	H	-61.70	-13.57	-75.27	-13.00	-62.27
130.88	H	-57.71	-13.66	-71.37	-13.00	-58.37
548.95	H	-66.75	-7.86	-74.61	-13.00	-61.61
684.75	H	-68.52	-6.13	-74.66	-13.00	-61.66
967.99	H	-66.01	-3.09	-69.10	-13.00	-56.10

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 850 / TX / CH 251 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
37.76	V	-56.00	-13.41	-69.41	-13.00	-56.41
61.04	V	-62.15	-15.29	-77.43	-13.00	-64.43
90.14	V	-58.60	-20.21	-78.82	-13.00	-65.82
121.18	V	-55.67	-12.93	-68.60	-13.00	-55.60
195.87	V	-64.08	-13.88	-77.95	-13.00	-64.95
838.01	V	-52.03	-4.56	-56.58	-13.00	-43.58
43.58	H	-64.35	-10.80	-75.15	-13.00	-62.15
119.24	H	-59.66	-13.72	-73.37	-13.00	-60.37
200.72	H	-65.31	-12.59	-77.90	-13.00	-64.90
574.17	H	-70.04	-7.59	-77.63	-13.00	-64.63
822.49	H	-67.06	-4.60	-71.65	-13.00	-58.65
838.01	H	-57.91	-4.50	-62.41	-13.00	-49.41

Remark:

1. *The emission behaviour belongs to narrowband spurious emission.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 512 **Test Date:** August 22, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-41.19	-13.88	-55.07	-13.00	-42.07
119.24	V	-49.03	-13.20	-62.24	-13.00	-49.24
133.79	V	-55.72	-12.59	-68.31	-13.00	-55.31
191.99	V	-52.56	-14.25	-66.81	-13.00	-53.81
204.60	V	-51.45	-14.54	-65.99	-13.00	-52.99
509.18	V	-60.14	-8.24	-68.38	-13.00	-55.38
43.58	H	-54.07	-10.80	-64.87	-13.00	-51.87
119.24	H	-53.66	-13.72	-67.38	-13.00	-54.38
195.87	H	-50.32	-13.07	-63.39	-13.00	-50.39
213.33	H	-53.89	-13.97	-67.86	-13.00	-54.86
549.92	H	-60.19	-7.84	-68.03	-13.00	-55.03
819.58	H	-59.75	-4.62	-64.37	-13.00	-51.37

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 661 **Test Date:** August 22, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
38.73	V	-43.24	-12.94	-56.19	-13.00	-43.19
118.27	V	-49.15	-13.44	-62.59	-13.00	-49.59
133.79	V	-55.23	-12.59	-67.82	-13.00	-54.82
196.84	V	-53.20	-13.78	-66.99	-13.00	-53.99
285.11	V	-58.85	-11.89	-70.74	-13.00	-57.74
567.38	V	-58.87	-7.91	-66.79	-13.00	-53.79
41.64	H	-54.15	-10.64	-64.80	-13.00	-51.80
66.86	H	-54.13	-17.15	-71.27	-13.00	-58.27
118.27	H	-54.73	-13.90	-68.63	-13.00	-55.63
194.90	H	-47.62	-13.20	-60.83	-13.00	-47.83
213.33	H	-50.71	-13.97	-64.68	-13.00	-51.68
370.47	H	-57.27	-12.40	-69.68	-13.00	-56.68

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 810 **Test Date:** August 22, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
38.73	V	-43.54	-12.94	-56.48	-13.00	-43.48
120.21	V	-50.02	-13.00	-63.02	-13.00	-50.02
132.82	V	-55.46	-12.50	-67.96	-13.00	-54.96
194.90	V	-49.50	-13.97	-63.47	-13.00	-50.47
234.67	V	-53.52	-14.25	-67.76	-13.00	-54.76
439.34	V	-58.91	-10.04	-68.95	-13.00	-55.95
	V					
41.64	H	-53.98	-10.64	-64.62	-13.00	-51.62
66.86	H	-53.06	-17.15	-70.21	-13.00	-57.21
122.15	H	-54.52	-13.58	-68.11	-13.00	-55.11
196.84	H	-49.73	-12.93	-62.67	-13.00	-49.67
209.45	H	-51.42	-13.82	-65.25	-13.00	-52.25
464.56	H	-59.01	-9.18	-68.19	-13.00	-55.19

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 128 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-54.78	-13.88	-68.67	-13.00	-55.67
99.84	V	-49.39	-17.68	-67.07	-13.00	-54.07
119.24	V	-54.59	-13.20	-67.79	-13.00	-54.79
399.57	V	-63.83	-11.22	-75.04	-13.00	-62.04
407.33	V	-60.36	-10.89	-71.25	-13.00	-58.25
512.09	V	-59.81	-8.19	-68.00	-13.00	-55.00
43.58	H	-64.55	-10.80	-75.36	-13.00	-62.36
99.84	H	-51.63	-17.49	-69.11	-13.00	-56.11
121.18	H	-59.64	-13.58	-73.22	-13.00	-60.22
198.78	H	-66.78	-12.66	-79.44	-13.00	-66.44
407.33	H	-62.77	-10.63	-73.39	-13.00	-60.39
512.09	H	-60.08	-8.20	-68.28	-13.00	-55.28

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 190 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-55.24	-13.88	-69.13	-13.00	-56.13
90.14	V	-57.01	-20.21	-77.22	-13.00	-64.22
120.21	V	-57.07	-13.00	-70.07	-13.00	-57.07
130.88	V	-50.63	-12.34	-62.96	-13.00	-49.96
452.92	V	-63.81	-9.78	-73.59	-13.00	-60.59
967.02	V	-60.47	-3.05	-63.52	-13.00	-50.52
42.61	H	-64.31	-10.72	-75.04	-13.00	-62.04
120.21	H	-60.59	-13.57	-74.17	-13.00	-61.17
130.88	H	-57.07	-13.66	-70.74	-13.00	-57.74
195.87	H	-65.40	-13.07	-78.47	-13.00	-65.47
548.95	H	-66.02	-7.86	-73.88	-13.00	-60.88
967.99	H	-67.45	-3.09	-70.54	-13.00	-57.54

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 251 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
37.76	V	-56.35	-13.41	-69.76	-13.00	-56.76
61.04	V	-62.91	-15.29	-78.20	-13.00	-65.20
90.14	V	-57.20	-20.21	-77.41	-13.00	-64.41
119.24	V	-55.16	-13.20	-68.37	-13.00	-55.37
195.87	V	-63.76	-13.88	-77.64	-13.00	-64.64
838.01	V	-51.14	-4.56	-55.70	-13.00	-42.70
45.52	H	-63.94	-11.23	-75.17	-13.00	-62.17
119.24	H	-59.56	-13.72	-73.28	-13.00	-60.28
197.81	H	-65.39	-12.80	-78.19	-13.00	-65.19
510.15	H	-68.87	-8.21	-77.08	-13.00	-64.08
663.41	H	-68.75	-6.45	-75.20	-13.00	-62.20
838.01	H	-57.77	-4.50	-62.27	-13.00	-49.27

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 512 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
37.76	V	-41.95	-13.41	-55.36	-13.00	-42.36
59.10	V	-50.15	-15.39	-65.54	-13.00	-52.54
120.21	V	-45.16	-13.00	-58.17	-13.00	-45.17
194.90	V	-52.48	-13.97	-66.45	-13.00	-53.45
288.99	V	-58.26	-11.77	-70.03	-13.00	-57.03
345.25	V	-51.60	-13.33	-64.94	-13.00	-51.94
42.61	H	-52.95	-10.72	-63.67	-13.00	-50.67
60.07	H	-54.04	-16.01	-70.05	-13.00	-57.05
98.87	H	-54.16	-17.77	-71.93	-13.00	-58.93
118.27	H	-52.11	-13.90	-66.01	-13.00	-53.01
194.90	H	-52.98	-13.20	-66.18	-13.00	-53.18
291.90	H	-58.11	-13.10	-71.22	-13.00	-58.22

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 661 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
38.73	V	-42.47	-12.94	-55.42	-13.00	-42.42
61.04	V	-49.83	-15.29	-65.12	-13.00	-52.12
119.24	V	-47.81	-13.20	-61.01	-13.00	-48.01
198.78	V	-53.41	-13.60	-67.00	-13.00	-54.00
222.06	V	-52.30	-15.11	-67.41	-13.00	-54.41
346.22	V	-57.08	-13.29	-70.37	-13.00	-57.37
45.52	H	-52.43	-11.23	-63.66	-13.00	-50.66
100.81	H	-53.44	-17.28	-70.72	-13.00	-57.72
117.30	H	-50.60	-14.09	-64.68	-13.00	-51.68
196.84	H	-54.69	-12.93	-67.62	-13.00	-54.62
243.40	H	-56.62	-14.35	-70.97	-13.00	-57.97
621.70	H	-59.93	-6.65	-66.58	-13.00	-53.58

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 810 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
36.79	V	-41.35	-13.88	-55.23	-13.00	-42.23
61.04	V	-51.30	-15.29	-66.59	-13.00	-53.59
119.24	V	-46.93	-13.20	-60.13	-13.00	-47.13
202.66	V	-53.57	-14.09	-67.66	-13.00	-54.66
218.18	V	-51.75	-15.37	-67.12	-13.00	-54.12
636.25	V	-60.17	-6.36	-66.54	-13.00	-53.54
44.55	H	-53.56	-10.88	-64.44	-13.00	-51.44
118.27	H	-52.04	-13.90	-65.94	-13.00	-52.94
135.73	H	-56.04	-13.85	-69.90	-13.00	-56.90
192.96	H	-53.58	-13.48	-67.06	-13.00	-54.06
285.11	H	-58.50	-12.85	-71.35	-13.00	-58.35
555.74	H	-59.56	-7.74	-67.30	-13.00	-54.30

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Above 1GHz

Operation Mode: GPRS 850 / TX / CH 128 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2470.00	V	-56.85	3.49	-53.36	-13.00	-40.36
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 850 / TX / CH 190 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1672.00	V	-60.05	0.73	-59.32	-13.00	-46.32
2512.00	V	-55.83	3.66	-52.17	-13.00	-39.17
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 850 / TX / CH 251 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1700.00	V	-60.05	0.79	-59.25	-13.00	-46.25
2547.00	V	-58.34	3.77	-54.58	-13.00	-41.58
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 512 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 661 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: GPRS 1900 / TX / CH 810 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 128 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
2470.00	V	-57.46	3.49	-53.97	-13.00	-40.97
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 190 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1672.00	V	-59.47	0.73	-58.73	-13.00	-45.73
2512.00	V	-54.44	3.66	-50.78	-13.00	-37.78
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 850 / TX / CH 251 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
1700.00	V	-59.29	0.79	-58.50	-13.00	-45.50
2547.00	V	-58.90	3.77	-55.14	-13.00	-42.14
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 512 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 661 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

Operation Mode: EDGE 1900 / TX / CH 810 **Test Date:** August 26, 2009

Temperature: 25°C **Tested by:** Ming Chen

Humidity: 55 % RH **Polarity:** Ver. / Hor.

Frequency (MHz)	Antenna Polarization (V/H)	Reading (dBm)	Correction Factor (dB)	Emission level (dBm)	Limit (dBm)	Margin (dB)
N/A						
N/A						

Remark:

1. *Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.*
2. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*

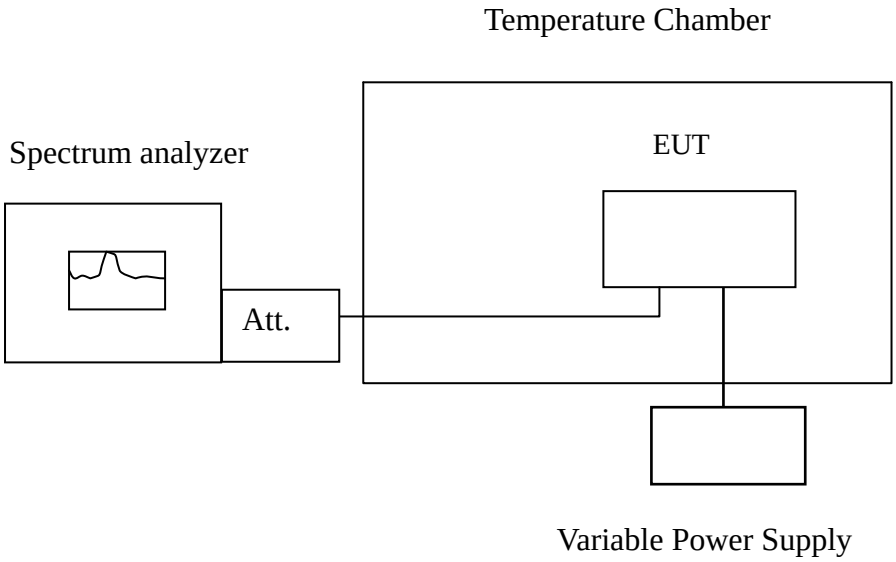
7.5FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235.

Frequency Tolerance: 2.5 ppm

Test Configuration



Remark: *Measurement setup for testing on Antenna connector*

TEST 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 20°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.

TEST RESULTS

No non-compliance noted.

Reference Frequency: GPRS Mid Channel 836.6 MHz @ 20°C				
Limit: +/- 2.5 ppm = 2090 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	836600009	21	2090
	40	836600011	23	
	30	836600012	24	
	20	836599988	0	
	10	836600016	28	
	0	836600008	20	
	-10	836600012	24	
	-20	836600015	27	
	-30	836600009	21	

Reference Frequency: GPRS Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	1880000013	26	4700
	40	1880000005	18	
	30	1880000007	20	
	20	1879999987	0	
	10	1880000016	29	
	0	1880000032	45	
	-10	1880000008	21	
	-20	1880000003	16	
	-30	1880000006	19	

Reference Frequency: EDGE Mid Channel 836.6 MHz @ 20°C				
Limit: +/- 2.5 ppm = 2090 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	836600016	23	2090
	40	836600022	29	
	30	836600014	21	
	20	836599993	0	
	10	836600006	13	
	0	836600009	16	
	-10	836600011	18	
	-20	836600010	17	
	-30	836600013	20	

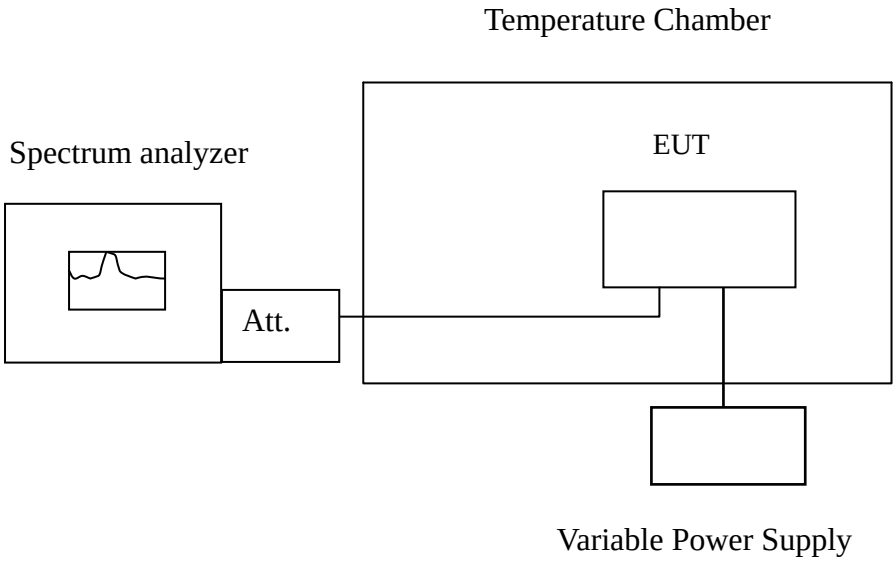
Reference Frequency: EDGE Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
3.7	50	1880000013	29	4700
	40	1880000015	31	
	30	1880000017	33	
	20	1879999984	0	
	10	1880000014	30	
	0	1880000010	26	
	-10	1880000009	25	
	-20	1880000012	28	
	-30	1880000013	29	

7.6FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

LIMIT

According to FCC §2.1055, FCC §22.355, .FCC §24.235,

Test Configuration



Remark: *Measurement setup for testing on Antenna connector.*

TEST PROCEDURE

Set chamber temperature to 20°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (± 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

No non-compliance noted.

Reference Frequency: GPRS Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	836599991	3	2090
3.7		836599988	0	
3.145		836599989	1	
2.8END		836599978	-10	

Reference Frequency: GPRS Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	1879999991	4	4700
3.7		1879999987	0	
3.145		1879999990	3	
2.8END		1879999962	-25	

Reference Frequency: EDGE Mid Channel 836.6 MHz @ 20°C				
Limit: ± 2.5 ppm = 2090Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	836599985	-8	2090
3.7		836599993	0	
3.145		836599984	-9	
2.8END		836599977	-16	

Reference Frequency: EDGE Mid Channel 1880 MHz @ 20°C				
Limit: ± 2.5 ppm = 4700 Hz				
Power Supply Vdc	Environment Temperature (°C)	Frequency (Hz)	Delta (Hz)	Limit (Hz)
4.255	20	1879999988	4	4700
3.7		1879999984	0	
3.145		1879999983	-1	
2.8END		1879999958	-26	

7.7POWERLINE CONDUCTED EMISSIONS

LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Appendix I for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

Operation Mode:	Normal Link	**Test Date:**	August 22, 2009
Temperature:	22°C	**Tested by:**	Ming Chen
Humidity:	45% RH		

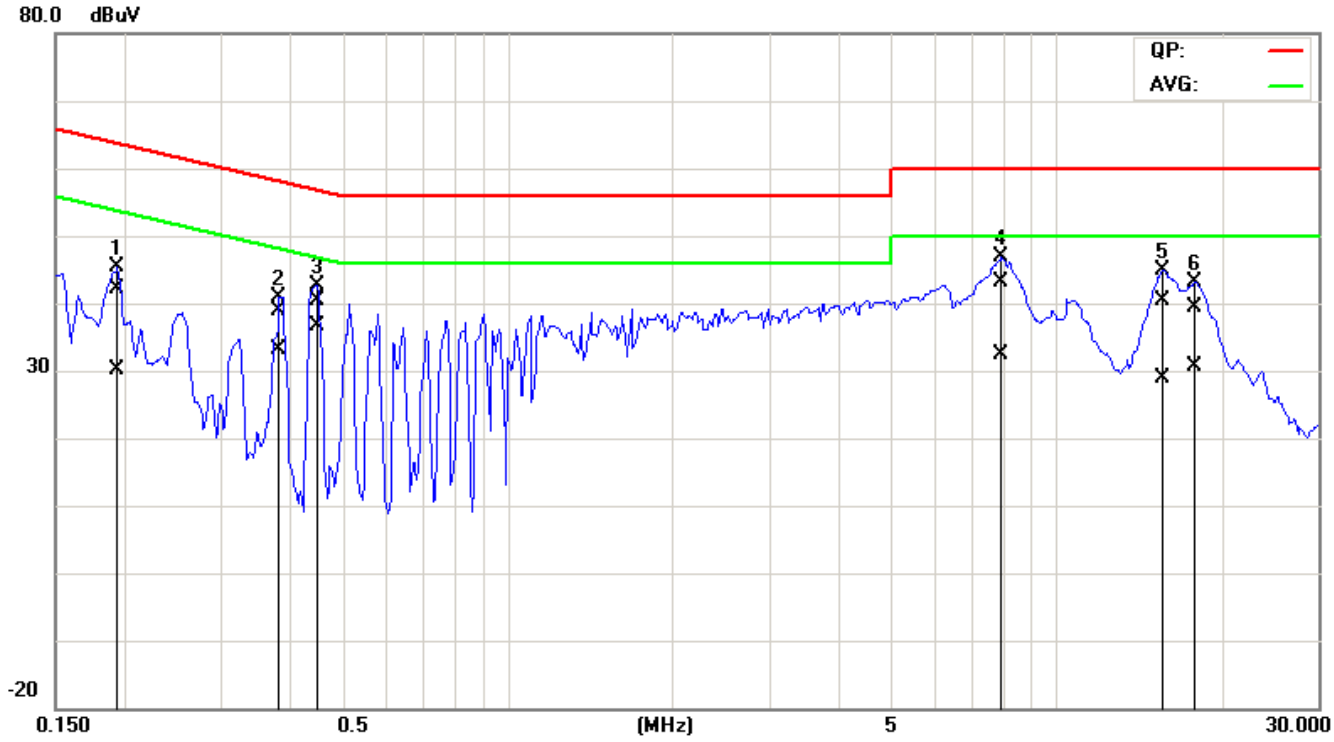
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB)	QP Result (dBuV)	AV Result (dBuV)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1950	42.01	30.11	0.09	42.10	30.20	63.82	53.82	-21.72	-23.62	L1
0.3850	38.83	33.13	0.07	38.90	33.20	58.17	48.17	-19.27	-14.97	L1
0.4500	40.33	36.53	0.07	40.40	36.60	56.88	46.88	-16.48	-10.28	L1
7.9600	43.10	32.20	0.10	43.20	32.30	60.00	50.00	-16.80	-17.70	L1
15.6150	40.17	28.57	0.33	40.50	28.90	60.00	50.00	-19.50	-21.10	L1
17.9400	39.12	30.32	0.38	39.50	30.70	60.00	50.00	-20.50	-19.30	L1
0.1900	41.40	35.10	0.10	41.50	35.20	64.04	54.04	-22.54	-18.84	L2
0.3900	38.03	30.33	0.07	38.10	30.40	58.06	48.06	-19.96	-17.66	L2
0.4400	39.33	26.43	0.07	39.40	26.50	57.06	47.06	-17.66	-20.56	L2
0.5150	40.34	35.04	0.06	40.40	35.10	56.00	46.00	-15.60	-10.90	L2
8.1550	42.20	34.10	0.10	42.30	34.20	60.00	50.00	-17.70	-15.80	L2
16.0000	40.26	30.46	0.34	40.60	30.80	60.00	50.00	-19.40	-19.20	L2

Remark:

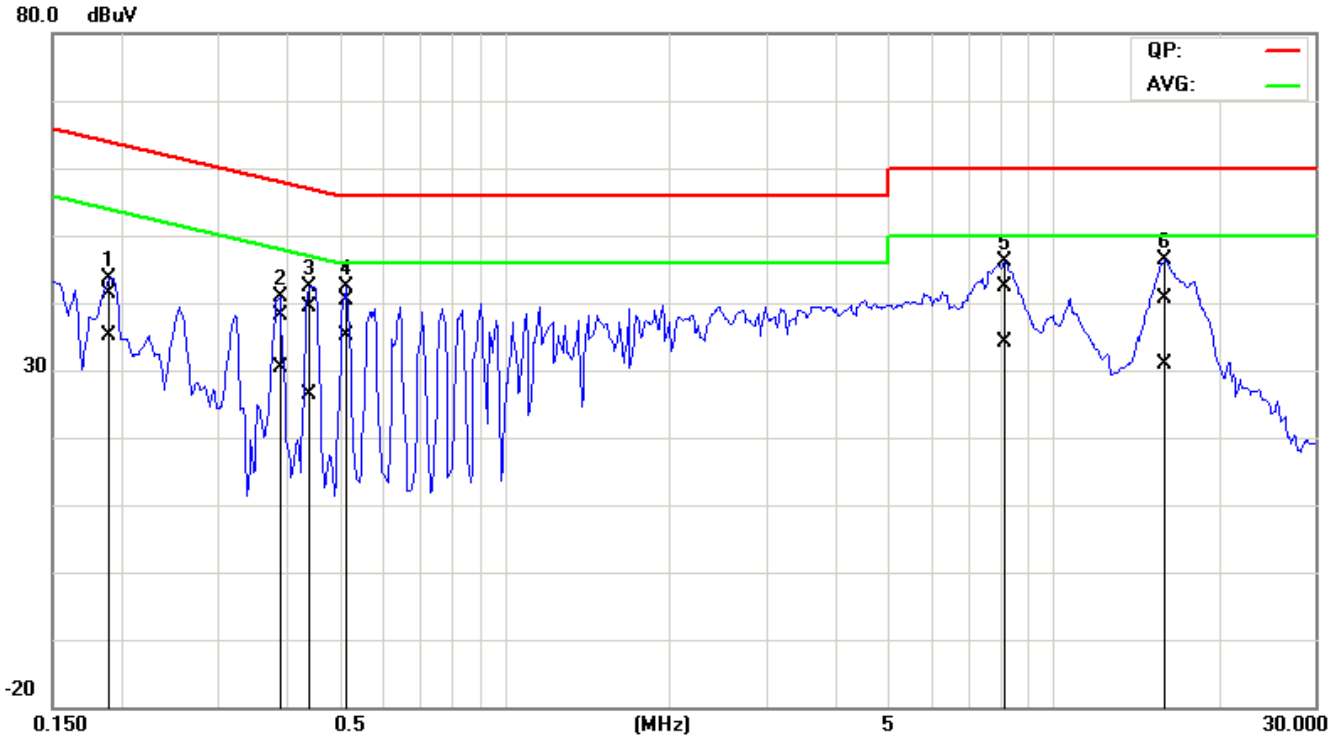
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz to 30MHz was 10kHz; the IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*
5. *"-" means Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.*

Test Plots

Conducted emissions (Line 1)



Conducted emissions (Line 2)



APPENDIX I
RADIO FREQUENCY EXPOSURE

LIMIT

EUT Specification

EUT	Cradle
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz ☐ WLAN: 5.745GHz ~ 5.825GHz ☒ Others: GSM / GPRS / EDGE 850MHz: 824 ~ 849 MHz
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	11.62 dBm (14.52mW)
Antenna gain (Max)	3 dBi (Numeric gain: 1.99)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 11.62dBm (14.52 mW) at 848.80MHz (with 1.99 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where *E = Field strength in Volts / meter*
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where *d = Distance in cm*
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

EUT output power = 14.52 mW

Numeric Antenna gain = 1.99

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where *P = Power in mW*
G = Numeric antenna gain
S = Power density in mW / cm^2

→ Power density = 0.00575 mW / cm^2

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)

EUT Specification

EUT	Cradle
Frequency band (Operating)	☐ WLAN: 2.412GHz ~ 2.462GHz ☐ WLAN: 5.725GHz ~ 5.850GHz ☐ WLAN: 5.15GHz ~ 5.35GHz ☒ Others: _1850 ~ 1910 MHz __
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm2) ☒ General Population/Uncontrolled exposure (S=1mW/cm2)
Antenna diversity	☒ Single antenna ☐ Multiple antennas ☐ Tx diversity ☐ Rx diversity ☐ Tx/Rx diversity
Max. output power	22.35 dBm (171.796mW)
Antenna gain (Max)	3 dBi (Numeric gain: 1.99)
Evaluation applied	☒ MPE Evaluation ☐ SAR Evaluation ☐ N/A

Remark:

1. *The maximum output power is 22.35 dBm (171.796mW) at 1909.80MHz (with 1.99 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.*

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where *E = Field strength in Volts / meter*
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where *d = Distance in cm*
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

EUT output power = 171.796 mW

Numeric Antenna gain = 1.99

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where *P = Power in mW*
G = Numeric antenna gain
S = Power density in mW / cm^2

→ Power density = 0.0680 mW / cm^2

(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm^2 even if the calculation indicates that the power density would be larger.)