

FCC PART 22, 24 TYPE APPROVALS EMI MEASUREMENT AND TEST REPORT

For

TELULAR CORPORATION

580 Old Willets Path
Hauppauge, New York 11772

FCC ID: MTF060304

This Report Concerns: ☒ Original Report	Equipment Type: GSM Dual Band Table Top Cellular Phone
Test Engineer: Dan Corona	
Report Number: R0701162-22	
Report Date: 2007-02-02	
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *TELULAR CORPORATION*'s product, FCC ID: MTF060304 model: SX7P-200G or the "EUT" as referred to in this report is a GSM850 & PCS1900 table top Cellular Phone.

1.2 Mechanical Description

Approximate measurement is: 165mm (L) x 170 mm (W) x 65mm (H)

** The test data gathered are from typical production sample, serial number: 701162 provided by BACL*

1.3 EUT Photo:



Please see additional photos in Exhibit C

1.4 Objective

This type approval report is prepared on behalf of *TELULAR CORPORATION* in accordance with Part 2, Subpart J, Part 22 Subpart H, and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, band edge, and conducted and radiated margin.

1.5 Related Submittal(s)/Grant(s)

No Related Submittals.

1.6 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - PCS

Applicable Standards: TIA/EIA 603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003& TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations is attached hereinafter and can also be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603 C.

The final qualification test was performed with the EUT operating at normal mode.

2.2 Equipment Modifications

No modifications were made to the EUT.

2.3 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Tamura Electronics	AC/DC Adapter	TL-A115	N/A
Telular Corp.	3.6V Back up Battery	BP3x50AA1200	N/A

2.4 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Agilent	Wireless Communications Test Set	8960 Series 10 E5515C	GB44051221
Dell	Laptop	Inspiron 1300	CN-0RJ272-70166-69A-03TC
Mini-Circuits	Splitter	ZFRSC-42	SF874700404

2.5 Interface Ports and Cabling

Cable Description	Length (M)	From	To
RF cable	0.2	Communications test set	Splitter
RF cable	0.4	Antenna port on EUT	Splitter
Data cable	0.5	Communications test set	Laptop

3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1091	RF Exposure	Compliant
§ 2.1046, § 22.912 (d) § 24.232	RF Output Power	Compliant
§ 2.1049 § 22.917 § 22.905 § 24.238	Out of Band Emissions, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917 § 24.238(a)	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355 § 24.235	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§ 22.917 §24.238	Band Edge	Compliant

4 - §2.1047 - MODULATION CHARACTERISTIC

4.1 Applicable Standard

Requirement: FCC § 2.1047.

4.2 Test Procedure

GSM digital mode is used by EUT. Connect EUT to Simulator and spectrum analyzer, check the waveform.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*

** Two Year Calibration Cycle*

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

4.4 Test Results

Please refer to the hereinafter plots.

Measurement/Instrument Screen									
Control		ORFS: Modulation & Switching Graph						TCH Parms	
Operating Mode		The image shows two graphs side-by-side. The top graph is titled 'MODULATION' and the bottom graph is titled 'SWITCHING'. Both graphs have a y-axis labeled 'dB' with a reference line at 10.00 dB and a scale from 0 to 10.00 dB. The x-axis for both graphs ranges from -1800 kHz to 1800 kHz, with a center point at 0 kHz. The modulation graph shows a yellow bar chart representing the signal spectrum, with a green line indicating the 'App. limit'. The switching graph shows a cyan bar chart representing the switching signal, with a green line indicating the 'App. limit'. Both graphs have a 'Pass' indicator at the bottom left.						Downlink Traffic Power	
Active Cell								Traffic Band	
Connection Type								Traffic Channel	
Auto								190	
End Call		The image shows two graphs side-by-side. The top graph is titled 'MODULATION' and the bottom graph is titled 'SWITCHING'. Both graphs have a y-axis labeled 'dB' with a reference line at 10.00 dB and a scale from 0 to 10.00 dB. The x-axis for both graphs ranges from -1800 kHz to 1800 kHz, with a center point at 0 kHz. The modulation graph shows a yellow bar chart representing the signal spectrum, with a green line indicating the 'App. limit'. The switching graph shows a cyan bar chart representing the switching signal, with a green line indicating the 'App. limit'. Both graphs have a 'Pass' indicator at the bottom left.						NS TX Level	
Paging INSI								5	
001010123456789								Channel Mode Setup	
Handover Setup								Return	
521 / 521		Continuous		☐ Background		Active Cell Connected		Sys Type: GSM	
2 of 2				IntRef		Offset			
								1 of 2	

Measurement/Instrument Screen									
Control		DRFS: Modulation & Switching Graph						TCH Parms	
Operating Mode		MODULATION Ref 10.00 dB 						Downlink Traffic Power	
Active Cell								Traffic Band	
Connection Type								PCS	
Auto								Traffic Channel	
End Call		Pass 						661	
Paging INSI		SWITCHING Ref 10.00 dBm 						INS TX Level	
001010123456789								0	
Handover Setup								Channel Mode Setup	
								Return	
		521 /521 Continuous							
Background		Active Cell Connected				Sys Type: GSM			
2 of 2		IntRef Offset				1 of 2			

5 - §1.1307(b) (1) & §2.1091 - RF EXPOSURE

5.1 Applicable Standard

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

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
1500-100,000	/	/	1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

5.2 MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

GSM Band

Maximum peak output power at antenna input terminal: 32.56 (dBm)

Maximum peak output power at antenna input terminal: 1786.49 (mW)

Prediction distance: 20 (cm)

Predication frequency: 836.6 (MHz)

Antenna Gain (typical): 0.5 (dBi)

Antenna gain: 1.122 (numeric)

Power density at predication frequency at 20 cm: 0.399 (mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 0.560 (mW/cm²)

PCS Band

Maximum peak output power at antenna input terminal: 29.22 (dBm)

Maximum peak output power at antenna input terminal: 835.60 (mW)

Prediction distance: 20 (cm)

Predication frequency: 1880 (MHz)

Antenna Gain (typical): 0.5 (dBi)

Antenna gain: 1.122 (numeric)

Power density at predication frequency at 20 cm: 0.187 (mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

5.3 Test Result

The EUT is a mobile device. The power density level at 20 cm is 0.399 mW/cm², which is below the uncontrolled exposure limit of 0.560 mW/cm² at 836.580 MHz for GSM band. The power density level at 20 cm is 0.187 mW/cm², which is below the uncontrolled exposure limit of 1mW/cm² at 1880 MHz for PCS band.

6 - §2.1053 - SPURIOUS RADIATED EMISSIONS

6.1 Applicable Standard

Requirements: CFR 47, § 2.1053, § 22.917, § 24.238.

6.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{Log}_{10} (\text{power out in Watts})$

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
Agilent	Amplifier, Pre	8447D	2944A10198	2006-08-17
HP	Amplifier, Pre, Microwave	8449B	3147A00400	2006-08-21
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2006-10-18
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2005-04-20*
HP	Generator, Signal	83650B	3614A00276	2006-05-10
A.R.A.	Antenna, Horn	DRG-118/A	1132	2006-08-17
Wainwright	Filter, Band Reject	WRCG823/850-813/860-40/8SS	2	N/A
Wainwright	Filter, Band Reject	WRCG1850/1910-1835/1925-40/8SS	5	N/A

* Two Year Calibration Cycle

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

6.4 Test Result

Worst case reading as follows:

GSM 850

-6.2 dB at 1673.20 MHz

GSM 1900

-15.8 dB at 3760.00 MHz

Run # 1: 30MHz -10GHz GSM 850 Band Middle Channel

Indicated		Table Angle	Test Antenna		Substituted		Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
Frequency	Amplitude		Height	Polar	Frequency	Level					
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
1673.20	58.63	181	1.8	V	1673.20	-26.60	8.7	1.3	-19.2	-13	-6.2
1673.20	57.38	280	1.2	H	1673.20	-27.80	8.7	1.3	-20.4	-13	-7.4
2509.80	38.48	149	1.1	V	2509.80	-31.70	9.5	1.6	-23.8	-13	-10.8
2509.80	35.46	154	1.1	H	2509.80	-35.30	9.5	1.6	-27.4	-13	-14.4
3346.40	25.55	185	1.5	V	3346.40	-45.20	10.2	2.2	-37.2	-13	-24.2
3346.40	23.00	234	1.6	H	3346.40	-53.10	10.2	2.2	-45.1	-13	-32.1
41.83.00	22.96	186	1.3	V	41.83.00	-52.93	11.1	2.5	-44.3	-13	-31.3
41.83.00	21.58	230	1.2	H	41.83.00	-56.11	11.1	2.5	-47.5	-13	-34.5

Run # 2: 30MHz -20GHz GSM 1900 Band Middle Channel

Indicated		Table Angle	Test Antenna		Substituted		Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
Frequency	Amplitude		Height	Polar	Frequency	Level					
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
3760.00	68.90	80	1.3	v	3760.00	-37.85	11.4	2.3	-28.8	-13	-15.8
3760.00	67.65	190	1.6	h	3760.00	-38.60	11.4	2.3	-29.5	-13	-16.5
5640.00	49.40	160	1.0	v	5640.00	-44.86	11.2	3.1	-36.8	-13	-23.8
5640.00	46.57	220	1.1	h	5640.00	-46.99	11.2	3.1	-38.9	-13	-25.9
7520.00	35.90	100	1.5	v	7520.00	-51.95	11.1	4.1	-44.95	-13	-31.95
7520.00	33.73	90	1.7	h	7520.00	-54.35	11.1	4.1	-47.35	-13	-34.35

7 - §2.1046, §22.913(a), & §24.232 – RF OUTPUT POWER

7.1 Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (a), in no case may the peak output power of a base station transmitter exceed 2 watt.

7.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

** Two Year Calibration Cycle*

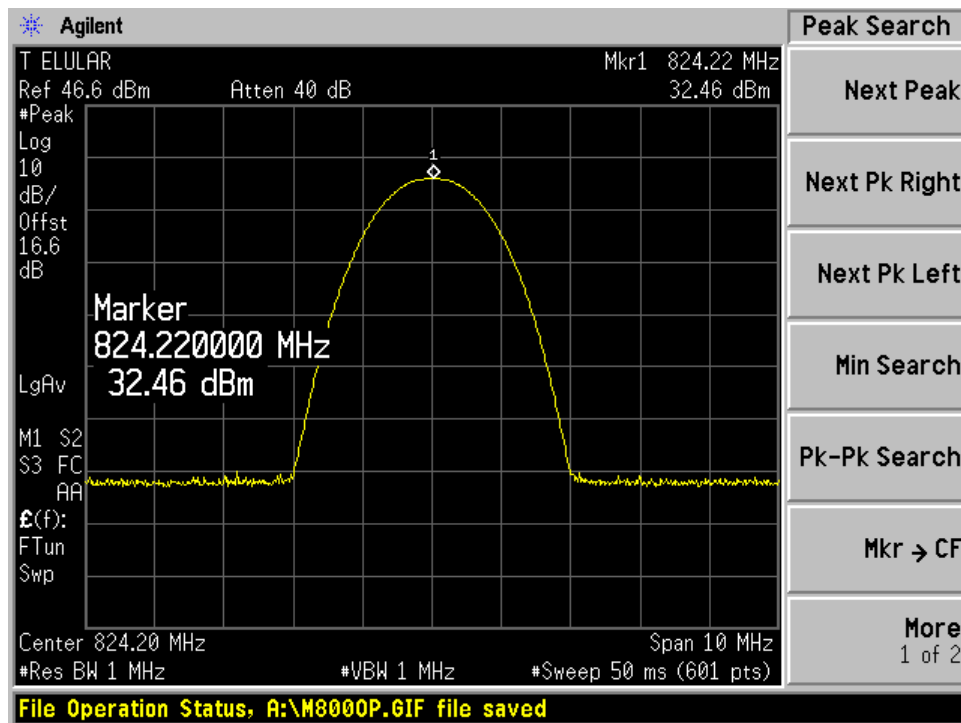
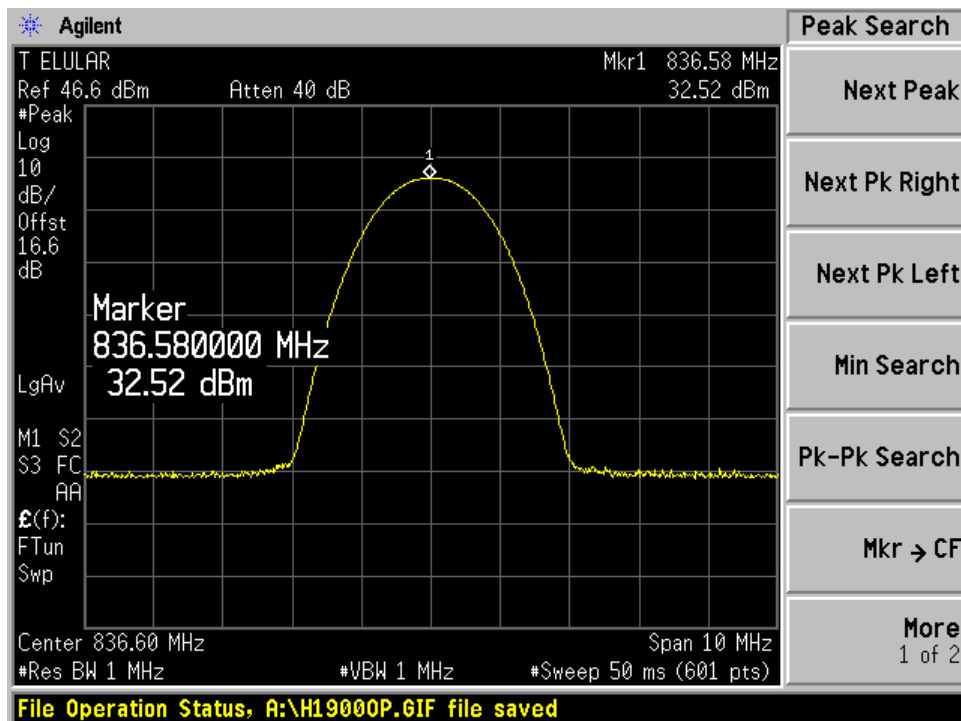
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

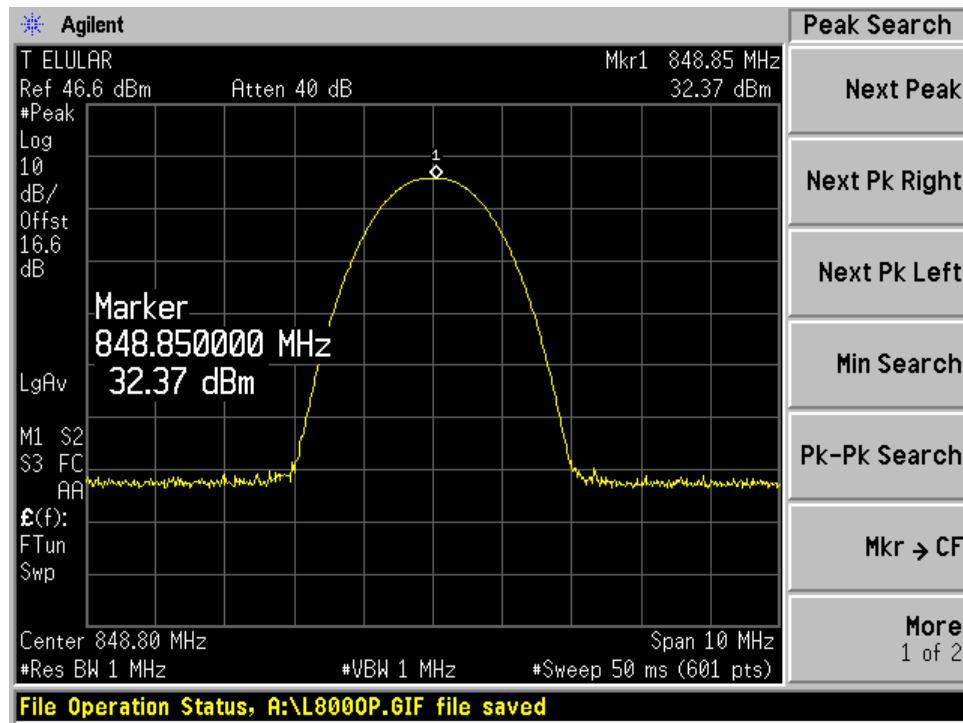
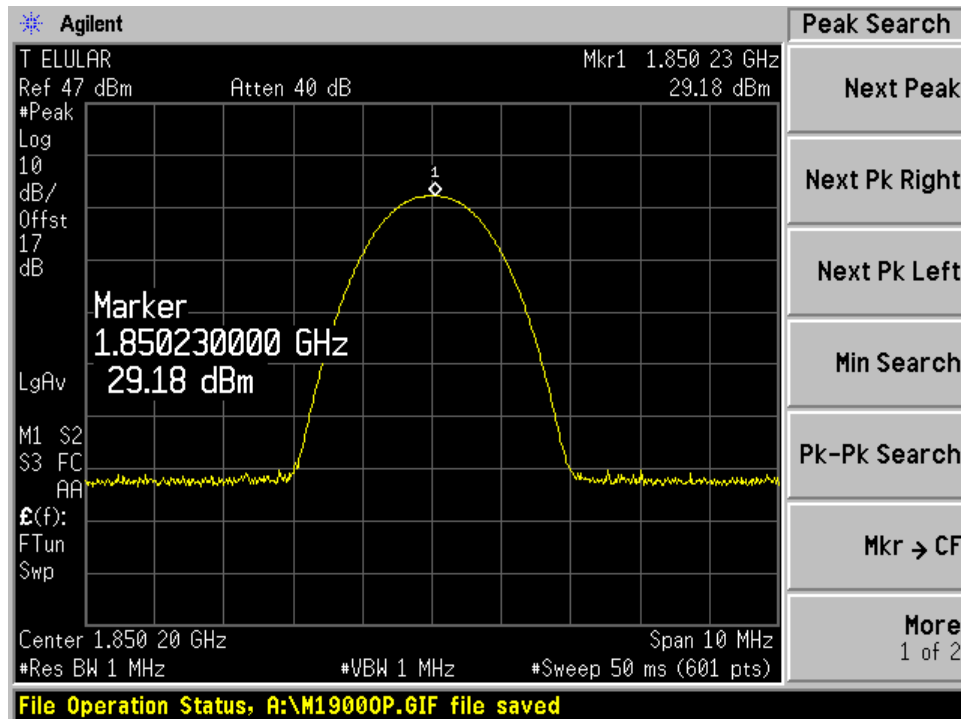
7.4 Test Results*GSM band, Part 22:*

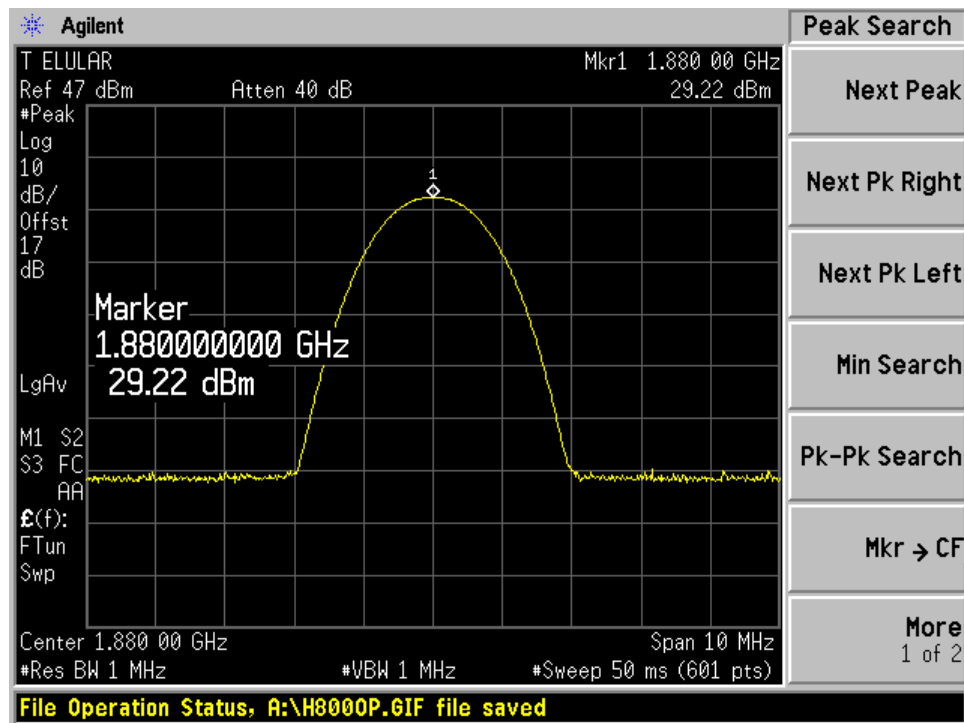
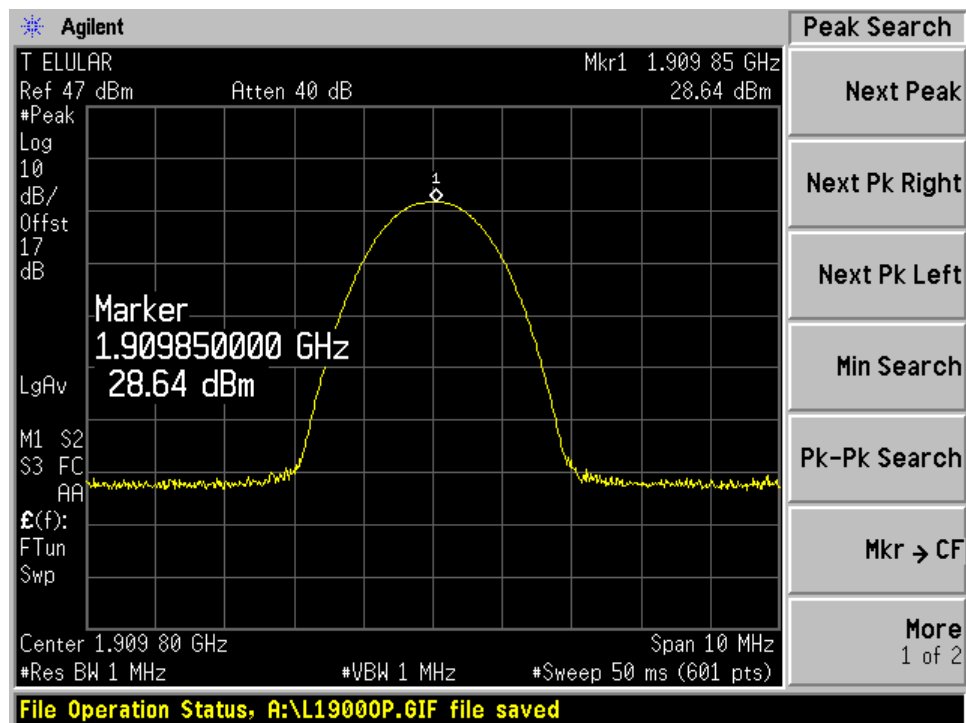
Channel	Frequency (MHz)	Conducted Output Power (dBm)	ERP (dBm)	ERP (Watt)	Limit (Watt)
LOW	824.2	32.46	30.5	1.122	7
MIDDLE	836.6	32.52	31.2	1.318	7
HIGH	848.8	32.37	29.9	0.977	7

PCS band, Part 24:

Channel	Frequency (MHz)	Conducted Output Power (dBm)	EIRP (dBm)	EIRP (Watt)	Limit (Watt)
LOW	1850.2	29.18	29.4	0.871	2
MIDDLE	1880.0	29.22	29.5	0.891	2
HIGH	1909.8	28.64	28.0	0.631	2

Plots of Conducted Output Power for Part 22*Low Channel**Middle Channel*

High Channel**Plots of Conducted Output Power for Part 24***Low Channel*

Middle Channel*High Channel*

8 - §2.1049, §22.917, §22.905, & §24.238 - OCCUPIED BANDWIDTH

8.1 Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 22.901, Section 22.917 and Section 24.238.

8.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 kHz (GSM /PCS) and the 26 dB & 99% bandwidth was recorded.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

* Two Year Calibration Cycle

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

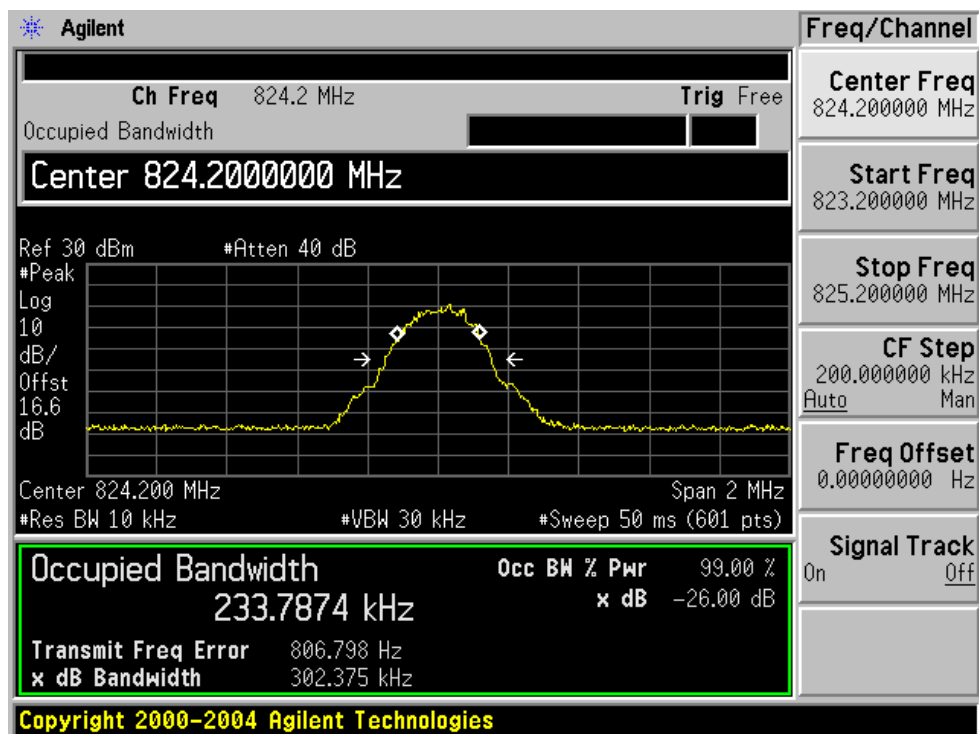
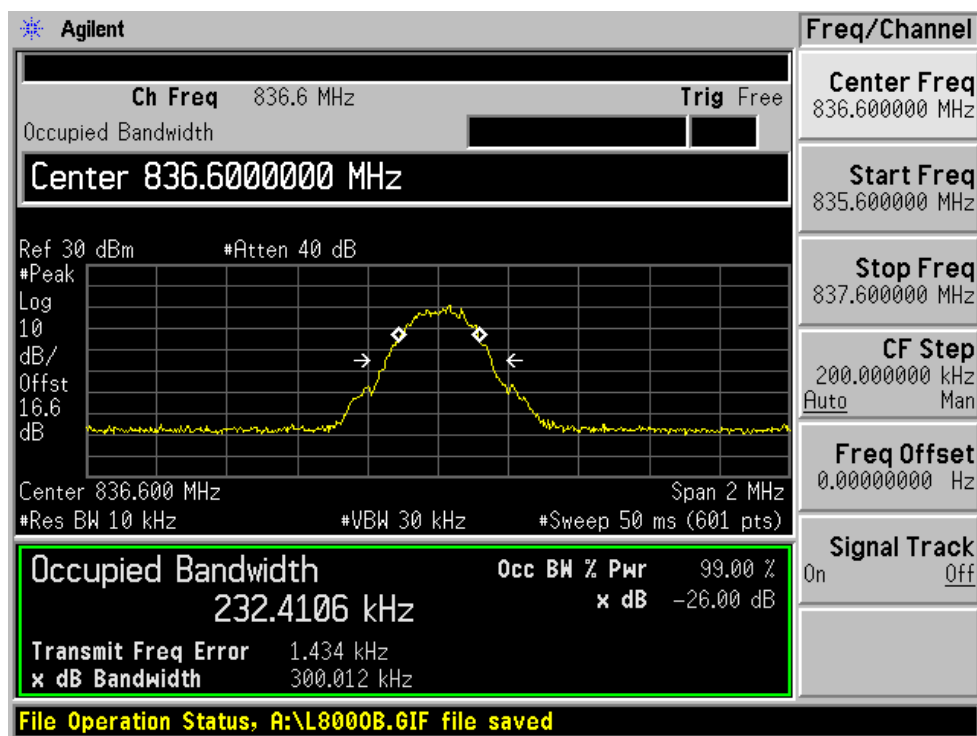
8.4 Test Results

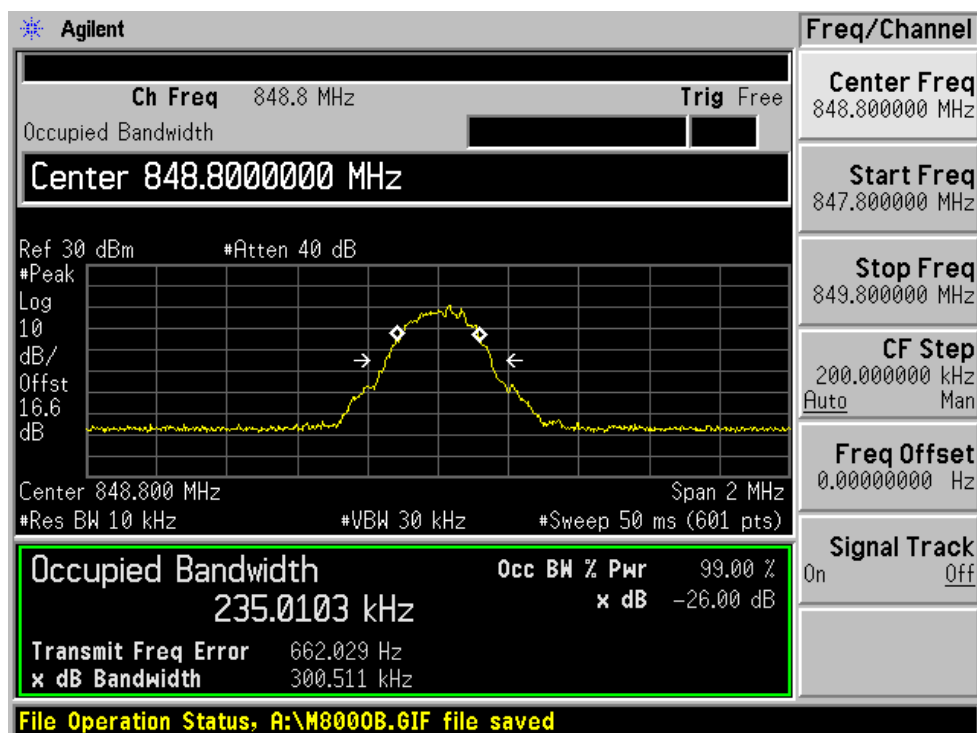
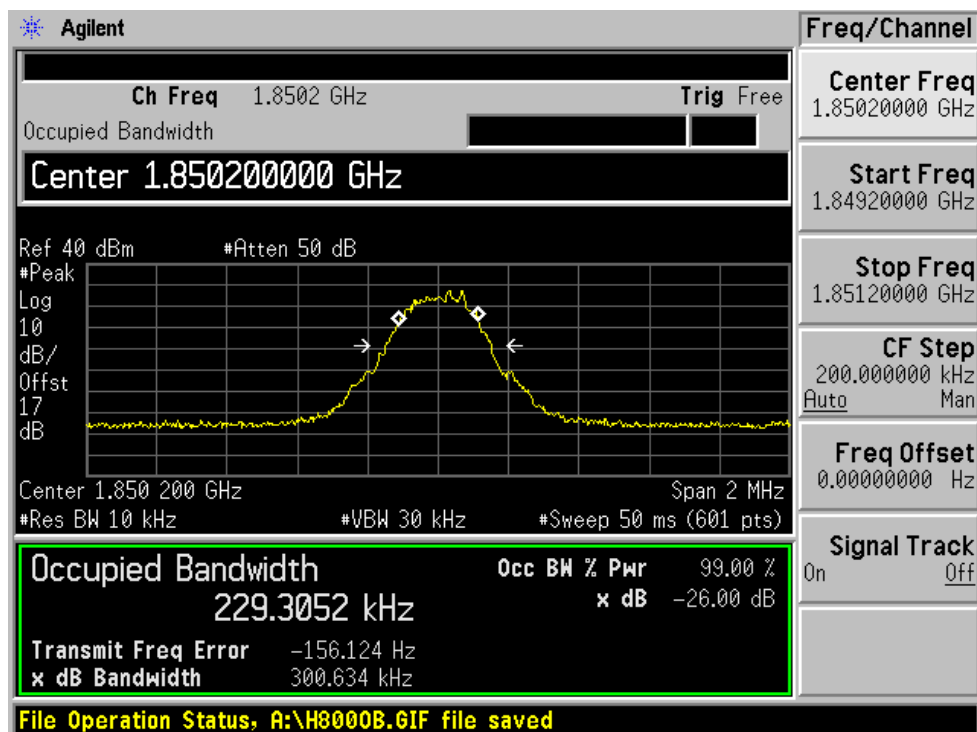
GSM band, Part 22:

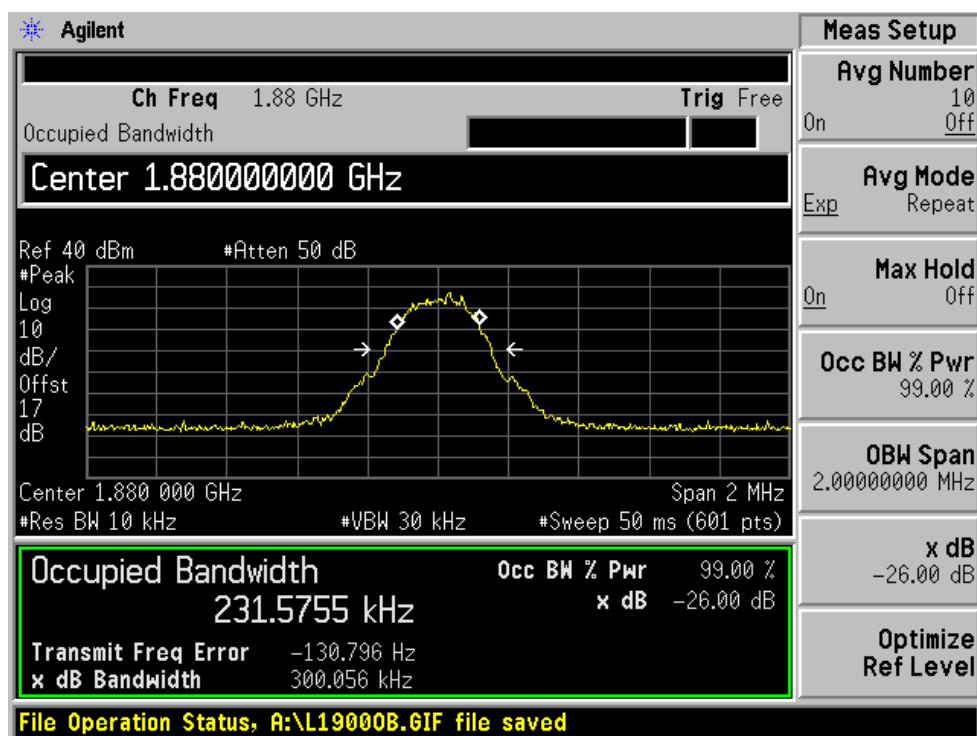
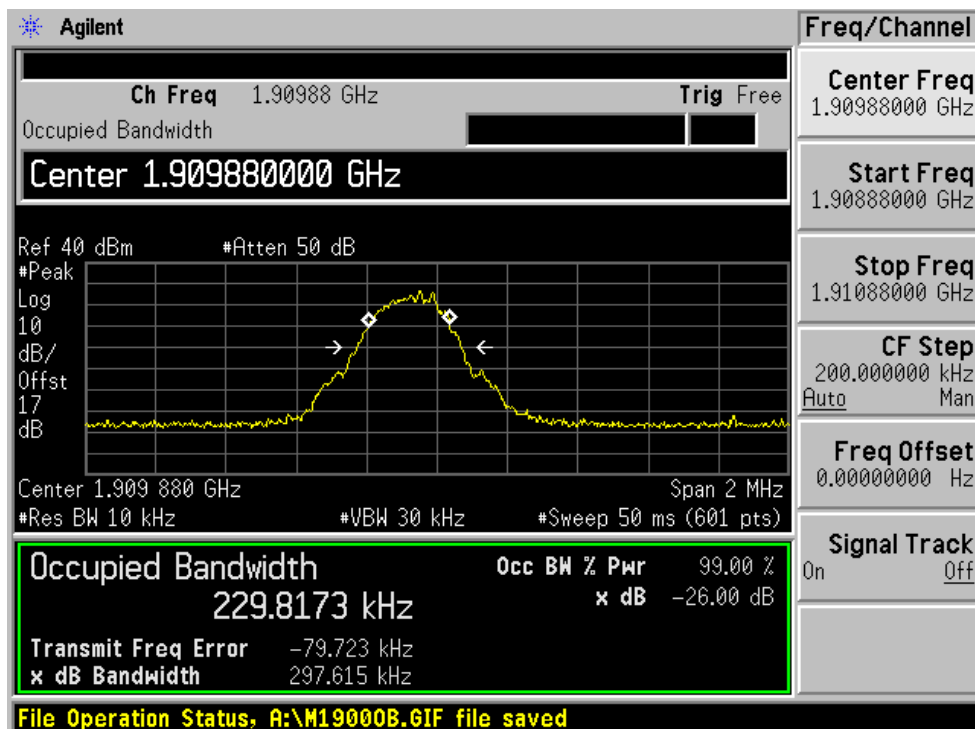
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
LOW	824.2	0.2338
MIDDLE	836.6	0.2324
HIGH	848.8	0.2350

PCS Band, Part 24:

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
LOW	1850.2	0.2293
MIDDLE	1880.0	0.2316
HIGH	1909.8	0.2298

*Plots of Occupied Bandwidth for Part22**Low Channel**Middle Channel*

High Channel*Plots of Occupied Bandwidth for Part24**Low Channel*

Middle Channel*High Channel*

9 - §2.1051, §22.917, & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

9.1 Applicable Standard

Requirements: CFR 47, § 2.1051, § 22.917 & §24.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

9.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

9.3 Test Equipment List and Details

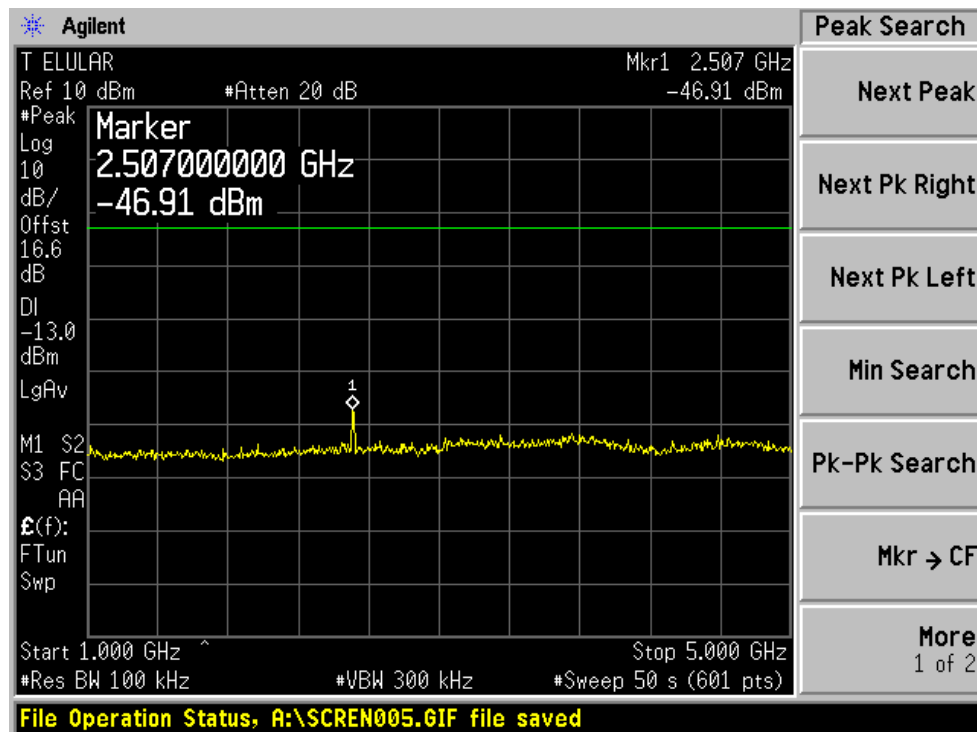
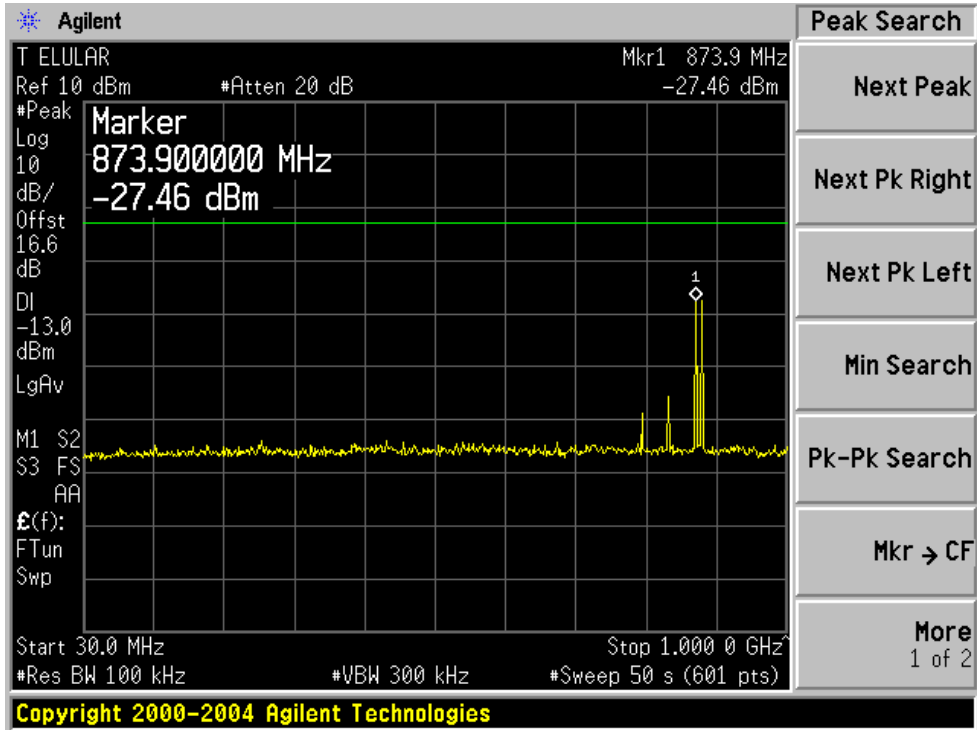
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

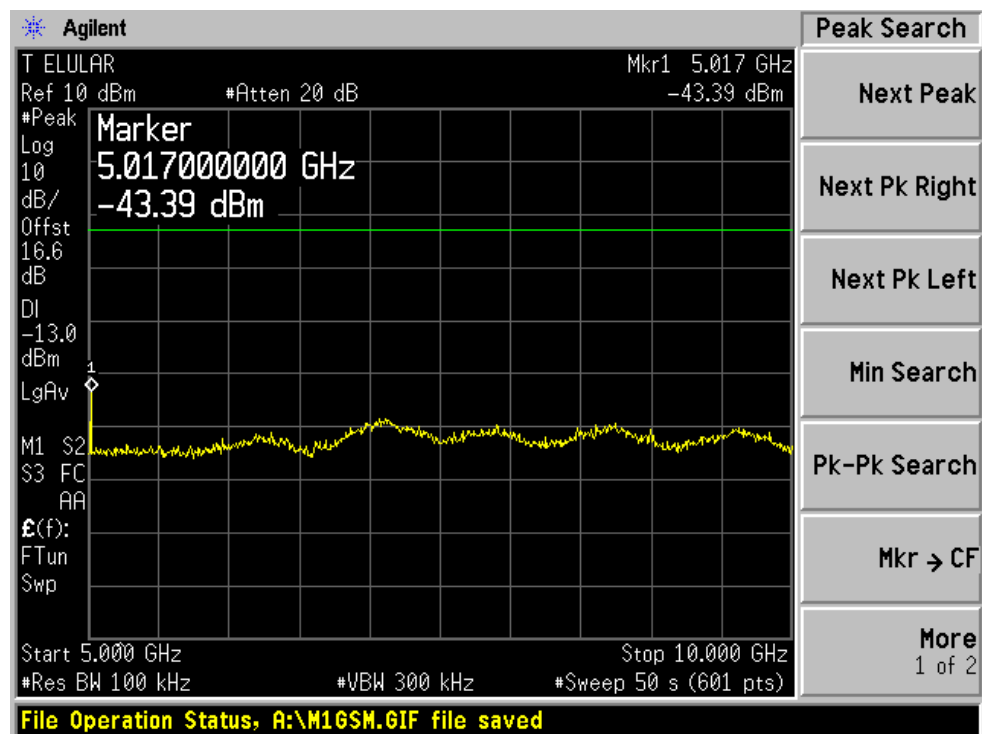
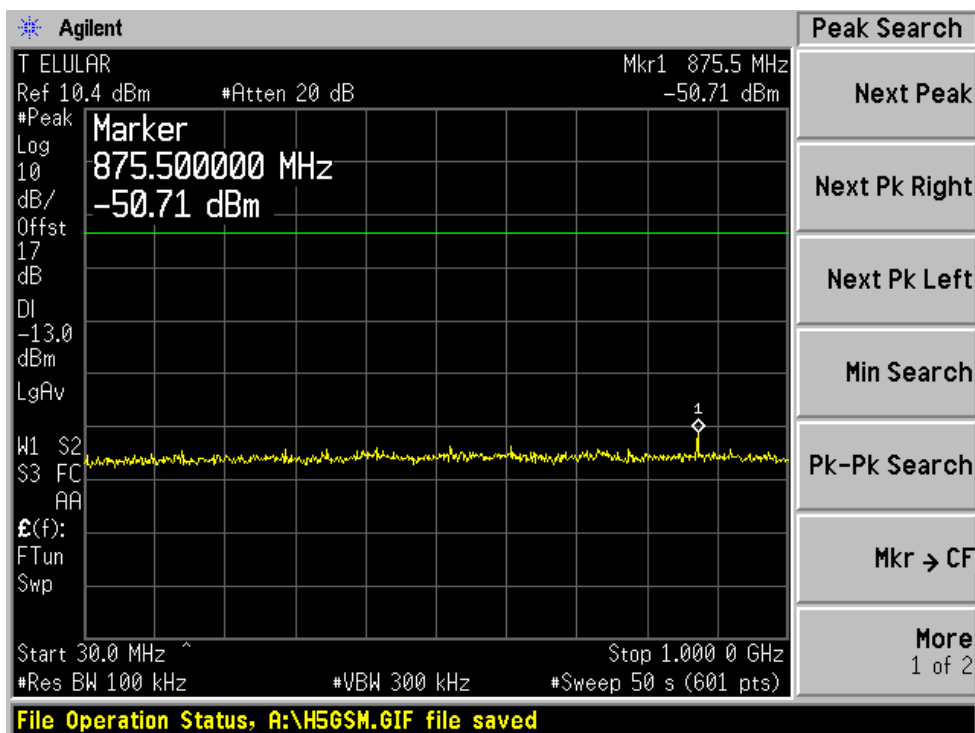
** Two Year Calibration Cycle*

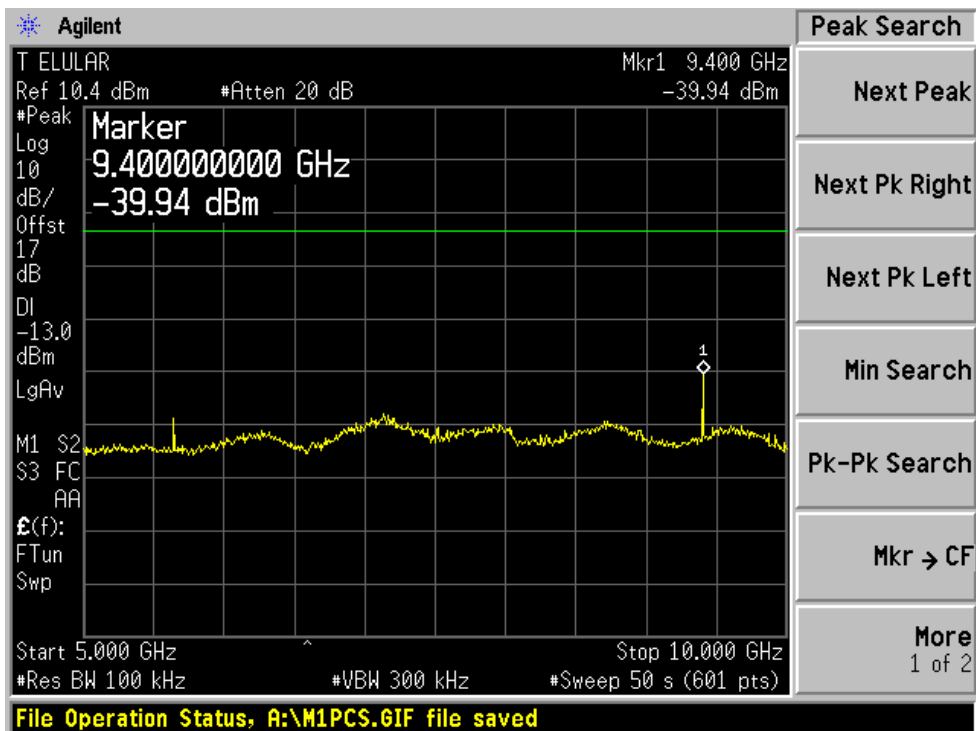
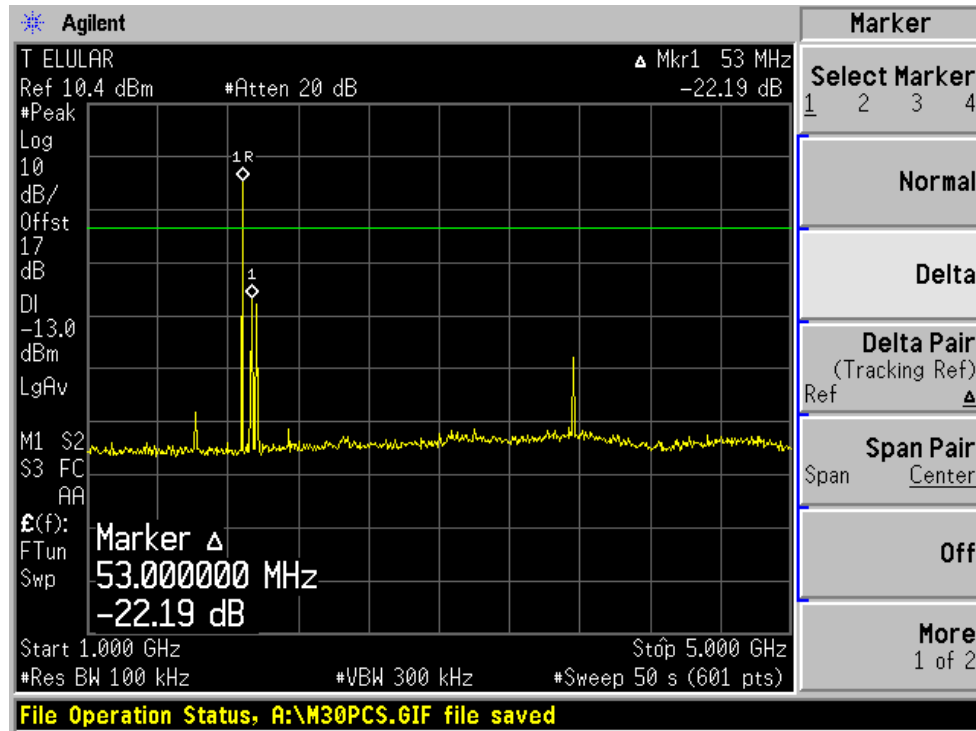
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

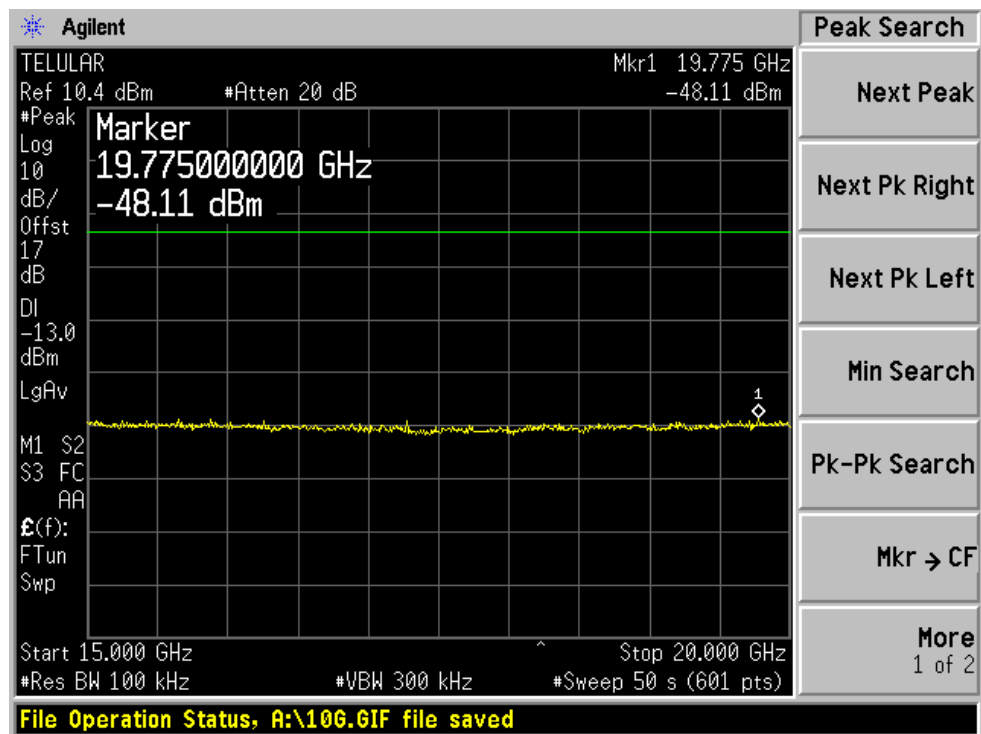
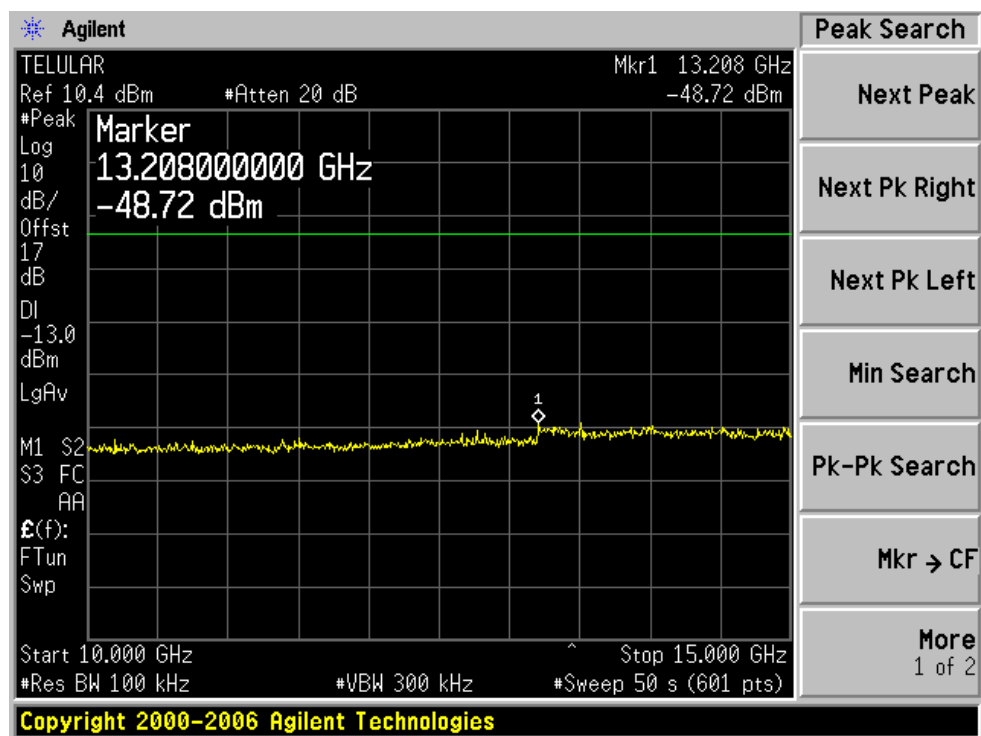
9.4 Test Results

Please refer to the hereinafter plots

Plots of Spurious Emissions for Part22

*Plots of Spurious Emissions for Part24*





10 - §2.1055 (a), §2.1055 (d), §22.355, & §24.235 - FREQUENCY STABILITY

10.1 Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & following:

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Table C-1_Frequency Tolerance for Transmitters in the Public Mobile Services

Table C-1_Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile [le]3 watts (ppm)	Mobile [le]3 watts (ppm)
25 to 50.....	20.0	20.0	50.0
50 to 450.....	5.0	5.0	50.0
450 to 512.....	2.5	5.0	5.0
821 to 896.....	1.5	2.5	2.5
928 to 929.....	5.0	n/a	n/a
929 to 960.....	1.5	n/a	n/a
2110 to 2220.....	10.0	n/a	n/a

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

10.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06
Tenney	Oven, Temperature	VersaTenn	12.222-193	2006-06-04

* Two Year Calibration Cycle

* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

10.4 Test Results

GSM 850 (AC Line)

Frequency Stability versus Temperature

Reference Frequency: 836.600 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Error (ppm)
50	120	836.599969	-0.0371
40	120	836.599968	-0.0383
30	120	836.599976	-0.0287
20	120	836.599982	-0.0215
10	120	836.599971	-0.0347
0	120	836.599967	-0.0394
-10	120	836.599987	-0.0155
-20	120	836.599976	-0.0287
-30	120	836.599963	-0.0442

Frequency Stability versus Voltage

Reference Frequency: 836.6 MHz, Limit: 2.5ppm			
Power Supplied (VAC)	Environment Temperature (°C)	Measured Frequency (MHz)	Error (ppm)
102	20	836.599989	-0.0135
138	20	836.599967	-0.0155

PCS 1900 (AC Line)*Frequency Stability versus Temperature*

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VAC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Error (ppm)
50	120	1879.999973	-0.0141
40	120	1879.999981	-0.0104
30	120	1879.999979	-0.0119
20	120	1879.999982	-0.0095
10	120	1879.999952	-0.0255
0	120	1879.999992	-0.0045
-10	120	1879.999978	-0.0117
-20	120	1879.999968	-0.0170
-30	120	1879.99998	-0.0106

Frequency Stability versus Voltage

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Power Supplied (VAC)	Environment Temperature (°C)	Measured Frequency (MHz)	Error (ppm)
102	20	1879.999956	-0.0235
138	20	1879.999978	-0.0117

GSM 850 (Back up Battery)*Frequency Stability versus Temperature*

Reference Frequency: 836.600 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	Error (ppm)
50	3.6	836.599982	-0.0215
40	3.6	836.599971	-0.0347
30	3.6	836.599976	-0.0287
20	3.6	836.599969	-0.0371
10	3.6	836.599987	-0.0155
0	3.6	836.599967	-0.0394
-10	3.6	836.599963	-0.0442
-20	3.6	836.599968	-0.0383
-30	3.6	836.599976	-0.0287

Frequency Stability versus Voltage

Reference Frequency: 836.6 MHz, Limit: 2.5ppm			
Power Supplied (VDC)	Environment Temperature (°C)	Measured Frequency (MHz)	Error (ppm)
3.1	20	836.599986	-0.0136
4.1	20	836.599968	-0.0144

PCS 1900 (Back up Battery)*Frequency Stability versus Temperature*

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (VDC)	Frequency Measure with Time Elapsed	
		Measured Frequency (MHz)	PPM Error
50	3.6	1879.999992	0.0045
40	3.6	1879.999981	0.0104
30	3.6	1879.999973	0.0141
20	3.6	1879.999982	0.0095
10	3.6	1879.999956	0.0235
0	3.6	1879.999978	0.0117
-10	3.6	1879.999998	0.0106
-20	3.6	1879.999968	0.0170
-30	3.6	1879.999979	0.0119

Frequency Stability versus Voltage

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Power Supplied (VDC)	Environment Temperature (°C)	Measured Frequency (MHz)	PPM Error
3.1	20	1879.999952	0.0255
4.1	20	1879.999976	0.0114

11 – §22.917 & §24.238 – BAND EDGE

11.1 Applicable Standard

According to § 22.917, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

11.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency, RBW set to 10 kHz.

Environmental Conditions

Temperature:	26° C
Relative Humidity:	46%
ATM Pressure:	1020mbar

The testing was performed by Dan Corona on 2007-01-26 to 31.

11.3 Test Equipment List and Details

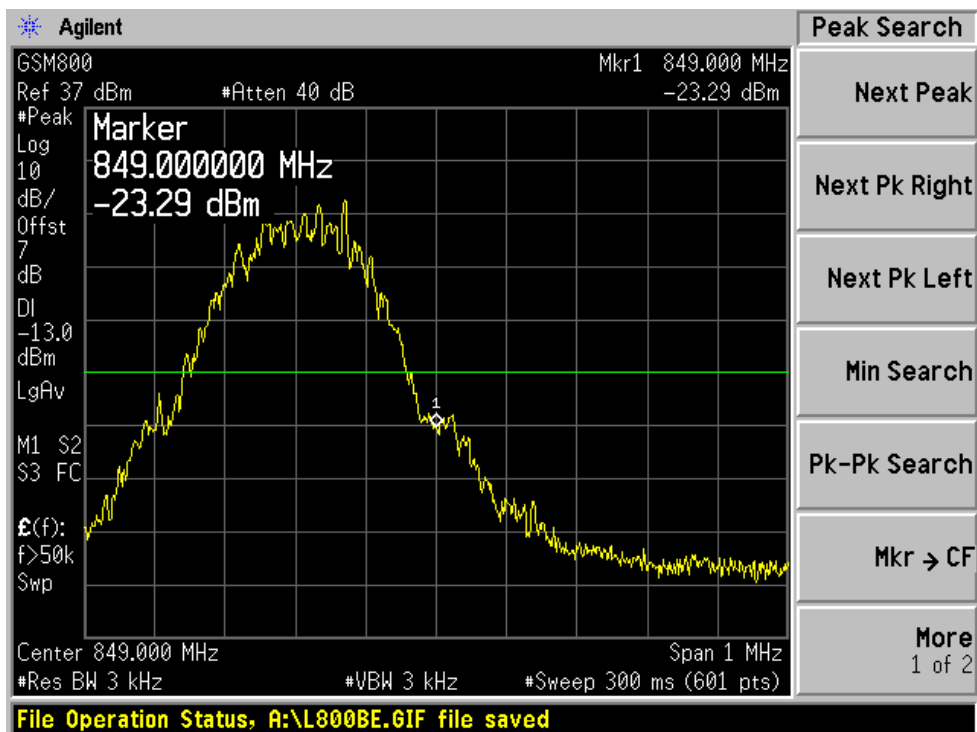
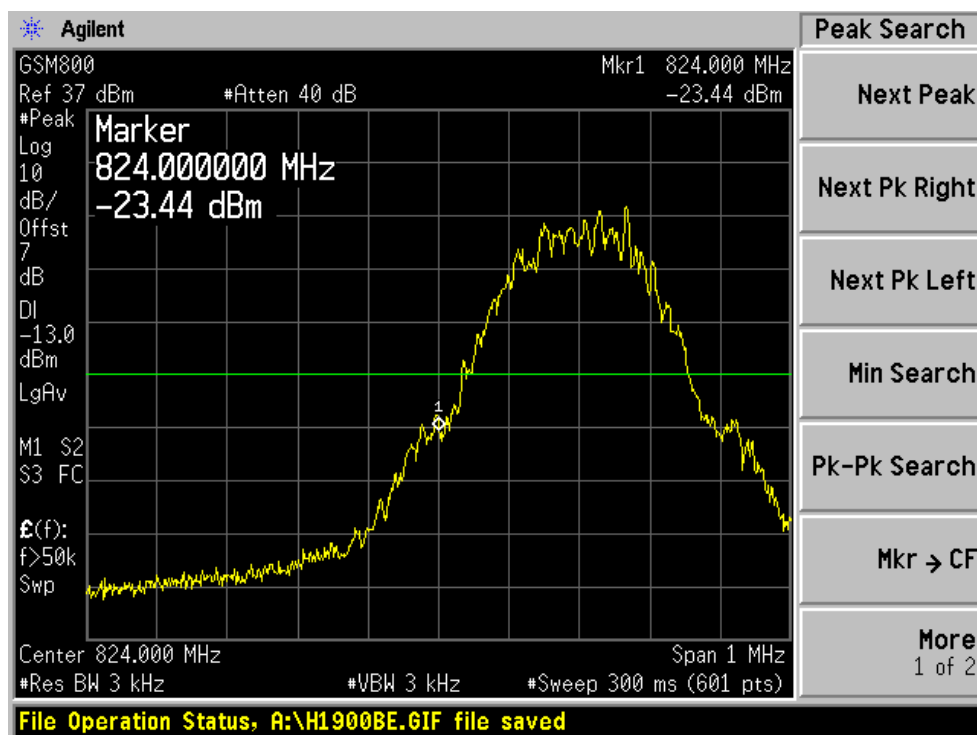
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Analyzer, Communications	E5515C	GB44051221	2005-08-08*
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-03-06

** Two Year Calibration Cycle*

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

11.4 Test Results

Please refer to the following plots.

Plots of Band Edge for Part 22

Plots of Band Edge for Part 24

