

FCC PART 22 TYPE APPROVALS EMI MEASUREMENT AND TEST REPORT

For

ZTE Corporation

ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen,
Guangdong, China 518057

FCC ID: Q78-G650
Model: G650

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Product Type: 800 MHz CDMA2000 1X Mobile Phone
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Report No.: R0606165	
Report Date: 2006-07-05	
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *ZTE Corporation's* product, *FCC ID: Q78-G650* or the "EUT" as referred to in this report is a 800 MHz CDMA2000-1X mobile phone, which measures approximately 115mmL x 51.7mmW x 21.5mmH. The frequency range is Tx 824-849 MHz, Rx 869-894 MHz.

** The test data gathered are from typical production sample, serial number: 350501810039 provided by the manufacturer.*

EUT Photo



Additional Photos in Exhibit C

Objective

This type approval report is prepared on behalf of *ZTE Corporation* in accordance with Part 2, Subpart J, Part 22 Subpart H 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.

Related Submittal(s)/Grant(s)

No Related Submittals

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

Applicable Standards: TIA/EIA 98-C, TIA603-C, ANSI C63.4-2003.

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

Test Facility

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

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC), Industry Canada (IC), 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 radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference have the reports on file and are listed under FCC file 31040/SIT 1300F2, IC registration number: 3062A, and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC, IC, 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 can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

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.

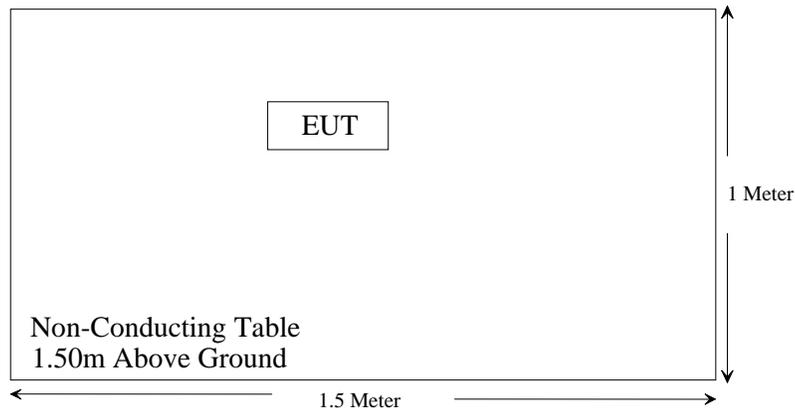
Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Agilent	Communication test set	8960	GB44051221

Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Spurious Radiated Emissions	Compliant
§ 2.1093	RF Exposure	SAR report
§ 2.1046, § 22.912 (d)	RF Output Power	Compliant
§ 2.1049 § 22.917 § 22.905	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355	Frequency stability vs. temperature Frequency stability vs. voltage	Compliant
§ 22.917	Band Edge	Compliant

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047(d). As part 22H has not specific requirement for CDMA modulation, therefore modulation characteristic is not presented.

§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

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

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
HP	Amplifier, Pre, Microwave	8449B	3147A00400	2005-08-10
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2006-05-02
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2006-04-20
HP	Generator, Signal	83650B	3614A00276	2006-05-10
A.R.A.	Antenna, Horn	DRG-118/A	1132	2005-08-17
Wainwright	Filter, Band Reject	WRCG823/850-813/860-40/8SS	2	N/A

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

Environmental Conditions

Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* *The testing was performed by James Ma on 2006-06-30*

Test Result

Worst case reading as follows:

Part22:

-22.4 dB at 1673.04 MHz

TX Spurious Emission scan 30 MHz - 9GHz (TX) Middle channel (836.52MHz)

Indicated		Table Angle	Test Antenna		Substituted		Antenna Gain	Cable Loss	Absolute Level	Limit	Margin
Frequency	Amp.		Height	Polar	Frequency	Level					
MHz	dBuV	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
1673.04	32.30	80	1.4	v	1673.04	-43.20	9.3	1.5	-35.4	-13	-22.4
3346.08	27.60	180	1.3	v	3346.08	-43.60	10.0	2.2	-35.8	-13	-22.8
3346.08	27.30	0	1.4	h	3346.08	-44.30	10.0	2.2	-36.5	-13	-23.5
2509.56	27.80	180	1.7	v	2509.56	-44.20	9.3	1.9	-36.8	-13	-23.8
2509.56	27.20	200	1.5	h	2509.56	-44.40	9.3	1.9	-37.0	-13	-24.0
1673.04	28.50	70	1.2	h	1673.04	-46.30	9.3	1.5	-38.5	-13	-25.5

Note: No Pre-amplifier.

§2.1046, §22.913(a)– RF OUTPUT POWER

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.

Test Procedure

Conducted:

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

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

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

Environmental Conditions

Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* *The testing was performed by James Ma on 2006-06-30*

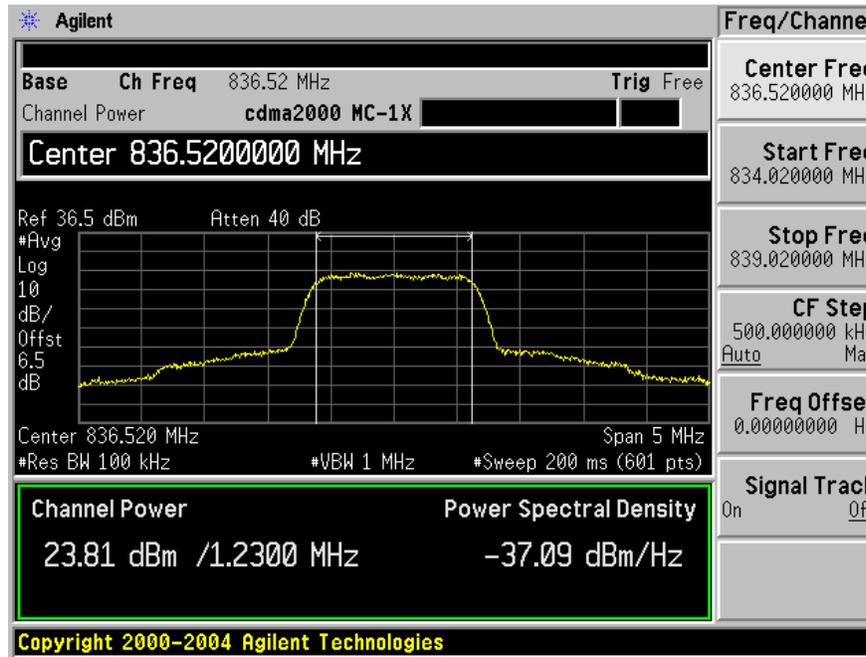
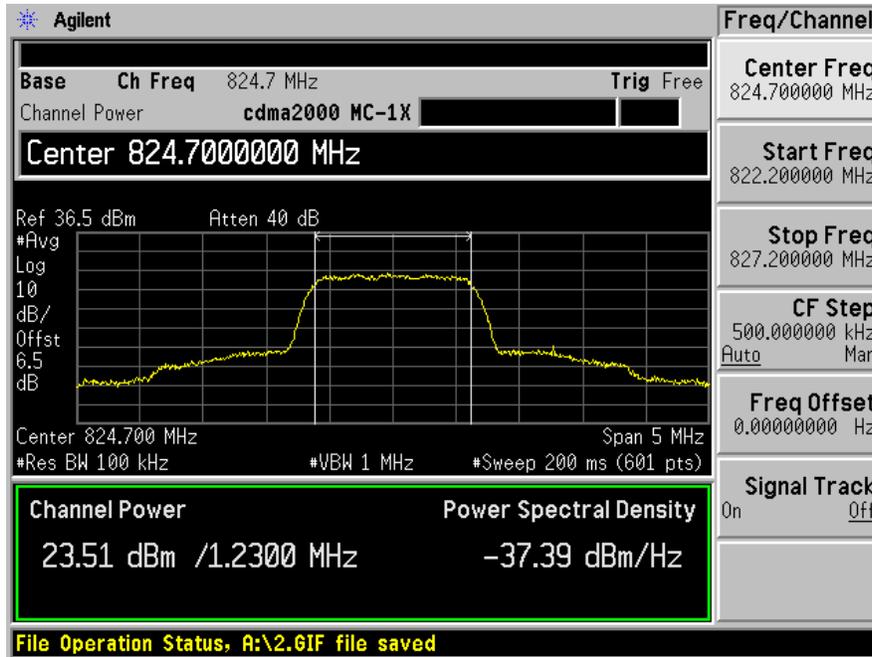
Test Results

Channel	Radio Configuration and Conducted Power (dBm)				
	<i>RC1</i>	<i>RC2</i>	<i>RC3</i>	<i>RC4</i>	<i>RC5</i>
Low	23.45	23.46	23.51	23.51	23.48
Mid	23.80	23.78	23.81	23.80	23.78
High	23.81	23.89	23.90	23.88	23.85

Based on the above results from the different radio configuration, RC3 is the worst case for all measurements.

The EUT antenna is non-retractable antenna with 0dBi gain, VSWR<2.0 and vertical polarization.

Plots of Conducted Output RF Power for RC3



Agilent

Base Ch Freq 848.3 MHz Trig Free

Channel Power **cdma2000 MC-1X**

Center 848.300000 MHz

Ref 36.5 dBm Atten 40 dB

#Avg 10
Log
dB/
Offst 6.5
dB

Center 848.300 MHz Span 5 MHz
#Res BW 100 kHz #VBW 1 MHz #Sweep 200 ms (601 pts)

Channel Power		Power Spectral Density	
23.90 dBm	/1.2300 MHz	-36.99 dBm/Hz	

Freq/Channel

Center Freq
848.300000 MHz

Start Freq
845.800000 MHz

Stop Freq
850.800000 MHz

CF Step
500.000000 kHz
Auto Man

Freq Offset
0.0000000 Hz

Signal Track
On Off

File Operation Status, A:\1.GIF file saved

§2.1049, §22.917, §22.905 - OCCUPIED BANDWIDTH

Applicable Standard

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

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 30kHz and the 26 dB & 99% bandwidth was recorded.

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

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

Environmental Conditions

Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* *The testing was performed by James Ma on 2006-06-30*

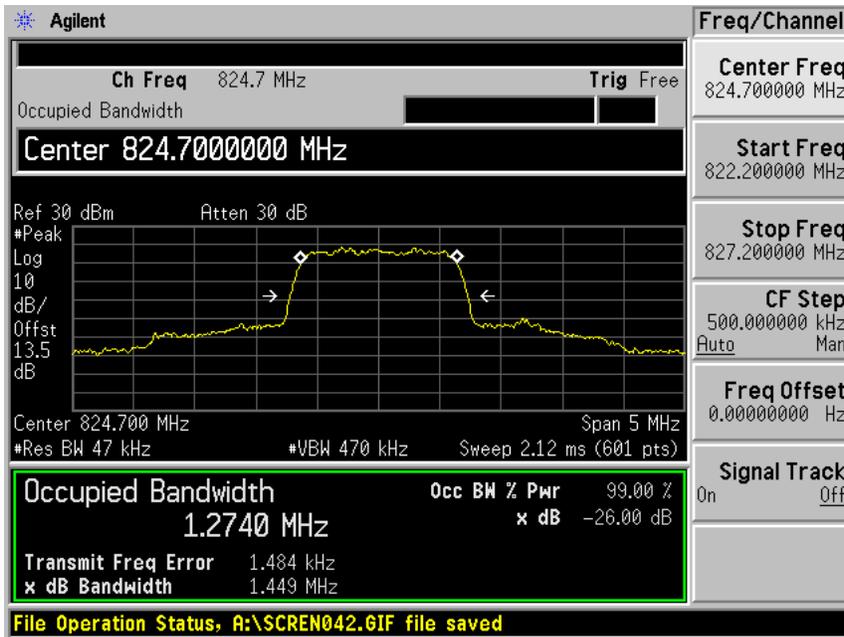
Test Results

Part 22:

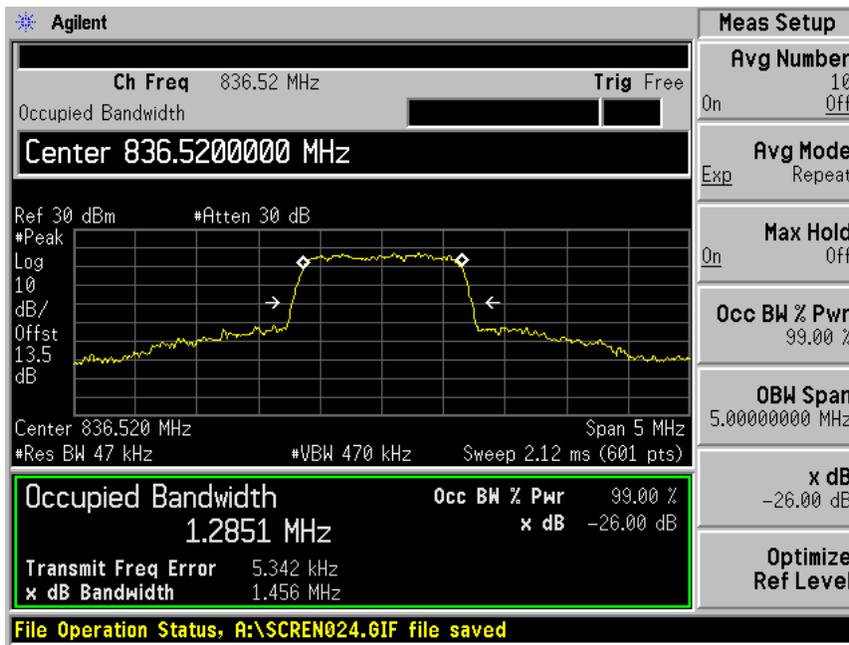
Channel	Frequency	Measured Bandwidth
	MHz	MHz
Low	824.69	1.2740
Mid	836.52	1.2851
High	848.32	1.2857

Please refer to the following plots.

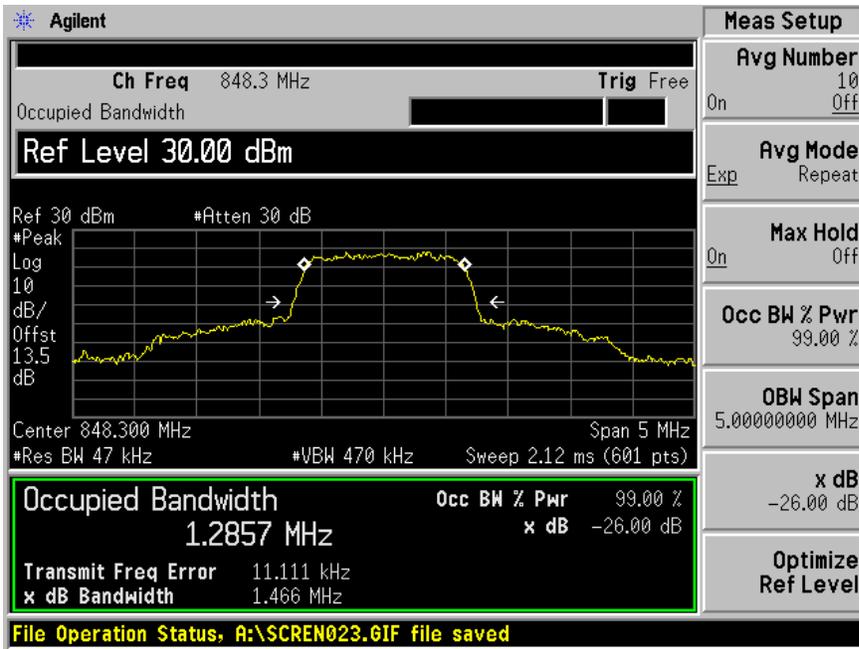
Low Channel:



Mid Channel:



High Channel:



§2.1051, §22.917 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Requirements: CFR 47, § 2.1051. § 22.917.

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

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.

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
Wainwright	Filter, Band Reject	WRCG823/850 -813/860- 40/8SS	2	N/R

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

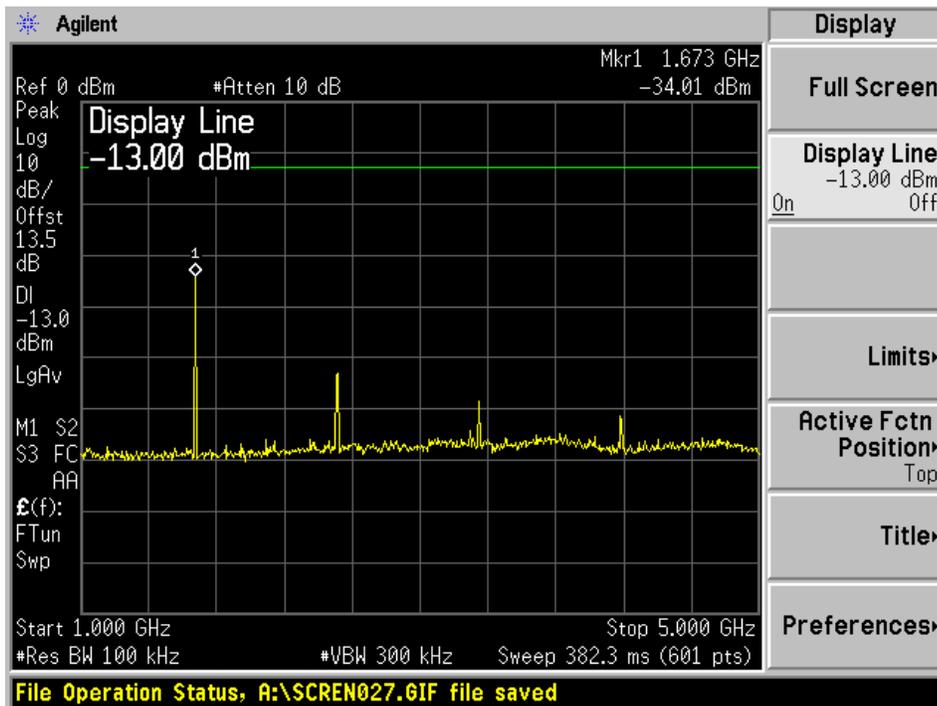
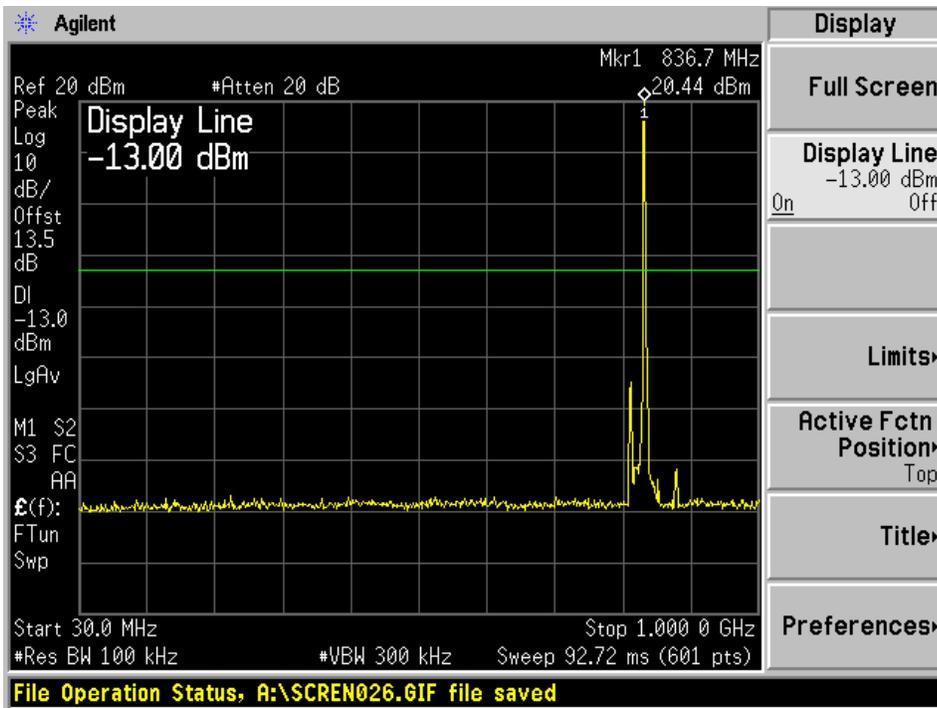
Environmental Conditions

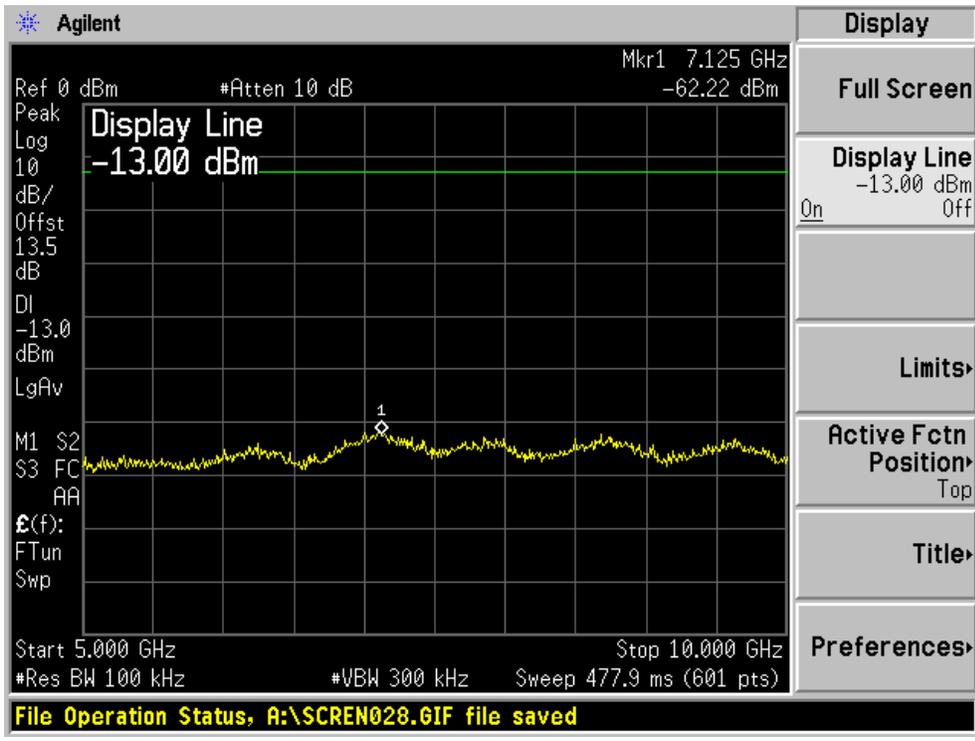
Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* *The testing was performed by James Ma on 2006-06-30*

Test Results

Please refer to the hereinafter plots.





§2.1055 (a), §2.1055 (d), §22.355 - FREQUENCY STABILITY

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 emission stays within the authorized frequency block.

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.

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	2005-06-04

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

Environmental Conditions

Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* The testing was performed by James Ma on 2006-06-30

Test Results

Frequency Stability Versus Temperature:

Reference Frequency: 836.52 MHz, Limit: 2.5ppm				
Environment Temperature (°C)	Power Supplied (VDC)	Frequency error (Hz)	Measurement Results	
			PPM Error	PPM Limit
50	3.7	-7.600000	-0.009085	2.5
40	3.7	-5.800000	-0.006933	2.5
30	3.7	-7.900000	-0.009444	2.5
20	3.7	-6.600000	-0.007890	2.5
10	3.7	-6.900000	-0.008248	2.5
0	3.7	-5.500000	-0.006575	2.5
-10	3.7	-5.800000	-0.006933	2.5
-20	3.7	-7.500000	-0.008966	2.5
-30	3.7	-7.700000	-0.009205	2.5

Frequency Stability Versus Voltage:

Reference Frequency: 836.52 MHz, Limit: 2.5ppm				
Power Supplied (VDC)	Environment Temperature (°C)	Frequency error (MHz)	Measurement Result	
			PPM Error	PPM Limit
3.4	20	-7.800000	-0.009324	2.5

§22.917 – BAND EDGE

Applicable Standard

According to § 22.917, the power of any emission 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.

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.

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

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

Environmental Conditions

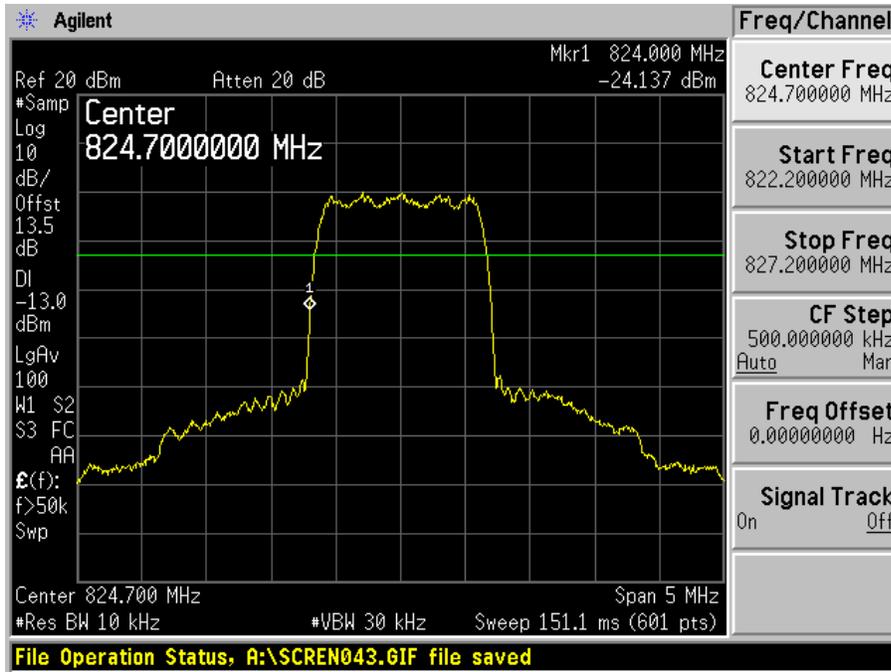
Temperature:	20° C
Relative Humidity:	55%
ATM Pressure:	1018mbar

* *The testing was performed by James Ma on 2006-06-30*

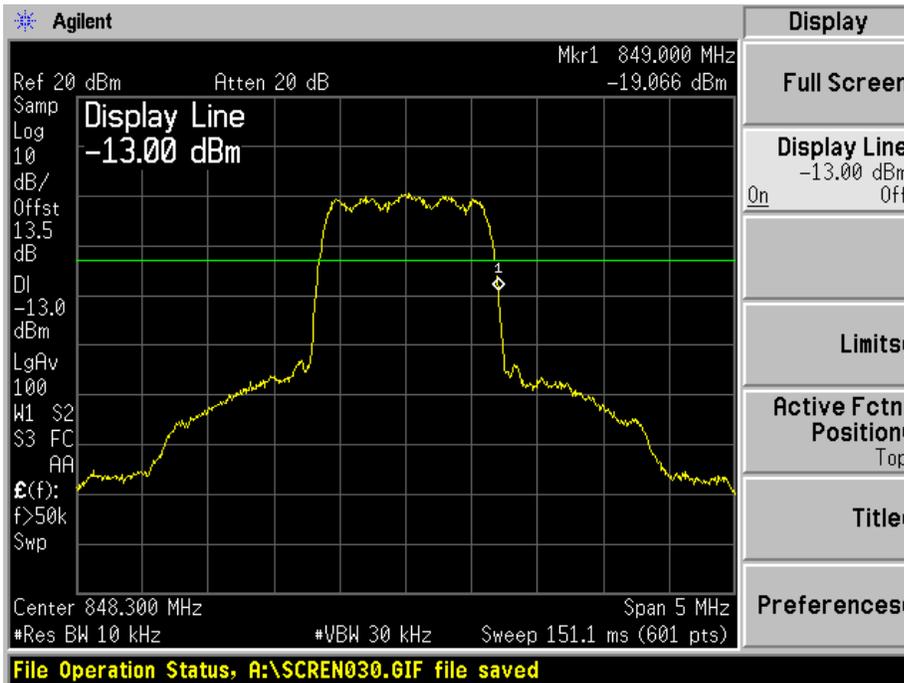
Test Results

Please refer to the following plots.

Lowest Channel:



Highest Channel:



§15.107 - CONDUCTED EMISSIONS

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are receiver, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is ± 2.4 dB.

EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC 15 Class B limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and bundled as required.

The charger of EUT was connected to 120VAC/60Hz power source.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
R&S	Receiver, EMI Test	ESCS30	100176	2006-03-13
R&S	LISN, Artificial Mains	ESH2-Z5	871884/039	2005-08-16

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

Test Procedure

During the conducted emission test, the power cord of the EUT was connected to the mains outlet of the LISN-1, the power cord of the monitor and modem were connected to the LISN-2.

Maximizing procedure were performed on the six (6) highest provided emissions of the EUT.

All data was recorded in the quasi-peak and average detection mode. Quasi-Peak readings are distinguished with an "QP". Average readings are distinguished with an "Ave".

Test Results Summary

According to the recorded data, the EUT complies with the FCC Conducted limits for a Class B device, with the worst margin reading of:

20.4 dB at 9.145 MHz at Neutral mode at 150 kHz to 30 MHz

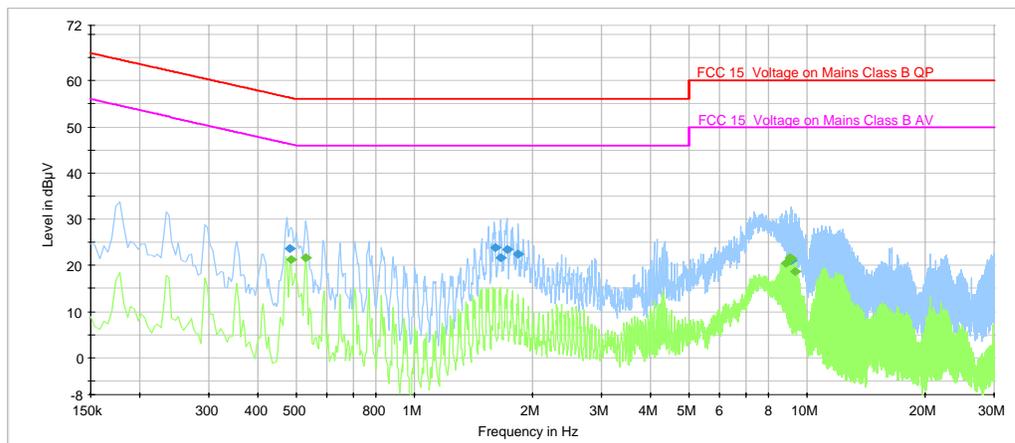
Conducted Emissions Test Data

Environmental Conditions

Temperature:	21 °C
Relative Humidity:	65%
ATM Pressure:	1025mbar

*The testing was performed by Daniel Deng on 2006-07-03.

FCC CLASS B - Line



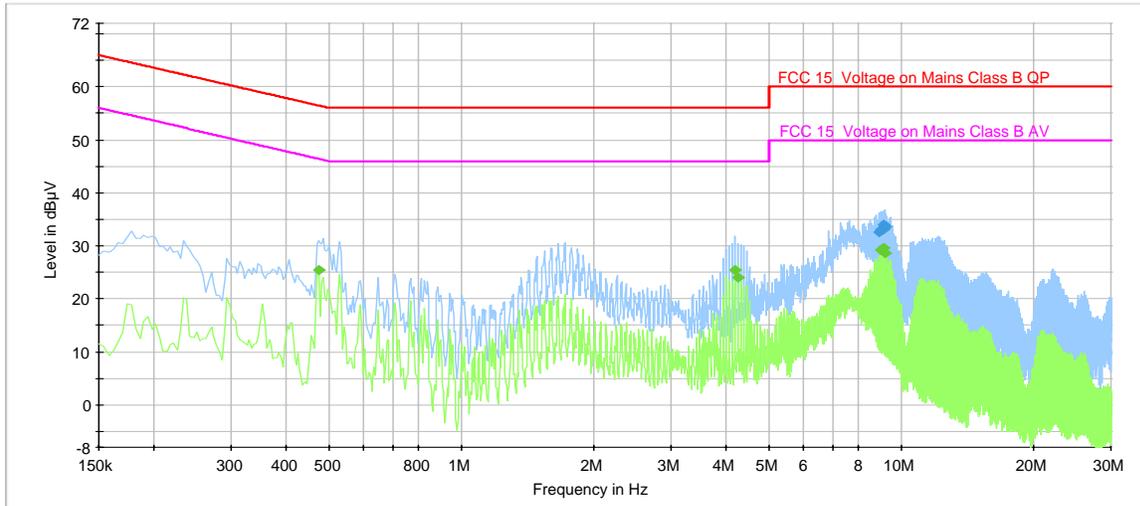
Quasi Peak Measurements

Frequency (MHz)	Quasi Peak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dBµV)
1.605000	23.9	1000.000	9.000	L1	32.1	56.0
1.725000	23.5	1000.000	9.000	L1	32.5	56.0
0.481000	23.6	1000.000	9.000	L1	32.7	56.3
1.841000	22.4	1000.000	9.000	L1	33.6	56.0
1.657000	21.6	1000.000	9.000	L1	34.4	56.0
9.121000	21.1	1000.000	9.000	L1	38.9	60.0

Average Measurements

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dBµV)
0.529000	21.6	1000.000	9.000	L1	24.4	46.0
0.485000	21.3	1000.000	9.000	L1	24.9	46.3
9.045000	21.7	1000.000	9.000	L1	28.3	50.0
9.109000	21.4	1000.000	9.000	L1	28.6	50.0
8.853000	20.4	1000.000	9.000	L1	29.6	50.0
9.369000	18.7	1000.000	9.000	L1	31.3	50.0

FCC CLASS B - Neutral



Quasi Peak Measurements

Frequency (MHz)	Quasi Peak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dBµV)
9.149000	34.0	1000.000	9.000	N	26.1	60.0
9.213000	33.6	1000.000	9.000	N	26.4	60.0
8.957000	33.1	1000.000	9.000	N	26.9	60.0
9.089000	33.2	1000.000	9.000	N	26.9	60.0
9.021000	33.1	1000.000	9.000	N	27.0	60.0
8.897000	32.6	1000.000	9.000	N	27.4	60.0

Average Measurements

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dBµV)
9.145000	29.6	1000.000	9.000	N	20.4	50.0
4.189000	25.4	1000.000	9.000	N	20.6	46.0
8.953000	29.2	1000.000	9.000	N	20.8	50.0
0.473000	25.4	1000.000	9.000	N	21.0	46.5
9.209000	28.6	1000.000	9.000	N	21.4	50.0
4.253000	24.0	1000.000	9.000	N	22.0	46.0