



# FCC PART 24 E MEASUREMENT AND TEST REPORT

For

# Cal-Comp Electronics (Suzhou) Co. Ltd.

No.2288, Jiangxing East Rd., Wujiang Economic Development Zone,

Jiangsu, 215200, China

FCC ID: VR2M330T

Report Type: **Product Type:** Mobile Phone Original Report Vi cent: Kang **Test Engineer:** Vicent Kang **Report Number:** RSZ09020402-24E **Report Date:** 2009-03-10 Merry Zhao merry, Thuo **Reviewed By:** EMC Engineer **Prepared By:** Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

**Note**: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government. \* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" (Rev.2)

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## **GENERAL INFORMATION**

## **Product Description for Equipment Under Test (EUT)**

The *Cal-Comp Electronics (Suzhou) Co. Ltd.*'s product, model number: *M330T* or the "EUT" as referred to in this report is a *Mobile Phone*, which measures approximately: 10.0 cm L x 5.0 cm W x 1.6 cm H, rated input voltage: DC 3.7V battery.

Frequency band: PCS 1900: 1850-1910 MHz (Tx), 1930-1990 MHz (Rx)

Bluetooth: 2402-2480 MHz (Tx/Rx)

\* All measurement and test data in this report was gathered from production sample serial number: 0902010 (Assigned by BACL). The EUT was received on 2009-02-04.

\*Note: The series products, model M330T and i-mobile 322, we select M330T to test, there is no electrical change has been made to the equipment, which was explained in the attached Declaration Letter.

#### **EUT Photo**



Please see additional photos in Exhibit B & C

## **Objective**

This type approval report is prepared on behalf of *Cal-Comp Electronics (Suzhou) Co. Ltd.* in accordance with Part 2, Subpart J, and Part 24 Subpart E of the Federal Communication Commissions rules.

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

#### **Related Submittal(s)/Grant(s)**

FCC Part 15.247 submission with FCC ID: VR2M330T.

#### **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 24 Subpart E - PCS

Applicable Standards: TIA/EIA 603-C, ANSI 63.4-2003.

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

## **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp.(Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <a href="http://ts.nist.gov/Standards/scopes/2007070.htm">http://ts.nist.gov/Standards/scopes/2007070.htm</a>

## **SYSTEM TEST CONFIGURATION**

## **Justification**

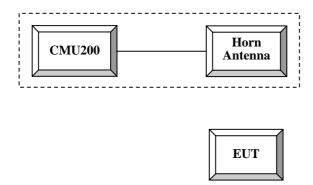
The EUT was configured for testing according to TIA/EIA-603-C.

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

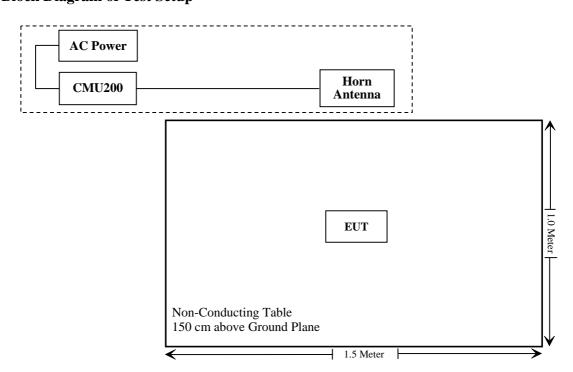
## **Equipment Modifications**

No modifications were made to the EUT.

## **Configuration of Test Setup**



## **Block Diagram of Test Setup**



# SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1037, §2.1093	RF Exposure	Compliant * Please refer to SAR Report
§2.1046, § 24.232 (c)	RF Output Power	Compliant
§ 2.1047	Modulation Characteristics	N/A
§ 2.1049, § 24.238	99% & -26 dB Occupied Bandwidth	Compliant
§ 2.1051, § 24.238 (a)	Spurious Emissions at Antenna Terminal	Compliant
§ 2.1053, § 24.238 (a)	Field Strength of Spurious Radiation	Compliant
§ 24.238 (a)	Out of Band Emission, Band Edge	Compliant
§ 2.1055, § 24.235	Frequency Stability vs. temperature Frequency Stability vs. voltage	Compliant

Note: \* SAR report released by BACL, report number: R0901197-SAR

## §1.1037, §2.1093 - RF EXPOSURE

## **Applicable Standard**

§1.1310 and §2.1093

## **Test Result**

The EUT is a hand portable device and thus requires SAR evaluation; please see BACL SAR Report R0901197-SAR for measurement and testing in details.

# §2.1047 - MODULATION CHARACTERISTIC

## **Applicable Standard**

According to FCC  $\S 2.1047(d)$ , Part 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

## § 2.1046 & § 24.232 (c) - RF OUTPUT POWER

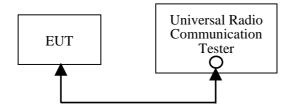
## **Applicable Standard**

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

## **Test Procedure**

Conducted method:

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



Radiated method:

TIA 603-C section 2.2.17

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09
HP	Preamplifier	8449B	3008A00277	2008-09-12	2009-09-11
HP	Signal Generator	HP8657A	2849U00982	2008-10-16	2009-10-16
HP	Amplifier	HP8447D	2944A09795	2008-08-02	2009-08-02
HP	Synthesized Sweeper	8341B	2624A00116	2008-11-07	2009-11-06
COM POWER	Dipole Antenna	AD-100	041000	2008-09-25	2009-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2008-05-17	2009-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## **Test Data**

## **Environmental Conditions**

Temperature:	25 °C	
Relative Humidity:	56 %	
ATM Pressure:	100.0kPa	

The testing was performed by Vicent Kang on 2009-02-16.

## **Conducted Power:**

## **GSM**

Channel	Frequency (MHz)	Output Power (dBm)
512	1850.2	29.22
661	1880.0	29.01
810	1909.8	28.44

## **GPRS**

Channel	Frequency (MHz)	Output Power (dBm)
512	1850.2	29.21
661	1880.0	28.99
810	1909.8	28.78

## **EIRP:**

## GSM

Indic	ated	Table	Test A	ntenna	Su	bstituted		Ant. Gain	Cable	Absolute	FCC Part 24E
Frequency (MHz)	S.A. Reading (dBµV/m)	Angle Degree	Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Polar (H/V)	Cord. (dBi)	Loss (dB)		Limit (dBm)
	Frequency in Low Channel										
1850.2	118.74	240	1.8	Н	1850.2	17.56	Н	6.2	1.02	22.74	33
1850.2	119.95	80	1.0	V	1850.2	20.11	V	6.2	1.02	25.29	33
				Frequ	ency in Mid	ldle Char	nnel				
1880	119.25	230	1.85	Н	1880	18.02	Н	6.2	1.03	23.19	33
1880	120.03	82	1.0	V	1880	20.03	V	6.2	1.03	25.20	33
	Frequency in High Channel										
1909.8	116.34	240	1.9	Н	1909.8	16.6	Н	6.2	1.03	21.77	33
1909.8	118.33	82	1.04	V	1909.8	18.13	V	6.2	1.03	23.30	33

## **GPRS**

Indic	eated	Table	Test A	ntenna	Su	bstituted		Ant. Gain	Cable	Absolute	FCC Part 24E
Frequency (MHz)	S.A. Reading (dBµV/m)	Angle Degree	Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Polar (H/V)	Cord. (dBi)	Loss (dB)	Level (dBm)	Limit (dBm)
	Frequency in Low Channel										
1850.2	118.01	240	1.8	Н	1850.2	16.82	Н	6.2	1.02	22.00	33
1850.2	118.46	80	1.0	V	1850.2	18.49	V	6.2	1.02	23.67	33
				Frequ	ency in Mid	ldle Char	nnel				
1880	120.33	230	1.85	Н	1880	18.90	Н	6.2	1.03	24.07	33
1880	117.25	82	1.0	V	1880	16.22	V	6.2	1.03	21.39	33
Frequency in High Channel											
1909.8	115.83	240	1.9	Н	1909.8	16.11	Н	6.2	1.03	21.28	33
1909.8	116.91	82	1.04	V	1909.8	16.59	V	6.2	1.03	21.76	33

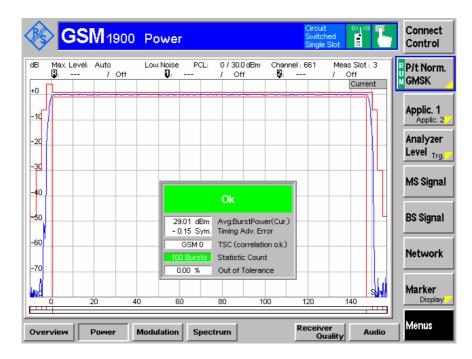
## **Plots of Conducted Output Power:**

**GSM** 

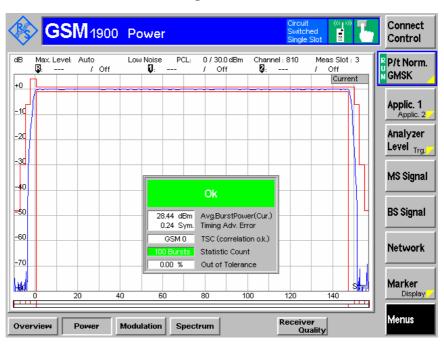
#### **Low Channel**



## **Middle Channel**

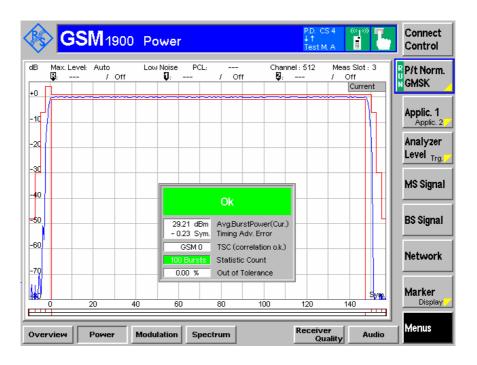


## **High Channel**

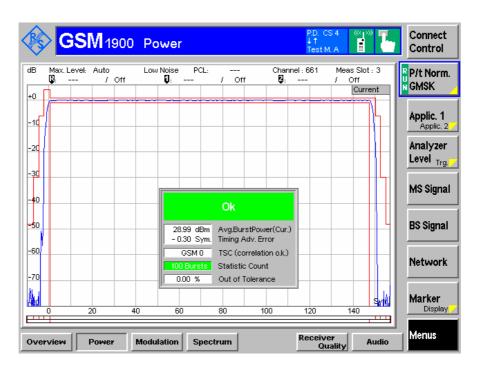


**GPRS** 

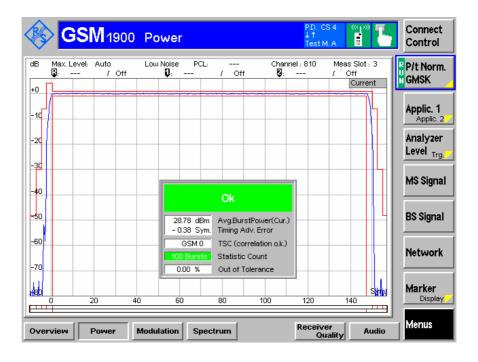
## **Low Channel**



#### **Middle Channel**



**High Channel** 



## **§2.1049 & §24.238 - OCCUPIED BANDWIDTH**

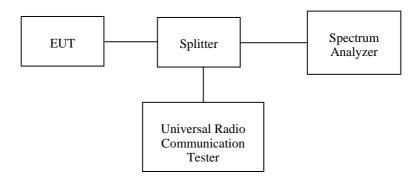
## **Applicable Standards**

CFR 47 §2.1049 and §24.238.

## **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 (Cellular /PCS) and the 26 dB & 99% bandwidth was recorded.



## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-10-16	2009-10-16
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## **Test Data**

#### **Environmental Conditions**

Temperature:	25 °C	
Relative Humidity:	56%	
ATM Pressure:	100.0kPa	

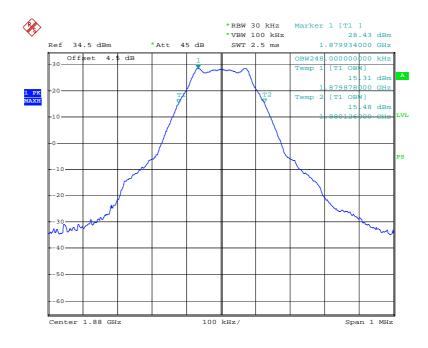
The testing was performed by Vicent Kang on 2009-02-16.

## GMSK modulation:

Channel	Channel	99% Occupied	26 dB Occupied		
	Frequency	Bandwidth	Bandwidth		
	(MHz)	(kHz)	(kHz)		
661	1880.0	248	332		

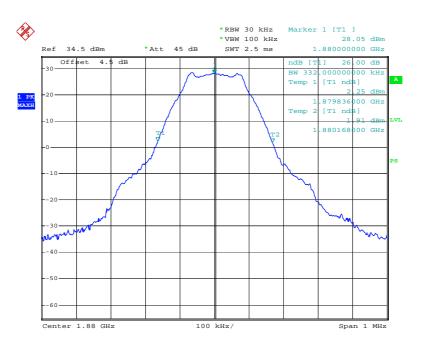
Please refer to the following plots.

## 99% Occupied Bandwidth



Date: 16.FEB.2009 11:20:48

## 26 dB Occupied Bandwidth



Date: 16.FEB.2009 11:23:03

## §2.1051 & §24.238(a) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

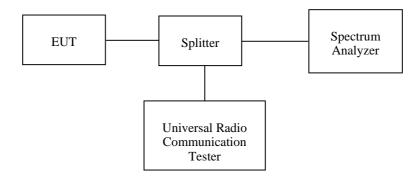
## **Applicable Standards**

CFR 47 §2.1051 and §4.238(a).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

#### **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  $10^{\text{th}}$  harmonic.



## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Data**

## **Environmental Conditions**

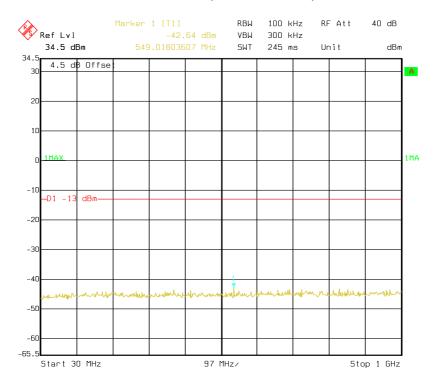
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Vicent Kang on 2009-02-16.

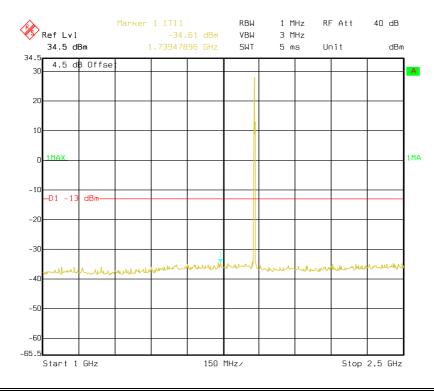
Please refer to the hereinafter plots.

## **GSM**

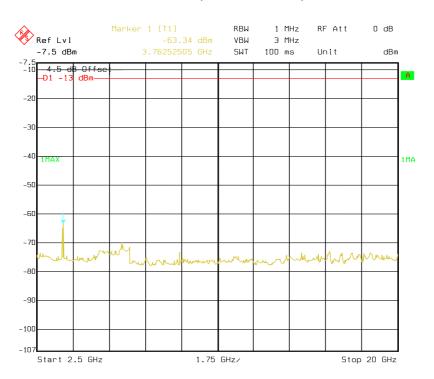
## 30 - 1000 MHz (Middle Channel)



## 1 - 2.5 GHz (Middle Channel)

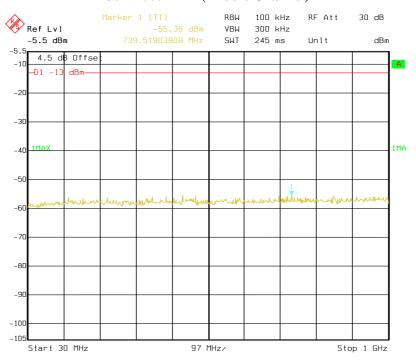


## 2.5 – 20 GHz (Middle Channel)

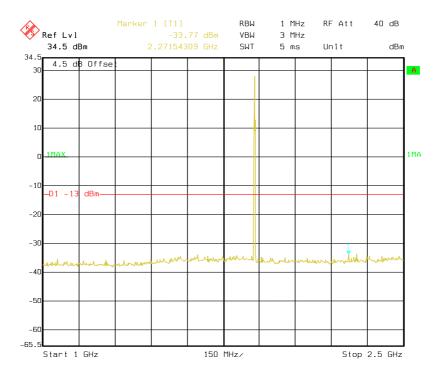


## **GPRS**

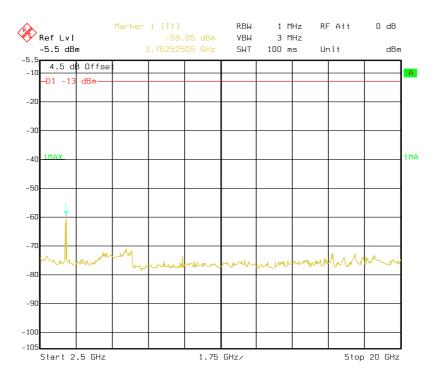
## 30 - 1000 MHz (Middle Channel)



## 1 - 2.5 GHz (Middle Channel)



## 2.5 – 20 GHz (Middle Channel)



## **§2.1053 & § 24.238 - SPURIOUS RADIATED EMISSIONS**

#### **Applicable Standards**

CFR 47 § 2.1053 and § 24.238.

#### **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  $dB = 10 \lg (TX \text{ pwr in Watts}/0.001)$  – the absolute level

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

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2008-03-11	2009-03-11
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09
НР	Preamplifier	8449B	3008A00277	2008-09-12	2009-09-11
HP	Signal Generator	HP8657A	2849U00982	2008-10-16	2009-10-16
НР	Amplifier	HP8447D	2944A09795	2008-08-02	2009-08-02
НР	Synthesized Sweeper	8341B	2624A00116	2008-11-07	2009-11-06
COM POWER	Dipole Antenna	AD-100	041000	2008-09-25	2009-09-25
A.H. System	Horn Antenna	SAS-200/571	135	2008-05-17	2009-05-17
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## **Test Data**

## **Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56%
ATM Pressure:	100.0kPa

The testing was performed by Vicent Kang on 2009-02-12.

## Below 1 GHz:

Indic	ated	Table	Test A	ntenna		Substi	tuted		Absolute	Part	Margin
Frequency (MHz)	Reading (dBµV)	Angle Degree	Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)	24E Limit (dBm)	(dB)
	Middle Channel										
184.34	58.74	130	1.5	V	184.34	-42.1	0	0.50	-42.6	-13	29.6
184.34	56.35	240	1.2	Н	184.34	-44.5	0	0.50	-45.0	-13	32.0
120.12	55.38	137.0	1.2	V	120.12	-45.2	0	0.46	-45.66	-13	32.66
120.12	53.21	199.0	1.3	Н	120.12	-47.0	0	0.46	-47.46	-13	34.46

## Above 1GHz:

Indic	ated	Table	Test A	ntenna		Substi	tuted		Absolute	Part	Margin
Frequency (MHz)	Reading (dBµV)	Angle Degree	Height (m)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)	24E Limit (dBm)	(dB)
	Middle Channel										
3760	71.66	200	1.6	V	3760	-27.86	6.9	1.47	-22.43	-13	9.43
3760	62.45	190	1.9	Н	3760	-36.93	6.9	1.47	-31.5	-13	18.50
5640	54.49	80	1.5	V	5640	-43.53	8.3	1.76	-36.99	-13	23.99
5640	49.07	170	1.6	Н	5640	-49.15	8.3	1.76	-42.61	-13	29.61
2418.68	47.70	180	1.5	Н	7520	-52.6	7.4	1.64	-46.84	-13	33.84
2418.88	47.11	110	1.5	V	7520	-53.1	7.4	1.64	-47.34	-13	34.34

## §24.238(a) - BAND EDGES

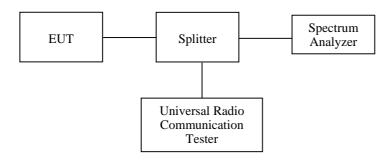
## **Applicable Standards**

According to \$24.238(a), 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  $43 + 10 \log(P) dB$ .

#### **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	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-11-07	2009-11-06
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

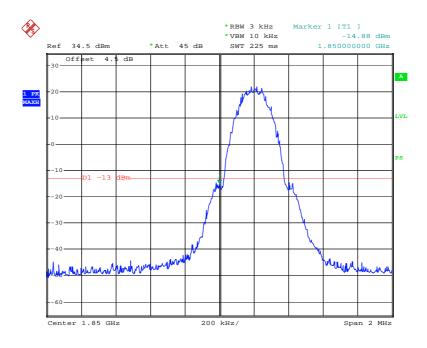
The testing was performed by Vicent Kang on 2009-02-16.

Please refer to the following tables and plots.

## **GSM**

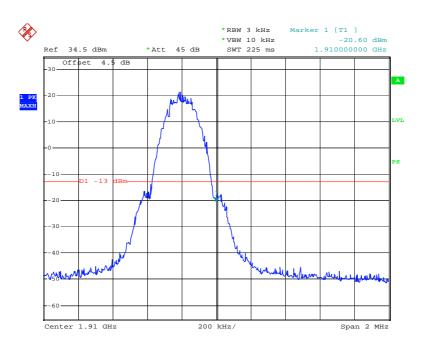
Frequency (MHz)	Emission (dBm)	Limit (dBm)
1850	-14.88	-13
1910	-20.60	-13

## **Lowest Channel**



Date: 16.FEB.2009 11:26:30

## **Highest Channel**

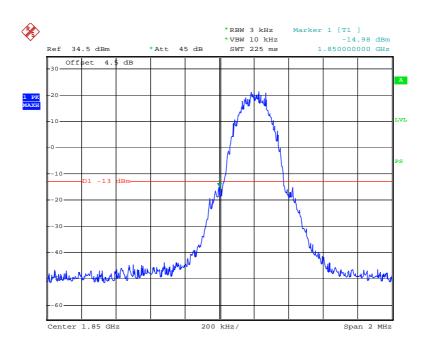


Date: 16.FEB.2009 11:28:54

## **GPRS**

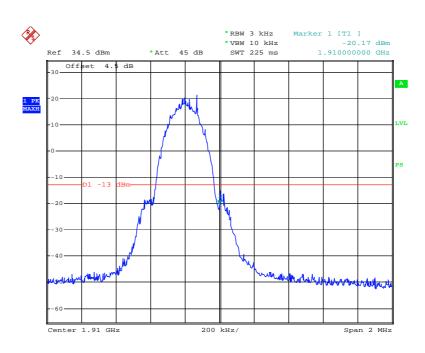
Frequency (MHz)	Emission (dBm)	Limit (dBm)	
1850	-14.98	-13	
1910	-20.17	-13	

## **Lowest Channel**



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## **Highest Channel**



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## **§2.1055, §24.235 - FREQUENCY STABILITY**

#### **Applicable Standard**

CFR47 § 2.1055 (a), §24.235

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions 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	Calibration Date	Calibration Due Date
WUHUAN	Temperature & Humidity Chamber	HTP205	20021115	2008-12-28	2009-12-28
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	1100.0008.02	2008-06-21	2009-06-21

<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

#### **Test Data**

#### **Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0kPa

The testing was performed by Vicent Kang on 2009-03-02.

Middle Channel, fo =1880.0 MHz				
Temperature (°C)	Power Supplied (Vdc)	Measured Frequency Error (Hz)	Measured Frequency Error (ppm)	Limit (ppm)
-30	3.70	-5	-0.0027	2.5
	3.50	-7	-0.0037	2.5
-25	3.70	-7	-0.0037	2.5
	3.50	-3	-0.0016	2.5
-15	3.70	-5	-0.0027	2.5
	3.50	-3	-0.0016	2.5
-5	3.70	-1	-0.0005	2.5
	3.50	-2	-0.0011	2.5
5	3.70	0	0.0000	2.5
	3.50	1	0.0005	2.5
15	3.70	7	0.0037	2.5
	3.50	10	0.0053	2.5
25	3.70	14	0.0074	2.5
	3.50	12	0.0064	2.5
35	3.70	-19	-0.0101	2.5
	3.50	-11	-0.0059	2.5
45	3.70	-16	-0.0085	2.5
	3.50	-18	-0.0096	2.5
55	3.70	-21	-0.0112	2.5
	3.50	-20	-0.0106	2.5

\*\*\*\*\* END OF REPORT \*\*\*\*\*