



MET Laboratories, Inc. *Safety Certification - EMI - Telecom Environmental Simulation*

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Panasonic Mobile Communications

July 20, 2005

1225 Northbrook Pky
Suite 2-359
Suwanee, GA 30024

Dear Mr. Pieter Seidel,

Enclosed is the EMC test report for compliance testing of the Panasonic Mobile Communications, GSM Cellular Phone EB-VS7. The Panasonic Mobile Communications, GSM Cellular Phone EB-VS7 was tested to the requirements of the FCC rules under Title 47 of the CFR Part 24E, for Broadband PCS Devices.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please feel free to contact me.

Sincerely yours,

MET LABORATORIES, INC.

Hoosamuddin S. Bandukwala
Wireless Programs Manager

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Electromagnetic Compatibility Criteria Test Report

For the

Panasonic Mobile Communications
GSM Cellular Phone EB-VS7

Tested under

FCC Rules
Title 47 of the CFR, Part 24E
For Broadband PCS Devices

MET Report: 17836-FCC24

July 20, 2005

Prepared For:

Panasonic Mobile Communications
1225 Northbrook Pky
Suite 2-359
Suwanee, GA 30024

Prepared By:
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Baltimore, MD 21230



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Kevin A. Mehaffey
Electromagnetic Compatibility Lab

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 24E of the FCC Rules under normal use and maintenance.

Liming Xu
Project Engineer



REPORT STATUS SHEET

Revision	Report/ Revision Date	Reason for Revision
Ø	July 20, 2005	N/A



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List of Terms and Abbreviations

AC	Alternating Current
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB μ A	Decibels above one microamp
dB μ V	Decibels above one microvolt
dB μ A/m	Decibels above one microamp per meter
dB μ V/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
CISPR	Comite International Special des Perturbations Radioelectriques (International Special Committee on Radio Interference)
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μ H	microhenry
μ F	microfarad
μ s	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane



Summary of Test Results

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 24E. All tests were conducted using measurement procedure of the Substitution Method of ANSI/TIA/EIA-603-A.

Type of Submission/Rule Part:	EIRP and emissions evaluation Per Part 24E
EUT:	Panasonic GSM Cellular Phone Model # EB-VS7.
FCC ID:	NWJ23C002A
Type of Emissions:	N/A
RF Power Output:	GSM EIRP 0.9 Watts (29.5 dBm) and conducted 0.9 Watts(29.5dBm)
Frequency Range (MHz):	1850.2-1909.8 MHz (Up Link)
Frequency Stability:	N/A

Table 1 Summary of Test Result

Name of Test	FCC Rule Part/Section	Results
RF Power Output	24.232(b)	Compliant
Modulation Characteristics	2.1047 (a)	Compliant
Occupied Bandwidth	2.1049	Compliant
Spurious Emissions at Antenna Terminals	2.1051; 24.238(a)	Compliant
Spurious Emissions at Antenna Terminals Frequency Block Edges	2.1051; 24.238(b)	Compliant
Radiated Spurious Emissions	2.1053; 24.238(a)	Compliant
Frequency Stability over temperature variations	2.1055 (a) (1)	Compliant
Frequency Stability over battery power	2.1055 (d) (2)	Compliant
Frequency Stability over supply voltage variations	2.1055 (d) (1)	N/A

Table 2 Summary of Test Data



I. General

A. Test Site

All testing was conducted at MET Laboratories, Inc., 914 West Patapsco Avenue, Baltimore, Maryland 21230-3432. Radiated Emissions measurements were performed inside of a Semi Anechoic Chamber. In accordance with §2.948(a)(2), a complete site description is filed with the Commission's Laboratory in Columbia, Maryland. MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program (Lab Code: 100273-0)

B. Description of Test Sample

The EUT is a Tri band GSM Cellular Phone
IMEI# 00440001427325
SW version: VS7-VQ02
HW version: Rev.C
Only 1900 MHz band (US) was tested.

Mode of Operation

Phone was tested in Normal Mode.

Modifications

1. Modifications to EUT

No modifications were made to the EUT.

2. Modifications to Test Standard

No modifications were made to the test standard.

Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Panasonic Mobile Communications upon completion of testing.

II. Electromagnetic Compatibility RF power output Requirements

**1 Test Type: RF conducted Power Output and EIRP (Substitution Method):****Technical Specifications: § 24.232(b).**

(b) Mobile/portable stations are limited to 2 watts EIRP. peak power and
The equipment must employ means to limit the power to the minimum necessary

Substitution Equivalent Isotropic Radiated Power (E.I.R.P)**Procedure:**

Radiated Measurements were made on a GSM1900Mhz Mobile phone. The EUT was placed on a 0.8-m high wooden table inside a shielded enclosure. An Antenna was placed 1meter from the EUT and measurements were made for frequencies and amplitude of field strengths in three channel settings (Low, Mid and High). For EIRP Substitution method EUT was replaced with a horn antenna, which was driven by a signal generator whose level, were adjusted to obtain the same level as received via the radiated method. EIRP is calculated by adding the gain of the horn antenna to the level on the signal generator.
Measurements were made according to the Substitution Method of ANSI/TIA/EIA-603-A.

Configuration:

Phone (EUT) was linked by a communications analyzer (Rohde & Schwarz CMU200). Phone was placed into a call mode with maximum RF power output on the selected three channels for the duration of the test.

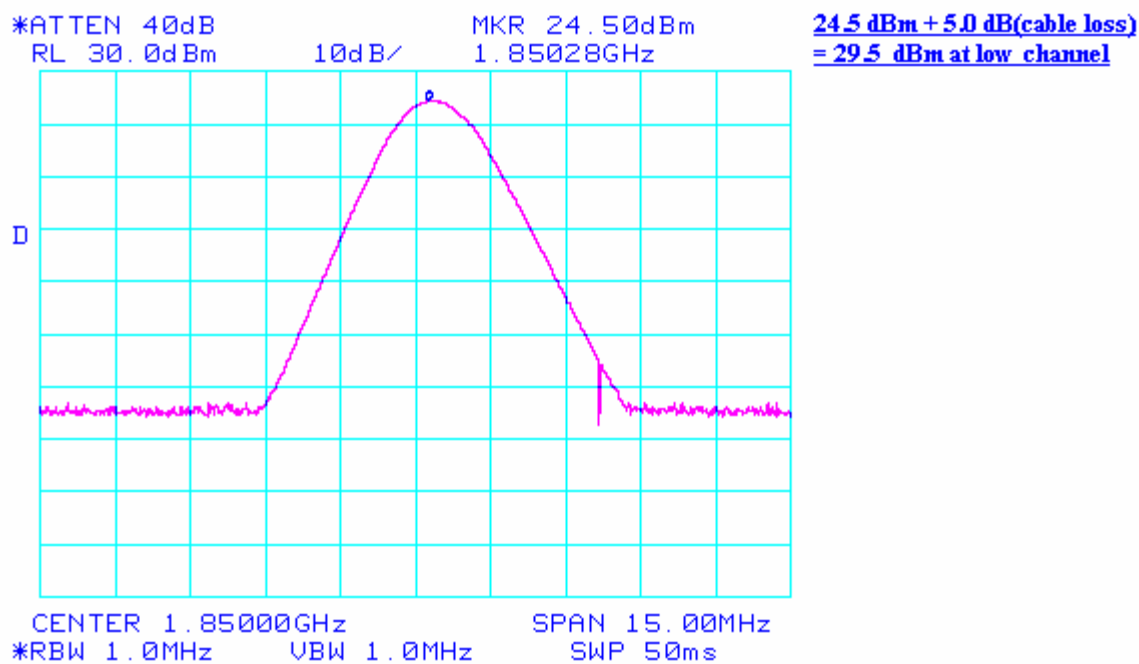
Result:

Measurement was made with the Panasonic GSM Cellular Phone EB-VS7
Below is the data taken from the EUT (the maximum RF power level in the blue)

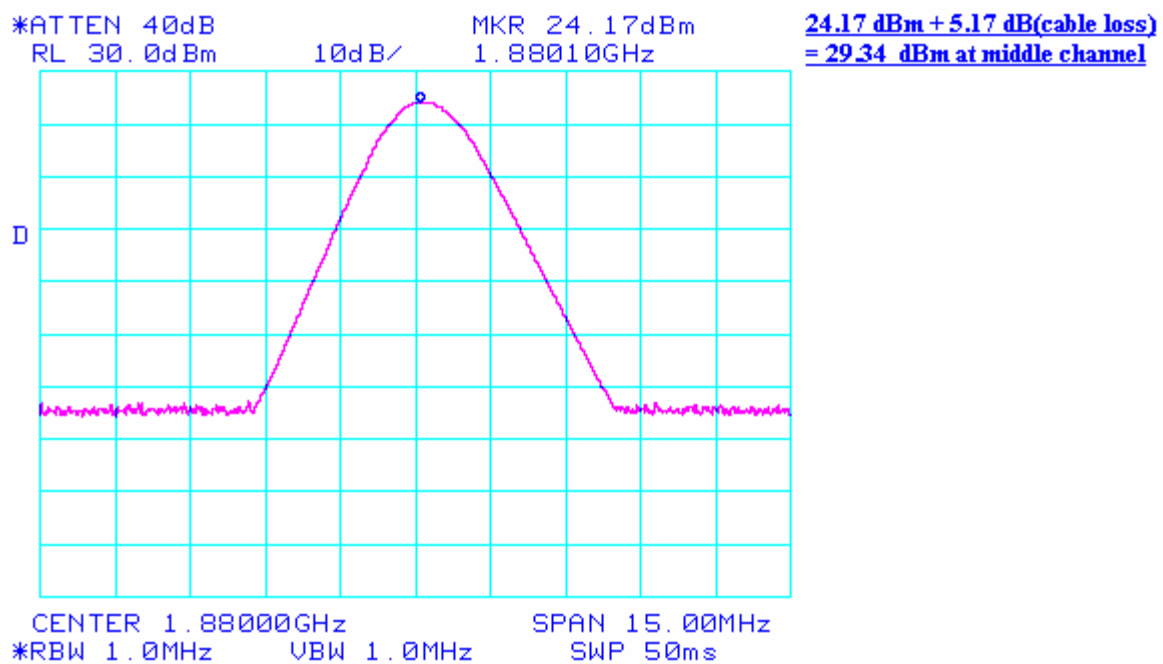
RF power measurements by MET Labs				
July 18, 2005				
Channel	Frequency (MHz)	Flip Open/Closed	EIRP (dBm)	Conducted (dBm)
512	1850.2	Open (GSM)	28.5	29.50
		Closed (GPRS)	27.5	27.50
661	1880.0	Open (GSM)	29.5	29.34
		Closed (GPRS)	28.7	27.34
810	1909.8	Open (GSM)	28.9	29.50
		Closed (GPRS)	26.6	27.50

Test Engineer: Liming Xu

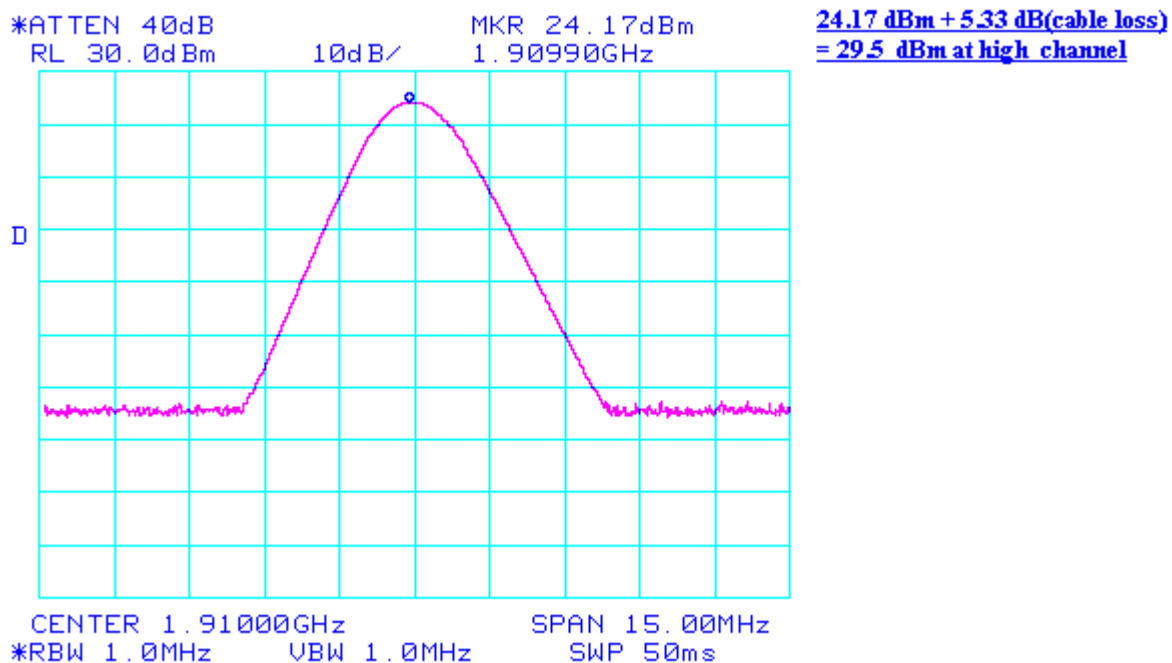
Test Date: July 18, 2005



Plot 1 RF conducted Power Output plot (Low channel)



Plot 2 RF conducted Power Output plot (Middle channel)



Plot 3 RF conducted Power Output plot (High channel)

Test Results: The EUT complies with the requirements of this section.

Test Engineer: Liming Xu

Test Date: July 18, 2005



III. Electromagnetic Compatibility Emissions Requirements



1. Radiated Spurious Emission

Test Requirement(s): **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 3.

15.109 (b) The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 3.

Frequency (MHz)	Field Strength (dB μ V/m)	
	§ 15.109 (b), Class A Limit (dB μ V) @ 10m	§ 15.109 (a), Class B Limit (dB μ V) @ 3m
30 - 88	39.00	40.00
88 - 216	43.50	43.50
216 - 960	46.40	46.00
Above 960	49.50	54.00

Table 3a. Radiated Emissions Limits calculated from FCC Part 15 Subpart B, 15.109 (a) (b)

Test Procedure:

- The EUT was placed on a 0.8 m high wooden table (See Photograph 1).
- Various antennas were placed near the EUT and measurements were taken of the field strengths and frequencies. For final radiated measurements, the EUT was placed in semi-anechoic chamber, and located 1 m and 3 m from an adjustable antenna mast.
- For pre-scanning, the spectrum analyzer scanned the frequency range from 30 MHz to 1 GHz to obtain an emission profile of the EUT. For each point of measurement, the turntable was rotated, and the antenna height was varied between 1 m and 4 m, in order to find the maximum radiated emissions.
- Measurements above 30 MHz were taken using the above procedures with the antenna in two polarizations: horizontal and vertical. Unless otherwise specified, measurements between 30 MHz and 1 GHz were made using a quasi-peak detector with a 120 kHz bandwidth.
- For measurements above 1 GHz, a 1 MHz detector was used with either a "peak" detector or an "average" detector. In general, all radiated emissions above 1 GHz measurements were made with the average detector unless otherwise noted.

**Radiated Emissions Test Results, 15.109 (30 MHz to 1 GHz) Class B**

Frequency (MHz)	EUT Azimuth (Degrees)	Antenna Polarity (H/V)	Antenna HEIGHT (m)	Uncorrected Amplitude (dBuv)	Antenna Correction Factor (dB) (+)	Cable Loss (dB) (+)	Distance Correction Factor (dB) (-)	Corrected Amplitude (dBuv)	Limit (dBuv)	Margin (dB)
32.486974	0	H	1	6.26	6.64	0.54	0	13.45	40	-26.55
32.486974	52	V	1.32	16.85	6.19	0.54	0	23.59	40	-16.41
47.768287	0	H	1	6.48	9.57	0.79	0	16.84	40	-23.16
47.768287	0	V	1	6.9	8.51	0.79	0	16.21	40	-23.79
177.65331	0	H	1	7.3	9.17	1.31	0	17.78	43.5	-25.72
177.65331	0	V	1	7.3	8.90	1.31	0	17.51	43.5	-25.99
950	0	H	1	7.1	23.20	2.33	0	32.63	46	-13.37
950	0	V	1	7.1	23.10	2.33	0	32.53	46	-13.47
155.73948	360	H	1	6.9	8.26	1.21	0	16.37	43.5	-27.13
155.73948	0	V	1	7.1	8.17	1.21	0	16.48	43.5	-27.02
874.37675	0	H	1	7.1	21.99	2.50	0	31.59	46	-14.41
874.37675	0	V	1	7.1	21.80	2.50	0	31.40	46	-14.60

Table 3b Radiated Emissions Test Results

Note: There are no detectable emissions from 950 MHz up to 20GHz.

Test Results: The EUT complies with the requirements of this section.

Test Engineer: Dusmantha Tennakoon

Test Date: July 15, 2005

**§ 24.238 Emission limitations for Broadband PCS equipment:**

The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

§ 24.238 (a) Out of band emissions. 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.

- a) The Radiated Spurious Emissions Limit is obtained by the following:
- b) Based on an output power (as measured at the output of the Antenna port) of 0.9 watts:

$$P_o = 0.9 \text{ W}$$

The radiated power level of all spurious emissions must be attenuated by at least $43 + 10 \log (P_o)$ below P_o , yielding:

$$P_o - [43 + 10 \log (P_o)] = -13 \text{ dBm}$$

Test Results: The EUT complies with the requirements of this section.

Test Engineer: Liming Xu
Test Date: July 18, 2005



2. Spurious Emissions at Antenna Terminals

Test Requirement(s): **§ 2.1051 Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

24.238 Emission limitations for Broadband PCS equipment: The rules in this section govern the spectral characteristics of emissions in the Broadband Personal Communications Service.

§ 24.238 (a) Out of band emissions. 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 Procedures:

- a) As required by 47 CFR 2.1051, spurious emissions at antenna terminal measurements were made at the RF output terminals using a 50 Ω attenuation and spectrum analyzer set for a 100 kHz bandwidth.
- b) The RBW of 100 kHz was used to investigate and search for spurious emissions; any spurious emissions found with this technique were re-measured with the appropriate 1 MHz RBW.
- c) This test was performed with digitally modulated carrier signals, and the EUT was adjusted for continuous transmission on frequencies across the operating band.
- d) The frequency spectrum was investigated from 9.0 KHz to 20.0 GHz. For measuring emissions above 2 GHz, a high-pass filter was used to eliminate the fundamental transmit frequency to prevent possible saturation effects on the front end of the spectrum analyzer.

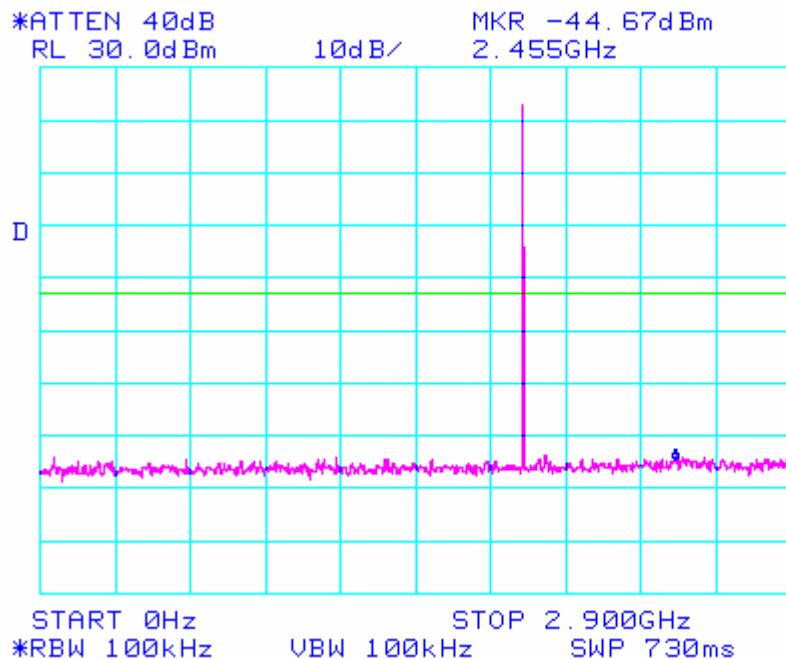
Test Results: The EUT complies with the requirements of this section. There were no detectable spurious emissions for this EUT.

Test Engineer: Liming Xu
Test Date: July 18, 2005



Spurious Emissions at Antenna Terminals Test Results

Conducted Spurious Emissions Measurements at Antenna Terminals, Test Data Plots

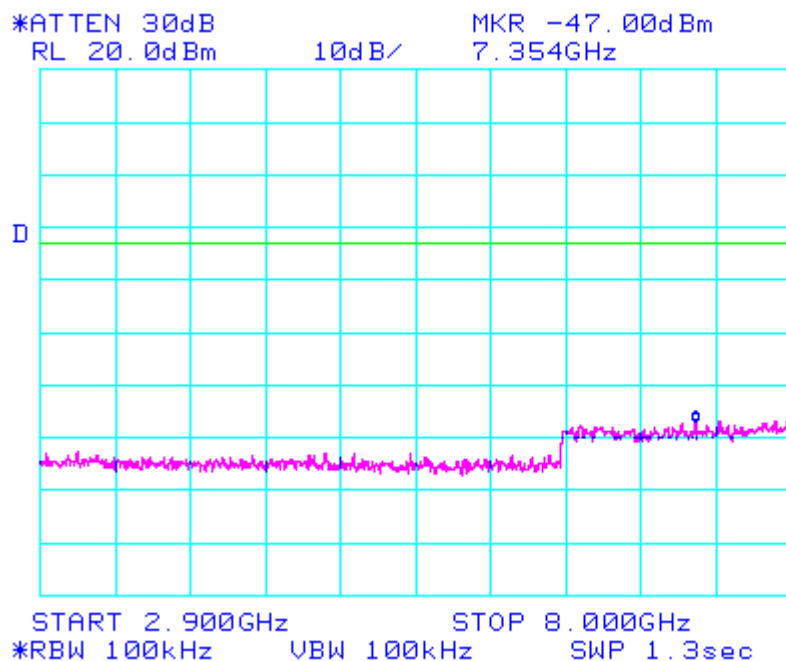


Plot 4 Conducted Spurious Emissions Measurements at Antenna Terminals Test Results



Spurious Emissions at Antenna Terminals Test Results

Conducted Spurious Emissions Measurements at Antenna Terminals, Test Data Plots

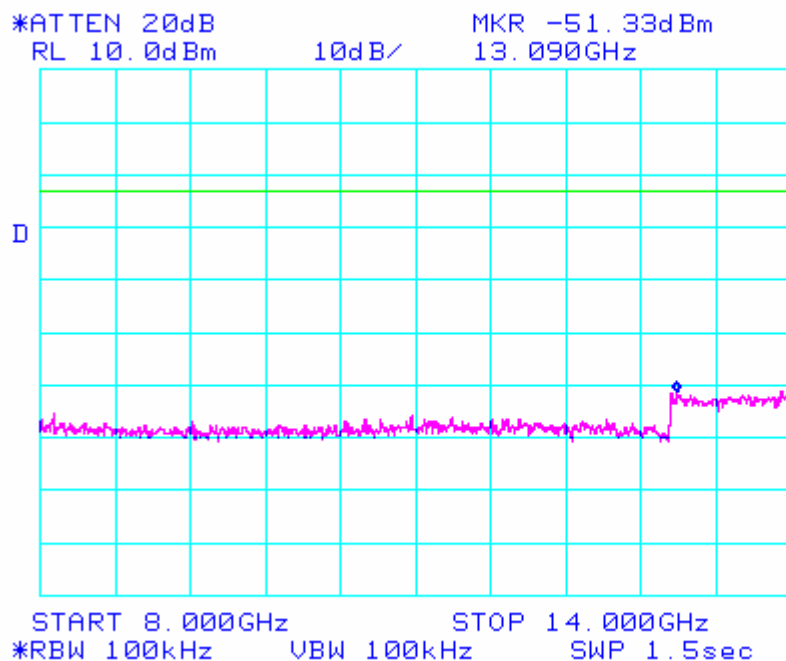


Plot 5 Conducted Spurious Emissions Measurements at Antenna Terminals Test Results



Spurious Emissions at Antenna Terminals Test Results

Conducted Spurious Emissions Measurements at Antenna Terminals, Test Data Plots

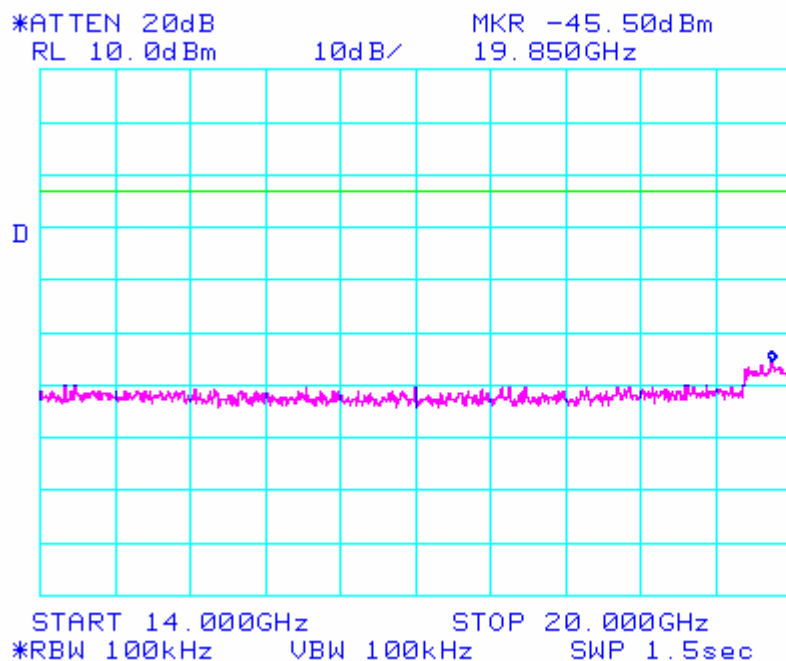


Plot 6 Conducted Spurious Emissions Measurements at Antenna Terminals Test Results



Spurious Emissions at Antenna Terminals Test Results

Conducted Spurious Emissions Measurements at Antenna Terminals, Test Data Plots



Plot 7 Conducted Spurious Emissions Measurements at Antenna Terminals Test Results

Test Engineer: Liming Xu

Test Date: July 18, 2005

**Spurious Emissions at Antenna Terminals at Block Edges +/- 1MHz****Technical Specifications:** §2.1051 and 24.238(b)

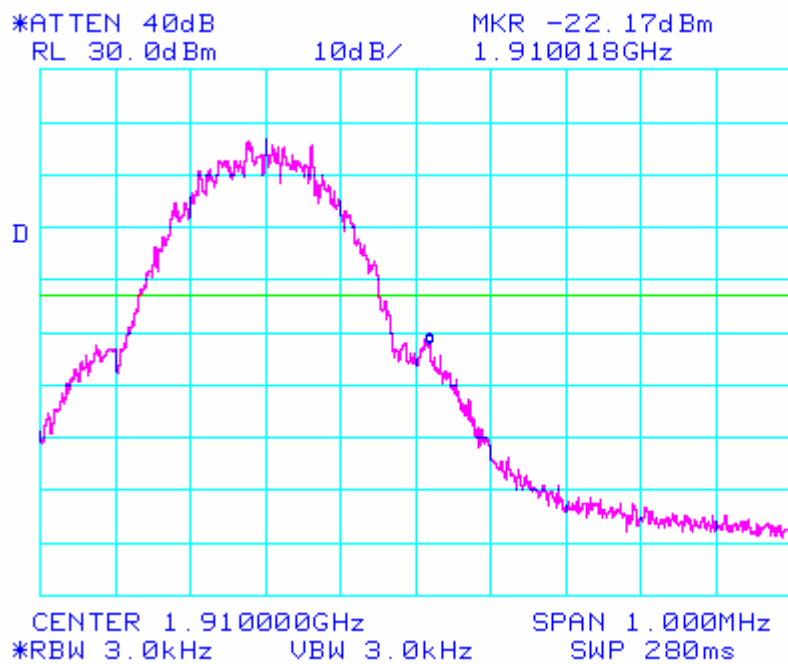
Measurement Procedures: As recommended in FCC Part 24, greater than or equal to 1% of emission spectrum bandwidth was chosen to measure the peak of any emission inside the 1.0 MHz frequency band adjacent to each frequency block edge, using a 5 KHz RBW. The unit was exercised using signal types required by §2.1049.

Test Results: Modulation products outside of this band are attenuated at least $43 + 10 \log(P)$ below the level of the modulated carrier. A Plot of the spurious emissions at +/- 1 MHz around the transmit frequency, as measured at the antenna port, appears on the following page.

SPURIOUS EMISSION FREQUENCY BLOCKS

Frequency Block (MHz) DL UL	High end	Low end
(1850--1910)	1910	1850

Table 4 Spurious Emissions (At Band Edges)

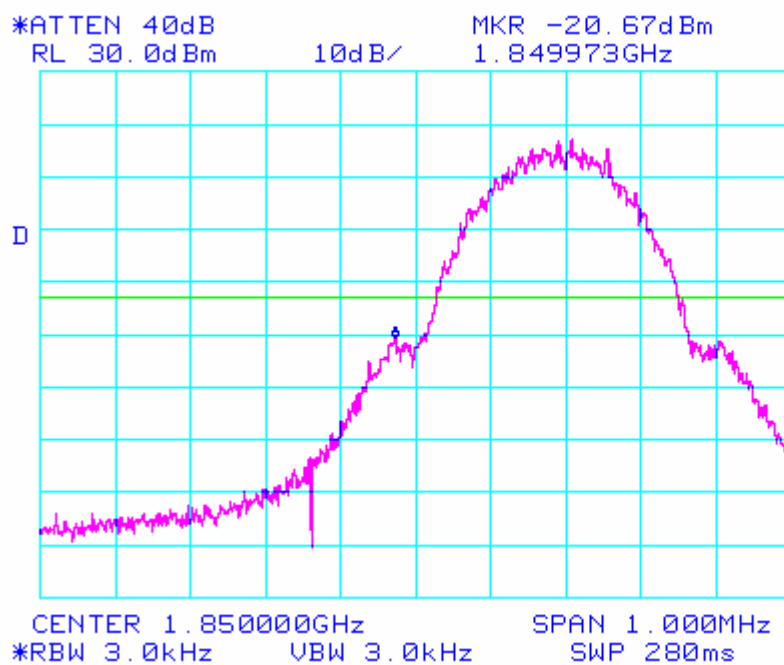


Modulation Method: GMSK

UL High end band-edge emission

Test Engineer: Liming Xu

Test Date: July 18, 2005



Modulation Method: GMSK

UL Low end band-edge emission

Test Engineer: Liming Xu

Test Date: July 18, 2005



III. Electromagnetic Compatibility Modulation Characteristics Requirements

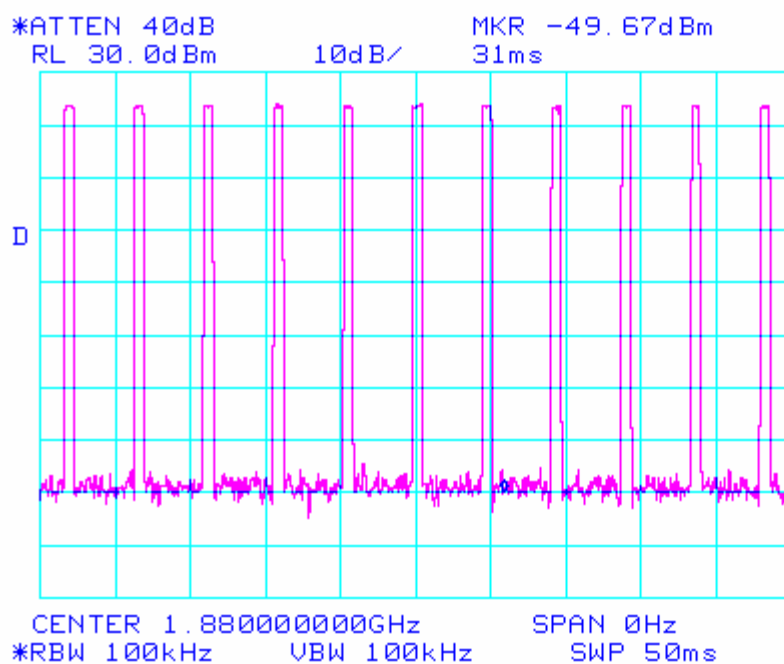


Test Type: Modulation Characteristics

Technical Specification: §2.1047(a)

Measurements Procedure: The EUT uses GMSK modulation. In this modulation, voice or data information is digitized and coded into a bit stream. The bits are conveyed through precise phase changes in the carrier.

Test Results: The following plots give a detailed explanation of the modulation scheme used in the EUT of the **GMSK**.



Test Engineer: Liming Xu
Test Date: July 18, 2005



IV. Electromagnetic Compatibility Occupied Bandwidth Requirements

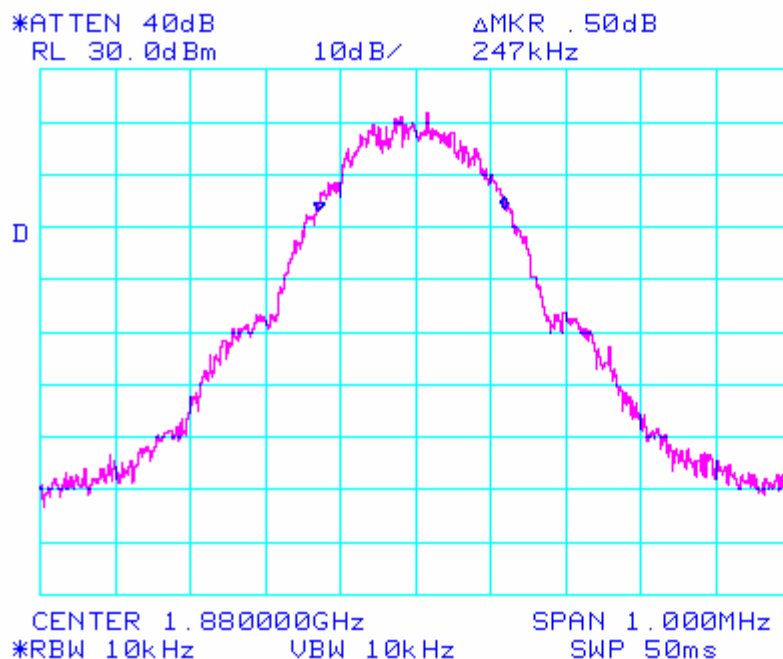


Test Type: Occupied Bandwidth

Technical Specifications: §2.1049

Measurement Procedures: As required by §2.1049 of CFR 47, *occupied bandwidth measurements* were made on the EUT. The EUT was configured to transmit a GMSK modulated carrier signal. Using an IF bandwidth of 10 KHz, we determined the occupied bandwidth of the emission at the selectable channel range.

Test Results: Equipment complies with Section 2.1049. Plots of the occupied bandwidth, as measured at the RF output port follow:



Up link Ch.661 Occupied B/W = 247 KHz

Test Engineer: Liming Xu
Test Date: July 18, 2005



V. Electromagnetic Compatibility Frequency Stability Requirements

**Frequency Stability over Temperature Variations****Technical Specifications:** §2.1055(a)(1)

Measurement Procedures: As required by §2.1055(a)(1) of CFR 47, *frequency tolerance measurements* were made over the temperature range of -30°C to +50°C. The frequency measurements were made using direct input to a spectrum analyzer. Climatic control was accomplished using an environmental simulation chamber. The temperature was first lowered to -30°C and then raised hourly in 10° increments. The unit remained in the chamber during temperature transitions and during the measurement process.

Test Results: Frequency tolerance of carrier signal: +/- 0.0001% (+/- 1ppm) for a temperature variation from - 30°C to + 50°C at normal supply voltage.

Temperature (°C)	Carrier Frequency (CH 1) (MHz)	Frequency Deviation (Hz)	Deviation Limit (KHz)
-30	1880.00000	40 *	± 1.86
-20	1880.00000	40 *	± 1.86
-10	1880.00000	40 *	± 1.86
0	1880.00000	40 *	± 1.86
+10	1880.00000	40 *	± 1.86
+20	1880.80000	40 *	± 1.86
+30	1880.00000	40 *	± 1.86
+40	1880.00000	40 *	± 1.86
+50	1880.00000	40 *	± 1.86

Table 5 CARRIER FREQUENCY DEVIATIONS DUE TO TEMPERATURE INSTABILITY

* * The battery of this phone (Panasonic Model number EB-BS001)
Operational temperature range: from -20 degree C to +60 degree C

* The frequency deviation is less than 40 Hz(Frequency error due to communication with base station)

* There is no detectable frequency variation when the frequency counter was set to 100Hz resolution.

*The unit meets the requirements of 2.1055 (a)(1)

Test Engineer: Dusmantha Tennakoon**Test Date: 7/26/05**

**Frequency Stability over Voltage Variations****Technical Specifications:** §2.1055(d)(2)

Measurement Procedures: As required by §2.1055(d)(2) of CFR 47, *frequency tolerance measurements* were made over changes in(d) (2):
For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

Test Results: Frequency tolerance of carrier signal: $\pm 0.0001\%$ for a variation in primary voltage from the battery end point.

Percentage of Rated Supply	Battery (V)	Carrier Frequency (MHz)	Frequency Deviation (Hz)	Deviation Limit (kHz)
100%	3.7	1880.00000	40 *	± 1.88
battery end point	3.1	1880.00000	40 *	± 1.88

Table 6 Carrier Frequency Deviations Due to Voltage Variations

The unit meets the requirements of 2.1055 (d)(2)

* The frequency deviation is less than 40 Hz(Frequency error due to communicating with base station)

* There is no detectable frequency variation when the frequency counter was set to 100Hz resolution.

Test Engineer: Liming Xu

Test Date: July 22, 2005



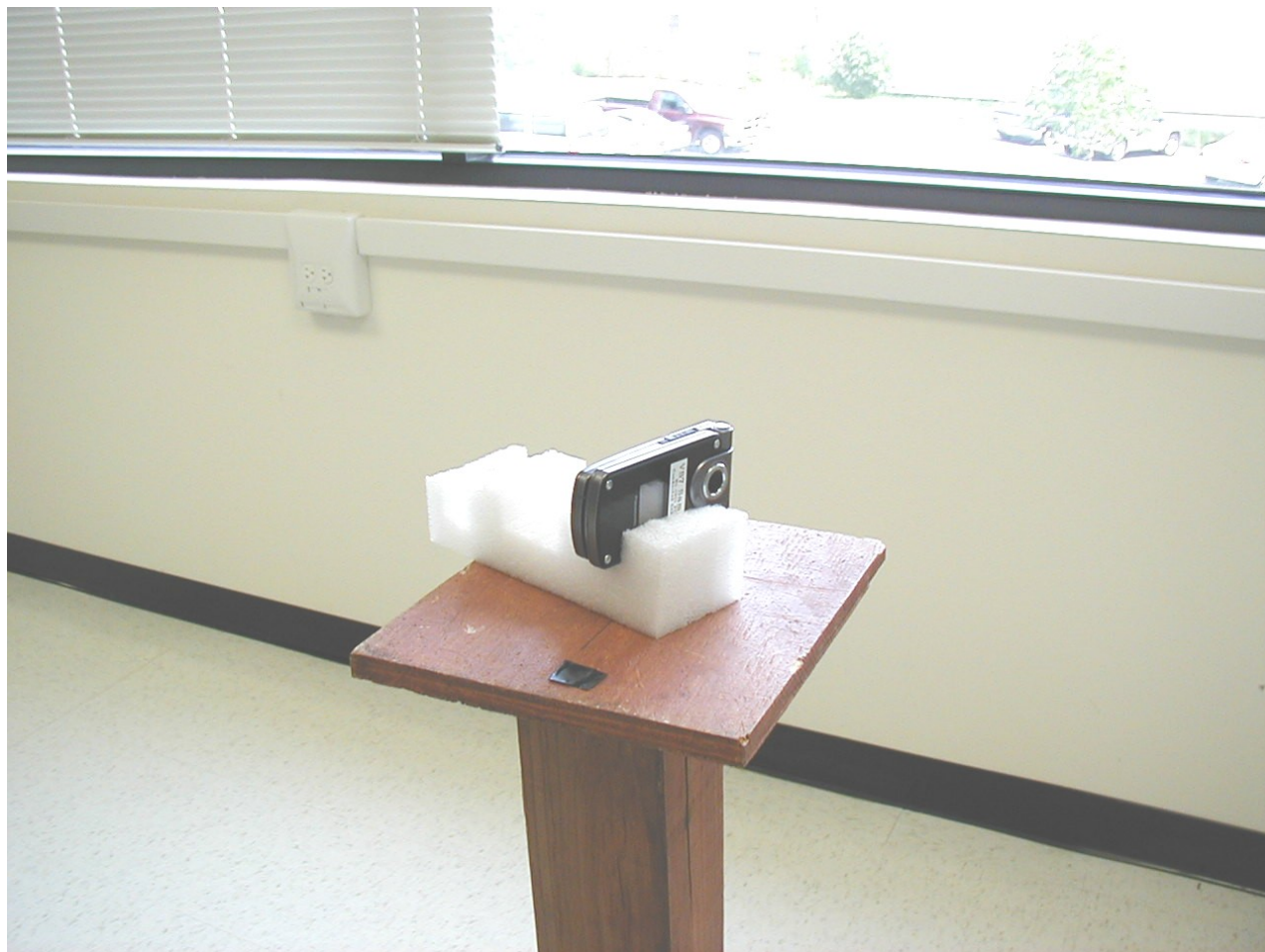
Photograph 1 EIRP measurement Setup



Photograph 2 EIRP measurement Setup



Photograph 3 EIRP measurement Setup



Photograph 4 EIRP measurement Setup



Photograph 5 Radiated emissions measurement Setup



Photograph 6 Radiated emissions measurement Setup



III. Test Equipment

**Table 7 Test Equipment List**

Test Equipment					
MET Asset #	Nomenclature	Manufacturer	Model	Last Cal Date	Cal Due Date
1T4300	Semi-Anechoic Chamber # 1	EMC Test Systems	NONE	5/3/2003	4/3/2006
1T4303	Antenna; BILOG	Schafner-Chase EMC	CBL6140A	05/13/2005	05/13/2006
1T2665	Antenna; Horn	EMCO	3115	3/28/2005	3/28/2006
1T2511	Antenna; Horn	EMCO	3115	6/28/2005	6/28/2006
1T4351	Spectrum Analyzer	Agilent	E7405A	9/28/2004	9/28/2005
1T4302	EMI Receiver	HP	85462A	10/18/2004	10/18/2005
1T4320	Universal Radio Communication Tester	Rhode & Schwarz	CMU200	8/9/2004	8/9/2007
1T4453	Vector Signal Generator	Rhode & Schwarz	SMIQ03	2/23/2005	2/23/2006



End of the report