FCC Type Approval

EMI MEASUREMENT AND TEST REPORT

For

High Tech Computer, Corp.

23, Hsin-Hua Rd.,
Taoyuan, 330 Taiwan

FCC ID: NM8MAGICIAN

This Report Concerns:	**Equipment Type:**
☒ Original Report	GSM 850/1900 + Bluetooth PDA Phone

Test Engineer:	Daniel Deng /
Report No.:	R0411298a
Report Date:	2004-12-22
Reviewed By:	Ming Jing /
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *High Tech Computer, Corp.'s* product, model no.: PM10C or the "EUT" as referred to this report is a GSM 850/1900 + Bluetooth PDA Phone which measures approximately 60mmL x 18mmW x 110mmH. The EUT is a DSS + PCS composite device. The DSS part operates at 2400 – 2483.5MHz with maximum output power of 1.05mW. The TNF part operates at 824 - 849 MHz with maximum output power of 1.950W (ERP), frequency tolerance 2.5ppm and emission designator 343KF9W for modulation of GSM850 cellular band and operates at 1850 – 1910MHz with maximum output power of 0.977W (EIRP), frequency tolerance 2.5ppm and emission designator 343KF9W for modulation of GSM1900 PCS band.

** The test data gathered are from typical production sample, serial number: 400J442300086, provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *High Tech Computer, Corp.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C, Part 22 Subpart H, and Part 24 Subpart E of the Federal Communication Commissions rules.

It is also prepared in accordance with Part 2, Subpart J, Part 15, Subparts A, B, C, Part 22 Subpart H and Part 24 Subpart E of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC 15.247 rules for the bluetooth transmitter:

- Maximum Peak Output Power
- Hopping Channel Separation
- Number of Hopping Frequency Used
- 20 dB Bandwidth
- Dwell Time on Each Channel
- 100 kHz Bandwidth of Band Edge
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement

The objective is also to determine compliance with Part 22 Subpart H, and Part 24 Subpart E rules for the Cellular and PCS transmitter:

- output power
- modulation characteristic
- occupied bandwidth
- spurious emission at antenna terminal
- field strength of spurious radiation
- frequency stability
- conducted and radiated margin.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

Test Facility

The Open Area Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, 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 radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

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 scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 1997, Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2001 & TIA/EIA 603A.

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

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Dell	Notebook PC	INSPIRON	N/A	DOC

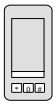
External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
USB cable	1.0	EUT	Notebook PC

Power Supply Information

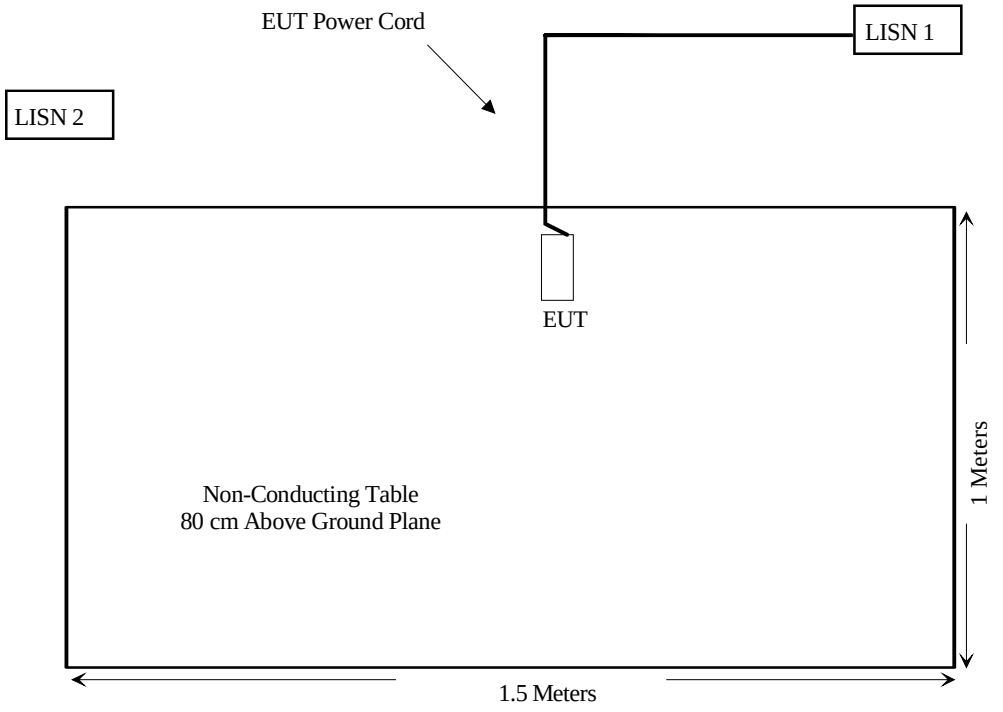
Manufacturer	Description	Model	Serial Number	FCC ID
Delta Electronics, Inc.	AC Adapter	ADP-5FH B	3UW0426000041	DOC
HTC	Li-Ion rechargeable	PM16A	35H00051-00	DOC

Configuration of Test System



EUT

Test Setup Block Diagram



SUMMARY OF TEST RESULTS FOR FCC PART 15

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§ 15.205	Restricted Bands	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.209	Radiated Emission	Compliant
§15.247 (a) (1)	Hopping Channel Separation	Compliant
§15.247 (a) (1)	Channel Bandwidth	Compliant
§15.247 (a) (1) (iii)	Number of Hopping Frequencies Used	Compliant
§15.247 (a) (1) (iii)	Dwell Time	Compliant
§15.247 (b) (1)	Maximum Peak Output Power	Compliant
§ 15.247 (b)(4) § 2.1093	RF Safety Requirements	Compliant
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant

ANTENNA REQUIREMENT

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (b)(4)(i), systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

The gain of antenna used for transmitting is 1 dBi for Bluetooth, 1dBi for GSM850 and 0.5dBi for PCS1900. The antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

§15.207(a) - CONDUCTED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, 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.

Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2001 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC Adapter of the notebook was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30MHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2004-08-16
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-09-15

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

Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

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

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an “QP”. Average readings are distinguished with an “Ave”.

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

The testing was performed by Daniel Deng on 2004-12-16.

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Conducted limit for a Class B device, with the *worst* margin reading of:

-12.9 dB at 2.470 MHz in the Line conductor

Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
2.470	33.1	AVG	Line	46.00	-12.9
0.255	33.8	AVG	Neutral	51.59	-17.8
2.470	38.0	QP	Line	56.00	-18.0
2.410	36.3	QP	Neutral	56.00	-19.7
0.570	25.0	AVG	Line	46.00	-21.0
0.570	34.8	QP	Line	56.00	-21.2
0.190	31.0	AVG	Neutral	54.04	-23.0
0.190	40.0	QP	Neutral	64.04	-24.0
0.255	37.3	QP	Neutral	61.59	-24.3
2.410	21.6	AVG	Neutral	46.00	-24.4
0.190	28.4	AVG	Line	54.04	-25.6
0.190	36.5	QP	Line	64.04	-27.5

Plot of Conducted Emissions Test Data

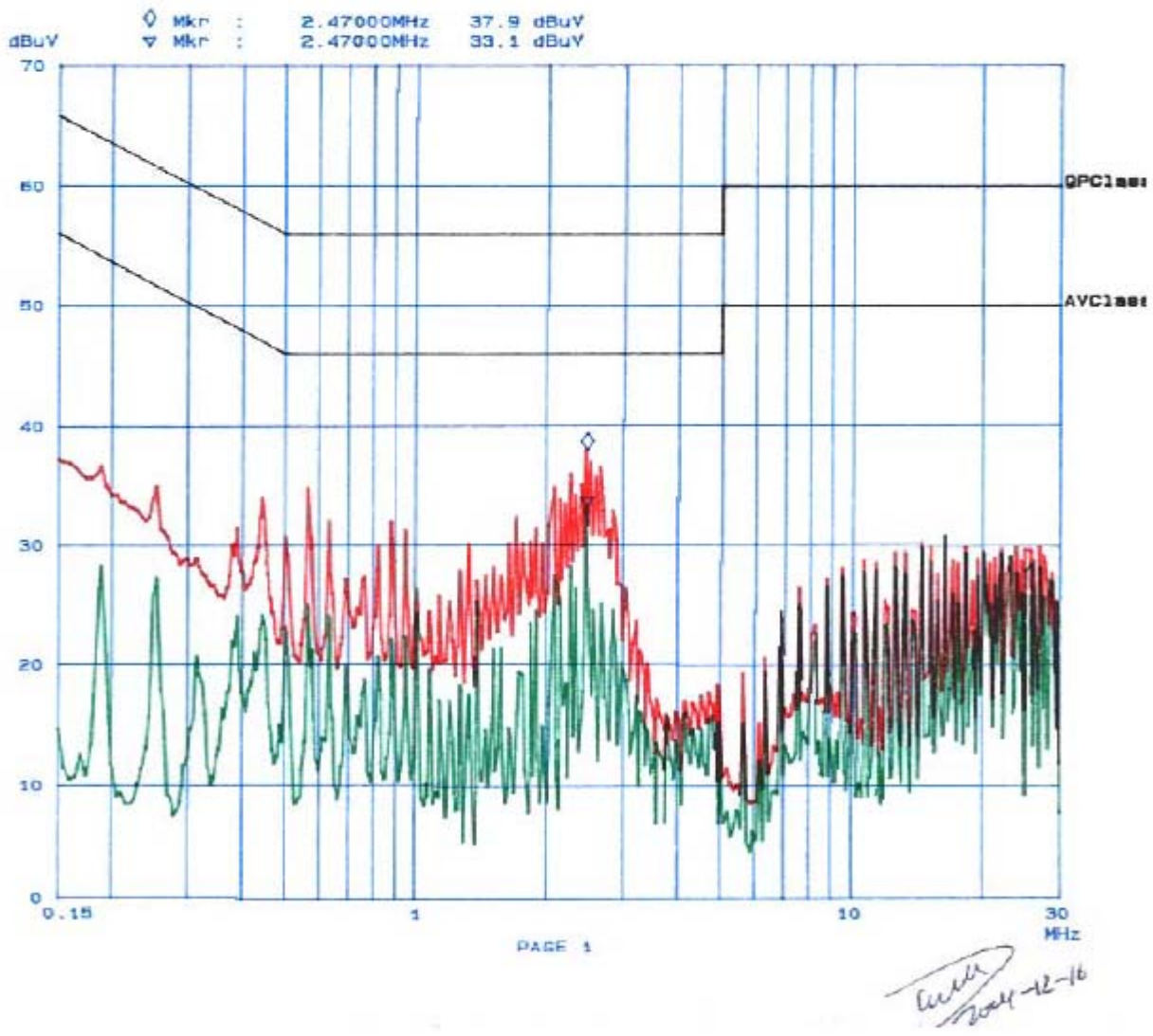
Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.

Bay Area Compliance Laboratory Corp 15. Dec 04 15:52
Class B

EUT: PM10C
Manuf: HTC
Op Cond: Normal
Operator: DANIEL
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

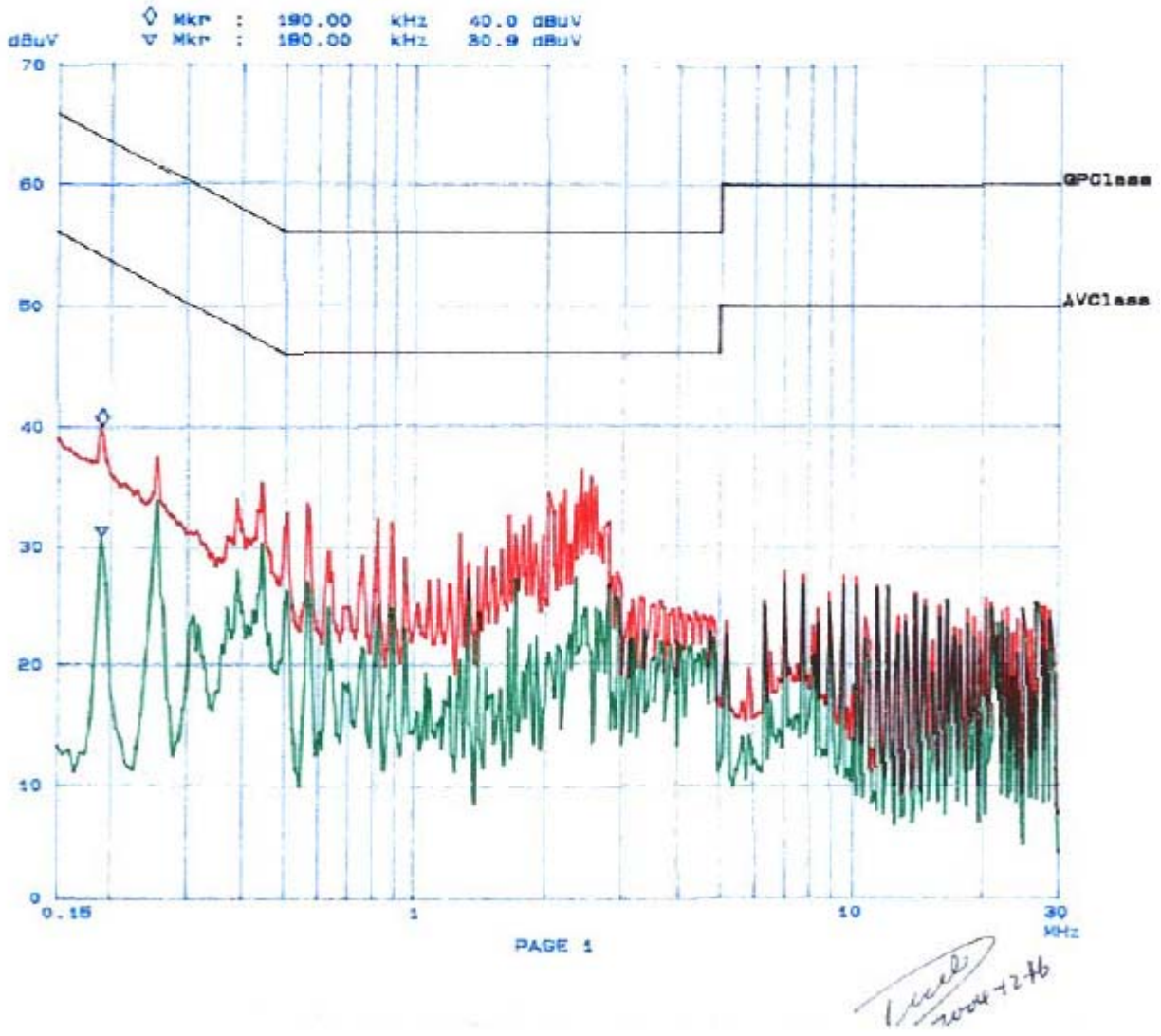


Bay Area Compliance Laboratory Corp 15. Dec 04 15:32
Class B

EUT: PM10C
Manuf: HTC
Op Cond: Normal
Operator: DANIEL
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	15dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	15dBLN	OFF
5M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF



§15.205 & §15.209 - RADIATED EMISSION

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ±4.0 dB.

Test Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2001. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The notebook was connected with 120Vac/60Hz power source.

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Amplifier, Pre, microwave	8449B	3147A00400	3/14/2004
HP	Amplifier, Pre	8447E	1937A01057	8/4/2004
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
ETS	Antenna, Biconical	3110B	9603-2315	10/11/2004
A.R.A.	Antenna, Horn, DRG	DRG-118/A	1132	9/30/2004
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	2455-261	8/1/2004
ETS	Antenna, logperiodic	3148	0004-1155	10/11/2004

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

The testing was performed by Daniel Deng on 2004-12-16.

Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.247, and had the worst margin of:

Transmitter:

-9.9 dB at **4804.00 MHz** in the **Vertical** polarization, Low Channel.

-4.3 dB at **4882.00 MHz** in the **Vertical** polarization, Middle Channel.

-11.7 dB at **4960.00 MHz** in the **Vertical** polarization, High Channel.

-4.2 dB at **868.06 MHz** in the **Horizontal** polarization, Unintentional Emission.

Receiver:

-15.1 dB at **867.11 MHz** in the **Vertical** polarization

Transmitter Radiated Emission Test Data

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB	
Low Channel											
2402.00	93.6	180	1.3	v	28.1	3.4	35.2	89.8			Fund/Peak
2402.00	93.3	180	1.4	h	28.1	3.4	35.2	89.6			Fund/Peak
2402.00	92.9	180	1.3	v	28.1	3.4	35.2	89.2			Fund/Ave
2402.00	92.6	180	1.4	h	28.1	3.4	35.2	88.9			Fund/Ave
4804.00	39.7	0	1.6	v	32.5	4.9	33.0	44.1	54	-9.9	Ave
4804.00	39.1	270	1.8	h	32.5	4.9	33.0	43.5	54	-10.5	Ave
7206.00	31.9	200	1.8	v	35.1	5.6	33.5	39.2	54	-14.8	Ave
7206.00	31.6	120	1.3	h	35.1	5.6	33.5	38.8	54	-15.2	Ave
4804.00	48.3	0	1.6	v	32.5	4.9	33.0	52.7	74	-21.3	Peak
4804.00	47.6	270	1.8	h	32.5	4.9	33.0	52.0	74	-22.0	Peak
7206.00	43.3	200	1.8	v	35.1	5.6	33.5	50.6	74	-23.4	Peak
7206.00	42.9	120	1.3	h	35.1	5.6	33.5	50.1	74	-23.9	Peak
Middle Channel											
2441.00	97.6	90	1.8	v	28.1	3.4	35.2	93.8			Fund/Peak
2441.00	97.4	180	1.6	h	28.1	3.4	35.2	93.7			Fund/Peak
2441.00	97.3	90	1.8	v	28.1	3.4	35.2	93.6			Fund/Ave
2441.00	97.2	180	1.6	h	28.1	3.4	35.2	93.5			Fund/Ave
4882.00	45.3	180	1.3	v	32.5	4.9	33.0	49.7	54	-4.3	Ave
4882.00	44.6	90	1.6	h	32.5	4.9	33.0	49.0	54	-5.0	Ave
7323.00	32.5	30	1.9	v	35.1	5.6	33.5	39.7	54	-14.3	Ave
7323.00	31.7	90	1.8	h	35.1	5.6	33.5	38.9	54	-15.1	Ave
4882.00	54.4	180	1.3	v	32.5	4.9	33.0	58.8	74	-15.2	Peak
4882.00	53.8	90	1.6	h	32.5	4.9	33.0	58.2	74	-15.8	Peak
7323.00	44.5	30	1.9	v	35.1	5.6	33.5	51.8	74	-22.2	Peak
7323.00	43.8	90	1.8	h	35.1	5.6	33.5	51.0	74	-23.0	Peak
High Channel											
2480.00	94.6	180	2.3	v	28.1	3.4	35.2	90.9			Fund/Peak
2480.00	94.5	180	1.8	h	28.1	3.4	35.2	90.8			Fund/Peak
2480.00	94.2	180	2.3	v	28.1	3.4	35.2	90.5			Fund/Ave
2480.00	94.1	180	1.8	h	28.1	3.4	35.2	90.4			Fund/Ave
4960.00	37.9	270	1.3	v	32.5	4.9	33.0	42.3	54	-11.7	Ave
4960.00	36.8	120	1.4	h	32.5	4.9	33.0	41.2	54	-12.8	Ave
7440.00	31.8	180	1.4	v	35.1	5.6	33.5	39.0	54	-15.0	Ave
7440.00	30.5	30	1.6	h	35.1	5.6	33.5	37.7	54	-16.3	Ave
4960.00	48.1	270	1.3	v	32.5	4.9	33.0	52.5	74	-21.5	Peak
7440.00	43.2	180	1.4	v	35.1	5.6	33.5	50.4	74	-23.6	Peak
4960.00	45.8	120	1.4	h	32.5	4.9	33.0	50.2	74	-23.8	Peak
7440.00	42.3	30	1.6	h	35.1	5.6	33.5	49.5	74	-24.5	Peak

Note:

FUND: Fundemental
AVG: Average

Unintentional Emission, transmitter

Indicated			Antenna	Antenna		Correction Factor			FCC 15 Subpart C	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB
868.06	44.3	0	1.0	h	22.5	3.8	28.8	41.8	46	-4.2
806.90	40.2	0	2.0	v	22.3	3.6	28.6	37.5	46	-8.5
270.56	46.6	30	1.5	v	13.3	2.2	28.8	33.3	46	-12.7
41.64	41.8	270	1.0	h	11.9	1.2	28.6	26.3	40	-13.7
256.98	44.5	180	1.3	v	13.3	2.2	28.6	31.4	46	-14.6
52.31	41.3	180	1.2	h	10.2	1.0	28.6	23.9	40	-16.1
113.42	43.2	200	1.5	v	11.3	1.5	28.9	27.1	43.5	-16.4

Radiated Emission, receiver

Indicated			Antenna	Antenna		Correction Factor			FCC 15 B	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dB	dB	dB	dBμV/m	dBμV/m	dB
867.11	43.2	0	2.0	v	22.5	3.8	28.6	40.9	46	-5.1
31.94	47.6	180	1.0	h	14.9	0.8	28.6	34.7	40	-5.3
114.39	49.5	180	1.3	h	11.3	1.5	28.6	33.7	43.5	-9.8
272.50	48.6	180	2.0	v	13.3	2.2	28.8	35.3	46	-10.7
121.18	45.2	90	1.5	v	11.7	1.6	28.9	29.6	43.5	-13.9
265.71	42.3	0	1.3	h	13.4	2.2	28.6	29.3	46	-16.7

§15.247 (a) (1) - HOPPING CHANNEL SEPARATION

Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on a bench without connection to measurement instrument Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Description	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

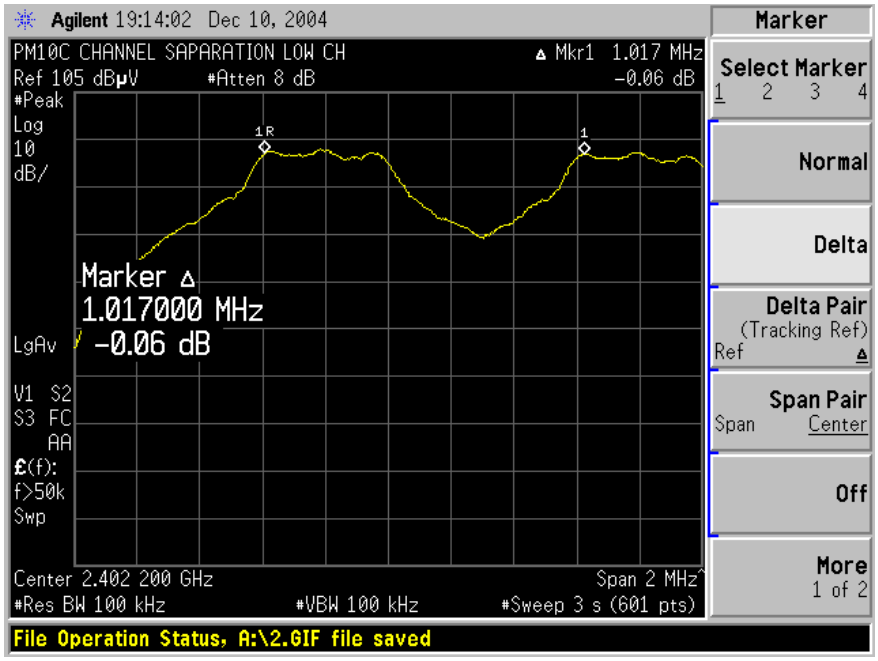
The testing was performed by Daniel Deng on 2004-12-16.

Measurement Results

Channel	Measurement (MHz)	Result
Low	1.017	Compliant
Middle	1.027	Compliant
High	1.007	Compliant

Plots of Hopping Channel Separation

Please refer to the following plots.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PM10C CHANNEL SAPARATION LOW CH
Ref 105 dBµV
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Mkr1 1.017 MHz
-0.06 dB
#Peak
Log
10
dB/
1R
1
Marker Δ
1.017000 MHz
-0.06 dB
LgAv
V1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.402 200 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 2 MHz
#Sweep 3 s (601 pts)
Marker
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(Tracking Ref)
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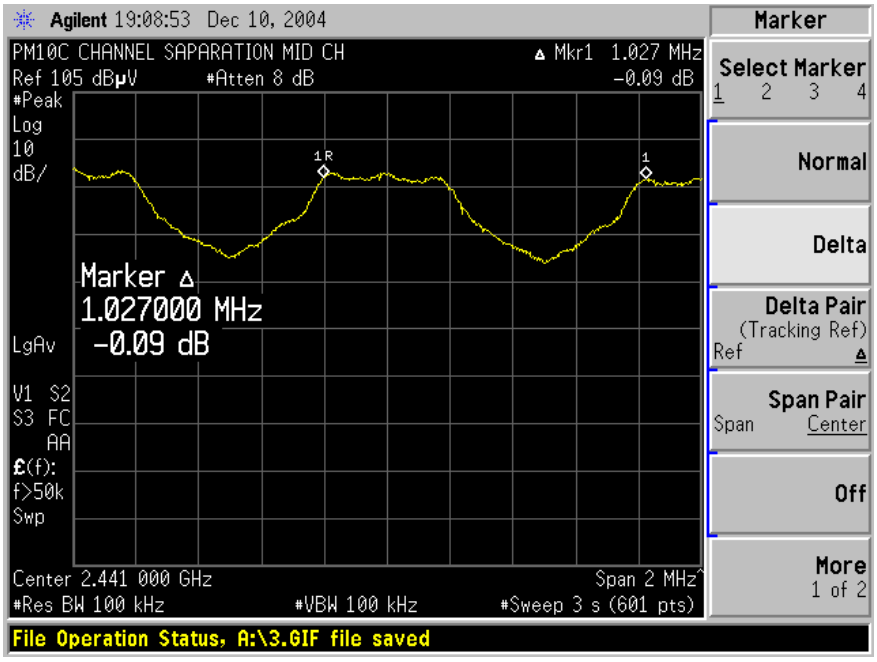
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PM10C CHANNEL SAPARATION MID CH
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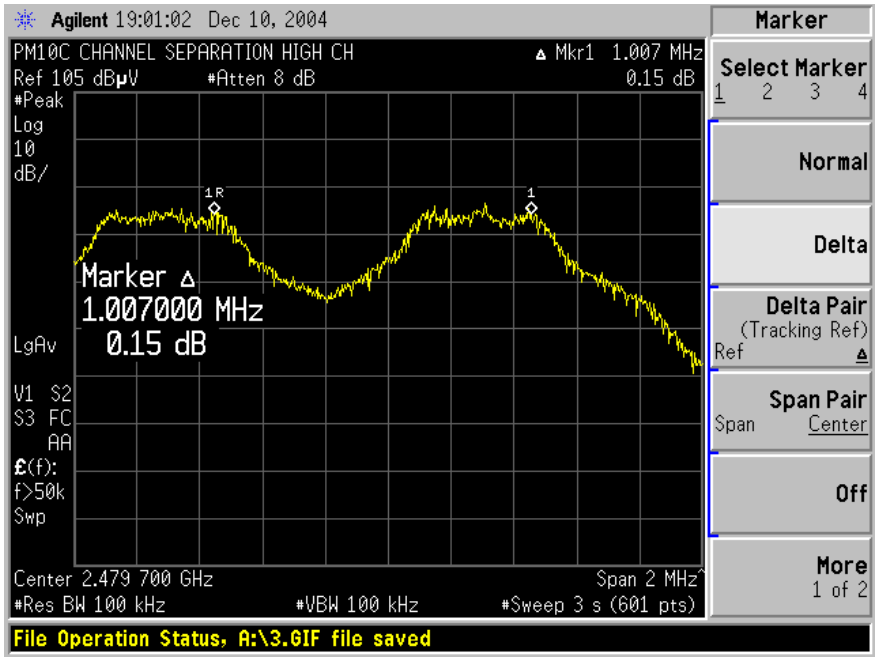
Mkr1 1.027 MHz
-0.09 dB
#Peak
Log
10
dB/
1R
1
Marker Δ
1.027000 MHz
-0.09 dB
LgAv
V1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.441 000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 2 MHz
#Sweep 3 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\3.GIF file saved


Agilent 19:01:02 Dec 10, 2004
PM10C CHANNEL SEPARATION HIGH CH
Ref 105 dBµV
#Atten 8 dB
Mkr1 1.007 MHz
0.15 dB
#Peak
Log
10
dB/
1R
1
Marker Δ
1.007000 MHz
0.15 dB
LgAv
V1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.479 700 GHz
#Res BW 100 kHz
#VBW 100 kHz
Span 2 MHz
#Sweep 3 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status. A:\3.GIF file saved

§15.247 (a) (1) - CHANNEL BANDWIDTH

Standard Applicable

According to §15.247(a)(l), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

The testing was performed by Daniel Deng on 2004-12-16.

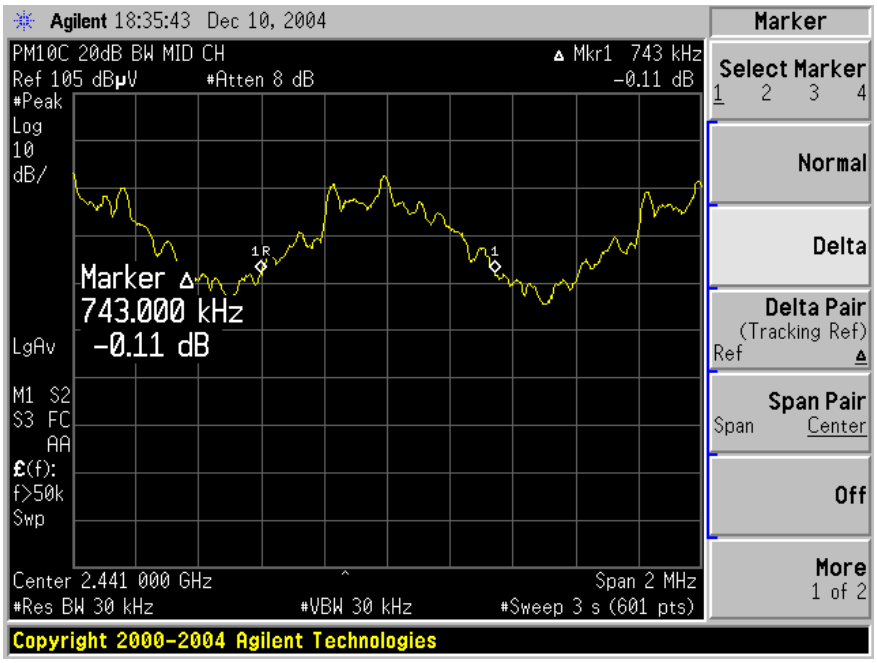
Measurement Result

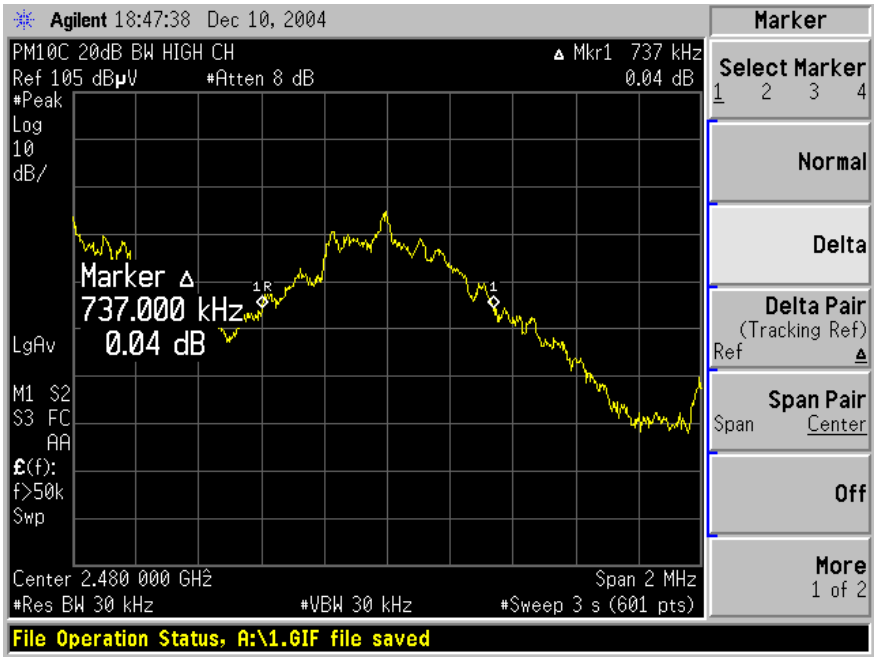
Frequency	Measurement (kHz)	Standard	Result
Low	733	≤ 1MHz	Compliant
Middle	743	≤ 1MHz	Compliant
High	737	≤ 1MHz	Compliant

Plot of Channel Bandwidth

Please refer to following plots.


Agilent 18:40:24 Dec 10, 2004
File
PM10C 20dB BW LOW CH
Mkr1 733 kHz
Ref 105 dBµV
#Atten 8 dB
-0.10 dB
#Peak
Log
10
dB/
Marker Δ
733.000 kHz
-0.10 dB
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.402 000 GHz
Span 2 MHz
#Res BW 30 kHz
#VBW 30 kHz
#Sweep 3 s (601 pts)
Catalog
Save
Load
Delete
Copy
Rename
More
1 of 2
File Operation Status, A:\2.GIF file saved


Agilent 18:35:43 Dec 10, 2004
Marker
PM10C 20dB BW MID CH
Mkr1 743 kHz
Ref 105 dBµV
#Atten 8 dB
-0.11 dB
#Peak
Log
10
dB/
Marker Δ
743.000 kHz
-0.11 dB
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.441 000 GHz
Span 2 MHz
#Res BW 30 kHz
#VBW 30 kHz
#Sweep 3 s (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
Copyright 2000-2004 Agilent Technologies


Agilent 18:47:38 Dec 10, 2004
PM10C 20dB BW HIGH CH
Ref 105 dBµV
#Atten 8 dB
Mkr1 737 kHz
0.04 dB
#Peak
Log
10
dB/
Marker Δ
737.000 kHz
0.04 dB
LgAv
M1 S2
S3 FC
AA
£(f):
f>50k
Swp
Center 2.480 000 GHz
#Res BW 30 kHz
#VBW 30 kHz
Span 2 MHz
#Sweep 3 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\1.GIF file saved

§15.247 (a) (1) (iii) - NUMBER OF HOPPING FREQUENCY USED

Standard Applicable

According to §15.247(a)(1)(iii), frequency hopping systems operating in the 2400-2483.5Mhz band shall use at least 75 hopping frequencies.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT on the bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

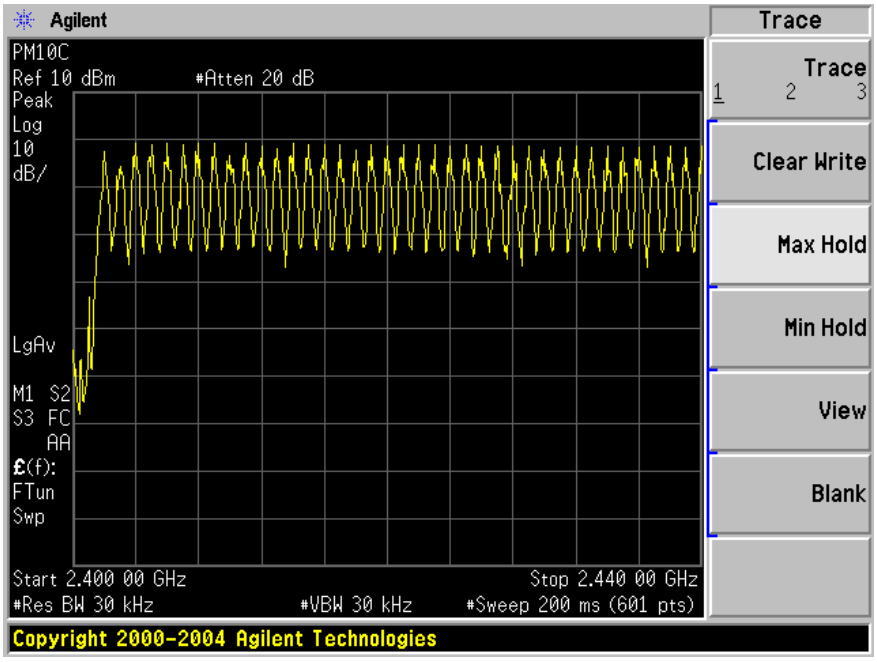
The testing was performed by Daniel Deng on 2004-12-16.

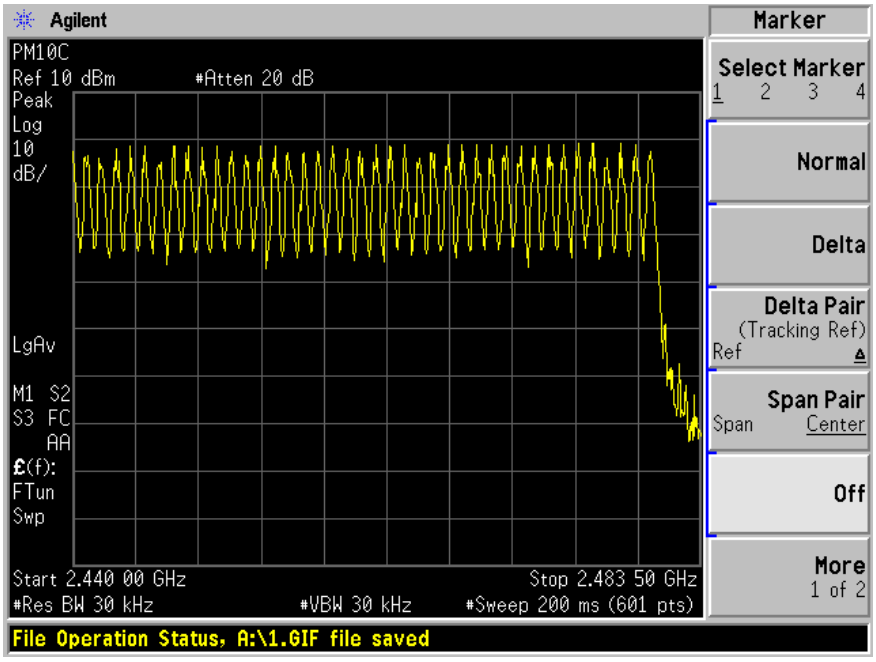
Measurement Results

Measurement	Standard	Result
79	75	Compliant

Plots of Number of Hopping Frequency

Please refer to the attached plots.


Agilent
PM10C
Ref 10 dBm
#Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.400 00 GHz
#Res BW 30 kHz
#VBW 30 kHz
Stop 2.440 00 GHz
#Sweep 200 ms (601 pts)
Copyright 2000-2004 Agilent Technologies
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank


Agilent
PM10C
Ref 10 dBm
#Atten 20 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.440 00 GHz
#Res BW 30 kHz
#VBW 30 kHz
Stop 2.483 50 GHz
#Sweep 200 ms (601 pts)
File Operation Status, A:\1.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2

§15.247 9 (a) (1) (iii) - DWELL TIME

Standard Applicable

According to §15.247 (a)(1)(iii), the average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

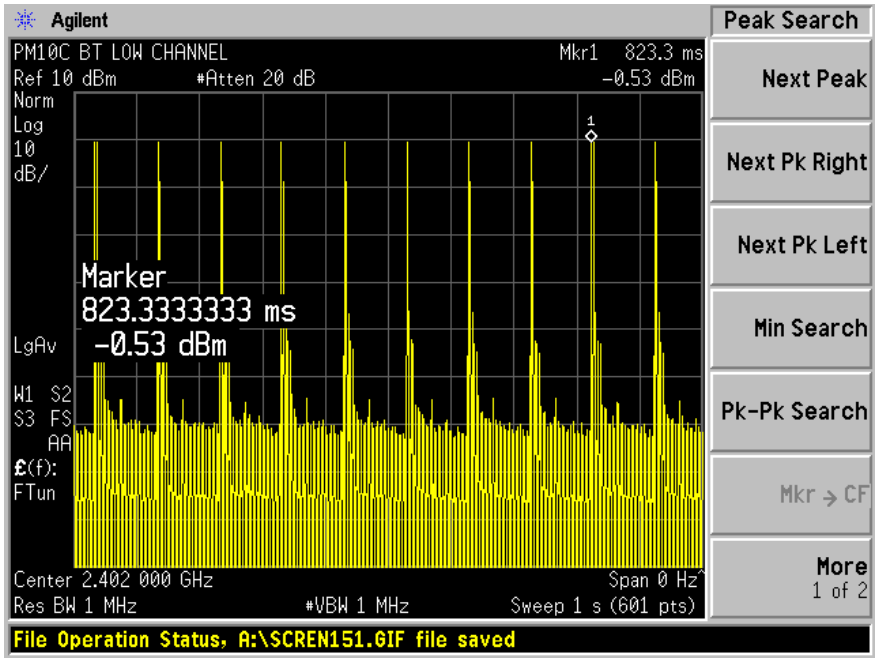
The testing was performed by Daniel Deng on 2004-12-16.

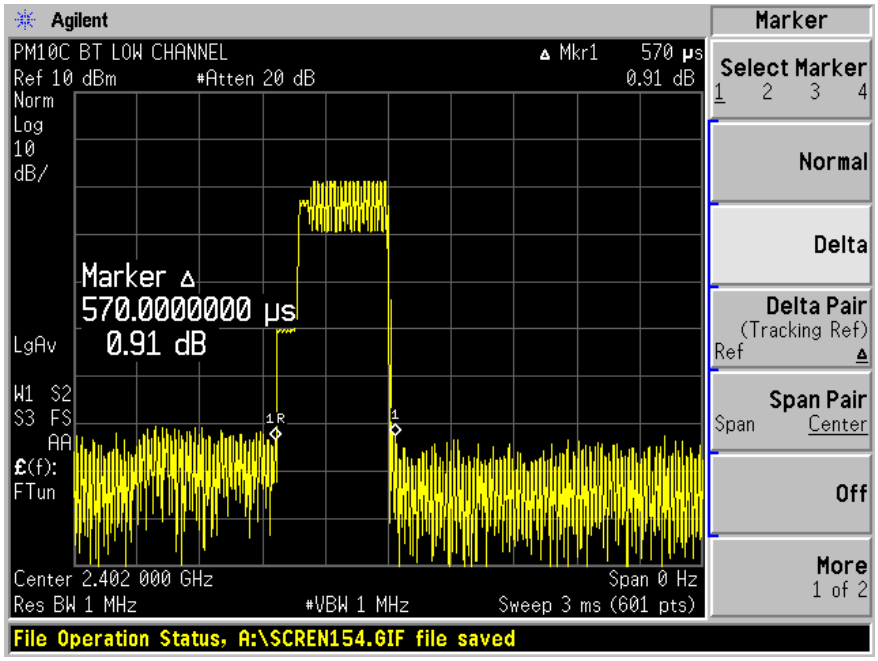
Measurement Results

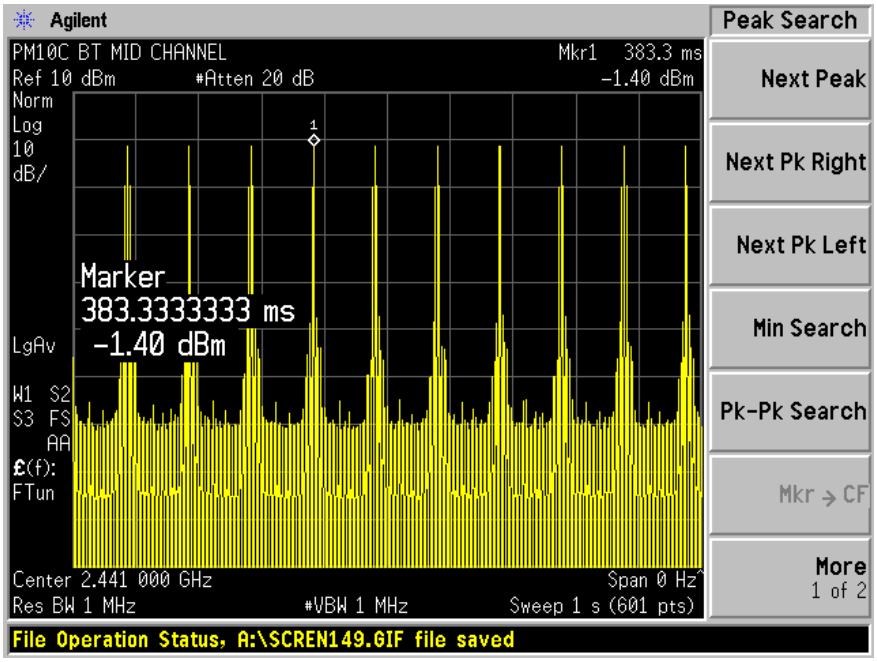
Low Channel: 10 x 0.57(ms) x [(79x0.4) / 1 (s)] = 0.180 s < 0.4 s
Middle Channel: 10 x 0.46(ms) x [(79x0.4) / 1 (s)] = 0.145 s < 0.4 s
High Channel: 10 x 0.47(ms) x [(79x0.4) / 1 (s)] = 0.149 s < 0.4 s

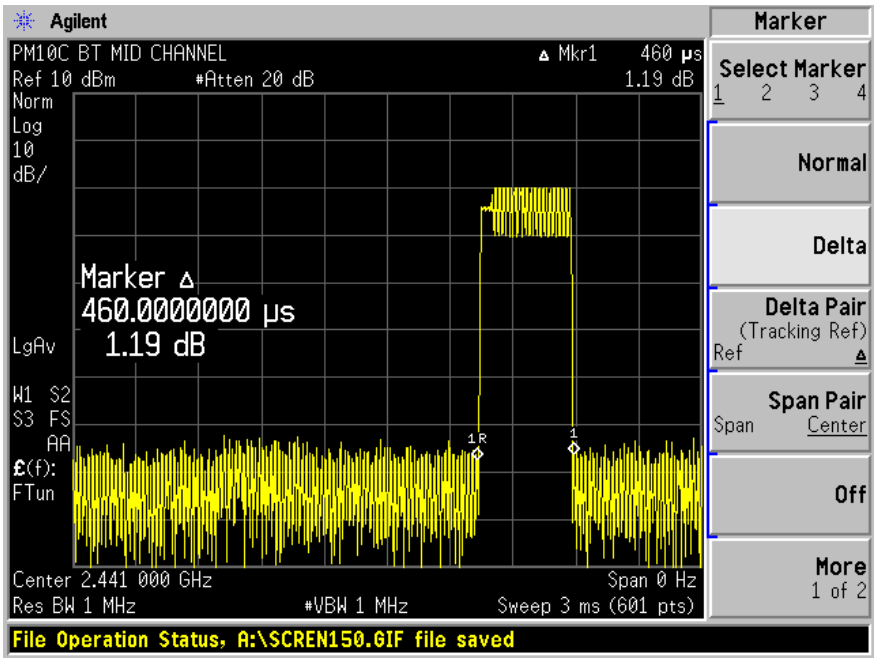
Plots of Dwell Time

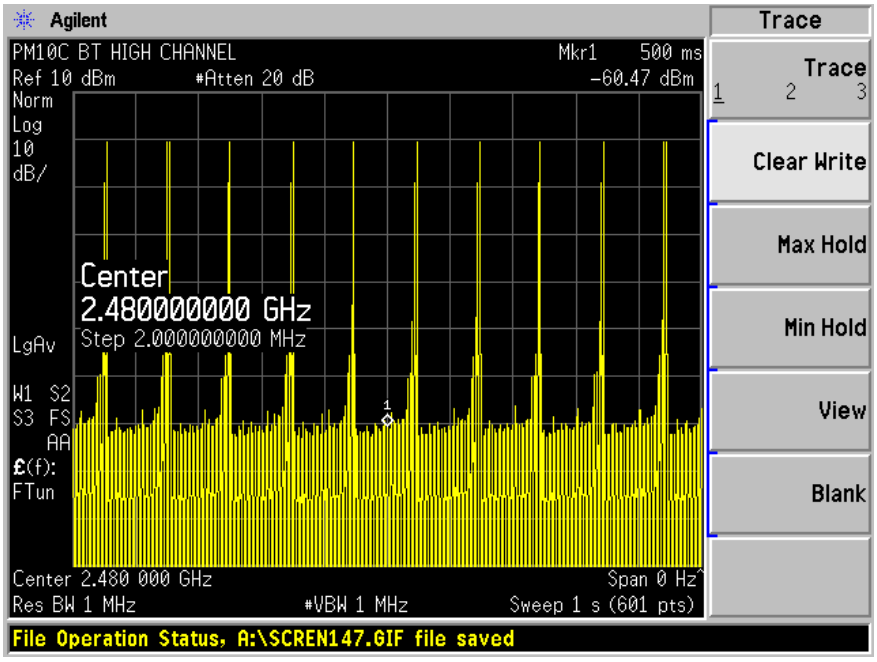
Please refer the following plots.

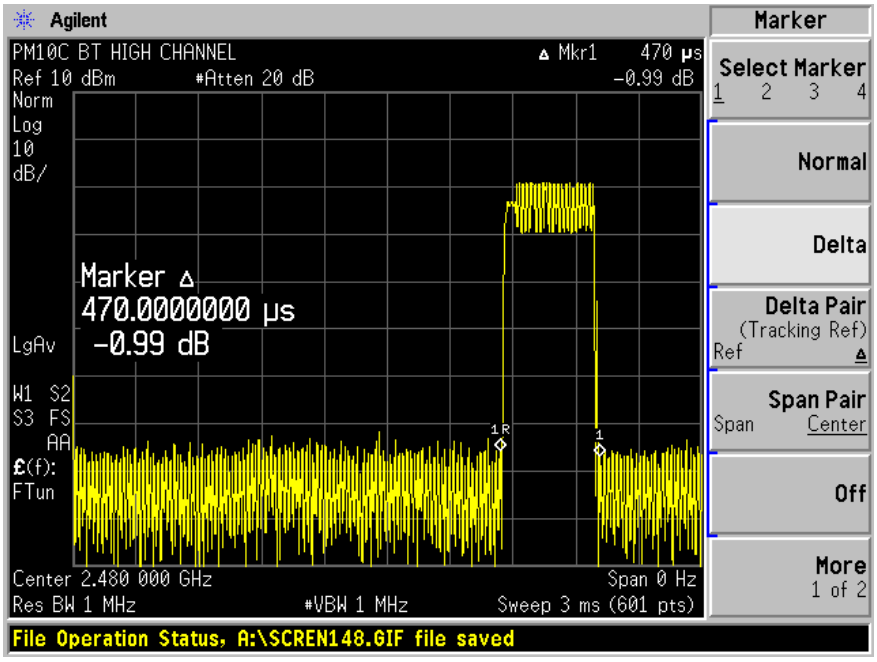

Agilent
PM10C BT LOW CHANNEL
Mkr1 823.3 ms
Ref 10 dBm
#Atten 20 dB
-0.53 dBm
Norm
Log
10
dB/
Marker
823.3333333 ms
-0.53 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.402 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 1 s (601 pts)
File Operation Status, A:\SCREN151.GIF file saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2


Agilent
PM10C BT LOW CHANNEL
Δ Mkr1 570 µs
Ref 10 dBm
#Atten 20 dB
0.91 dB
Norm
Log
10
dB/
Marker Δ
570.0000000 µs
0.91 dB
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.402 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 3 ms (601 pts)
File Operation Status, A:\SCREN154.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2


Agilent
PM10C BT MID CHANNEL
Mkr1 383.3 ms
Ref 10 dBm
#Atten 20 dB
-1.40 dBm
Norm
Log
10
dB/
Marker
383.3333333 ms
-1.40 dBm
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 1 s (601 pts)
File Operation Status, A:\SCREN149.GIF file saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2


Agilent
PM10C BT MID CHANNEL
Δ Mkr1 460 µs
Ref 10 dBm
#Atten 20 dB
1.19 dB
Norm
Log
10
dB/
Marker Δ
460.0000000 µs
1.19 dB
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 3 ms (601 pts)
File Operation Status, A:\SCREN150.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2


Agilent
PM10C BT HIGH CHANNEL
Mkr1 500 ms
Ref 10 dBm
#Atten 20 dB
-60.47 dBm
Norm
Log
10
dB/
Center
2.480000000 GHz
Step 2.000000000 MHz
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.480 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 1 s (601 pts)
Trace
Trace
1 2 3
Clear Write
Max Hold
Min Hold
View
Blank
File Operation Status, A:\SCREN147.GIF file saved


Agilent
PM10C BT HIGH CHANNEL
Δ Mkr1 470 µs
Ref 10 dBm
#Atten 20 dB
-0.99 dB
Norm
Log
10
dB/
Marker Δ
470.0000000 µs
-0.99 dB
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center 2.480 000 GHz
Span 0 Hz
Res BW 1 MHz
#VBW 1 MHz
Sweep 3 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref Δ
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN148.GIF file saved

§15.247 (b) (1) - MAXIMUM PEAK OUTPUT POWER

Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter shall not exceed 1 Watt.

Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

Environmental Conditions

Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

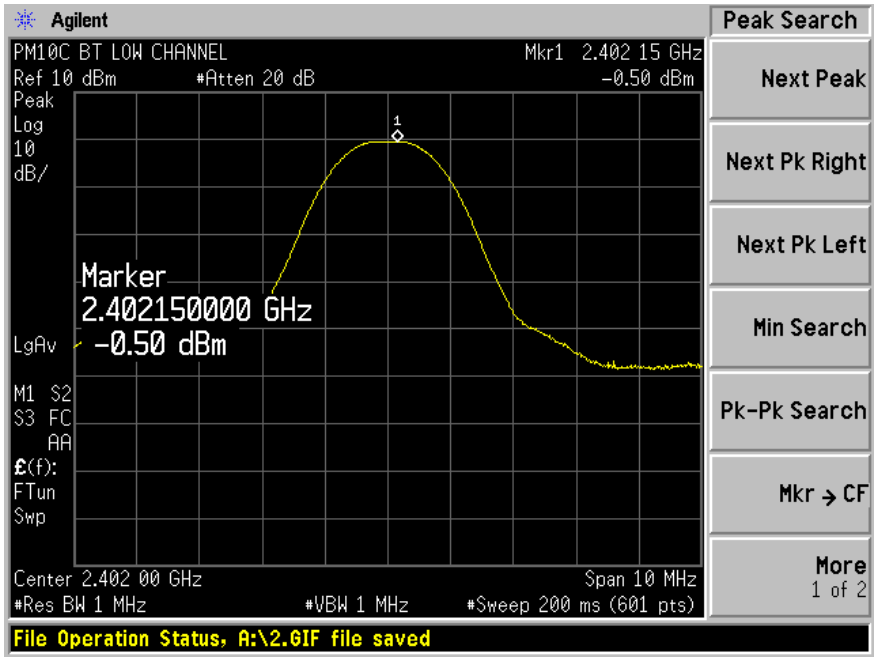
The testing was performed by Daniel Deng on 2004-12-16.

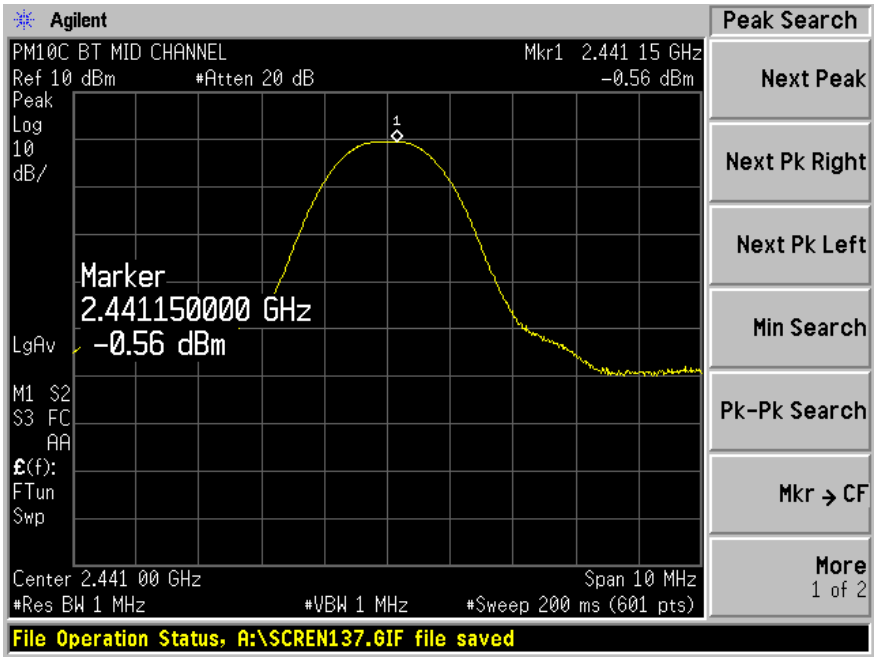
Measurement Result

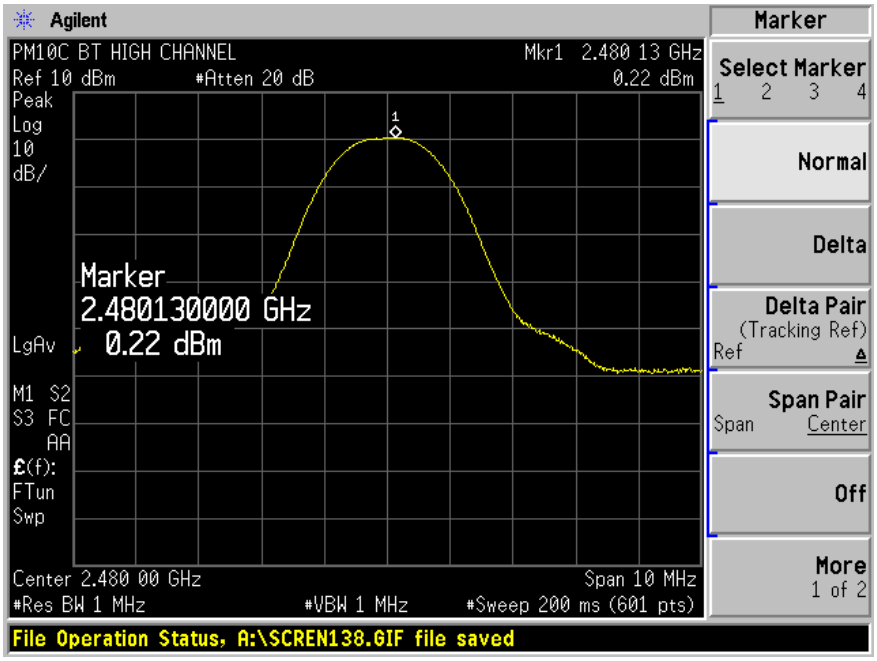
Channel	Frequency	Output Power in dBm	Output Power in W	Standard	Result
Low	2402	-0.50	0.00089	≤ 1W	Compliant
Middle	2442	-0.56	0.00088	≤ 1W	Compliant
High	2480	0.22	0.00105	≤ 1W	Compliant

Plots of Maximum Peak Output Power

Please refer to following plots.


Agilent
PM10C BT LOW CHANNEL
Mkr1 2.402 15 GHz
Ref 10 dBm
#Atten 20 dB
-0.50 dBm
Peak
Log
10
dB/
Marker
2.402150000 GHz
-0.50 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 2.402 00 GHz
Span 10 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 200 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\2.GIF file saved


Agilent
PM10C BT MID CHANNEL
Mkr1 2.441 15 GHz
Ref 10 dBm
#Atten 20 dB
-0.56 dBm
Peak
Log
10
dB/
Marker
2.441150000 GHz
-0.56 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 2.441 00 GHz
Span 10 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 200 ms (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN137.GIF file saved


Agilent
Marker
PM10C BT HIGH CHANNEL
Mkr1 2.480 13 GHz
Ref 10 dBm
#Atten 20 dB
0.22 dBm
Peak
Log
10
dB/
Marker
2.480130000 GHz
0.22 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Center 2.480 00 GHz
Span 10 MHz
#Res BW 1 MHz
#VBW 1 MHz
#Sweep 200 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN138.GIF file saved

§15.247 (b) (4) - RF EXPOSURE

According to the TCB Exclusions List, the limit for general population of portable transmitters that are used less than 2.5cm from a person's body is :

Low Threshold : ($60/f_{GHz}$) mW, d < 2.5 cm => (60/2.4) = 25mW

The maximum output power for the device is 0.00105W (1.05mW) which is less than the limit lited in the TCB exclusions lists (25mW). Therefore, SAR test is not required for the Part15 portion of this device.

§15.247 (c) - 100 KHZ BANDWIDTH OF BAND EDGES

Standard Applicable

According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

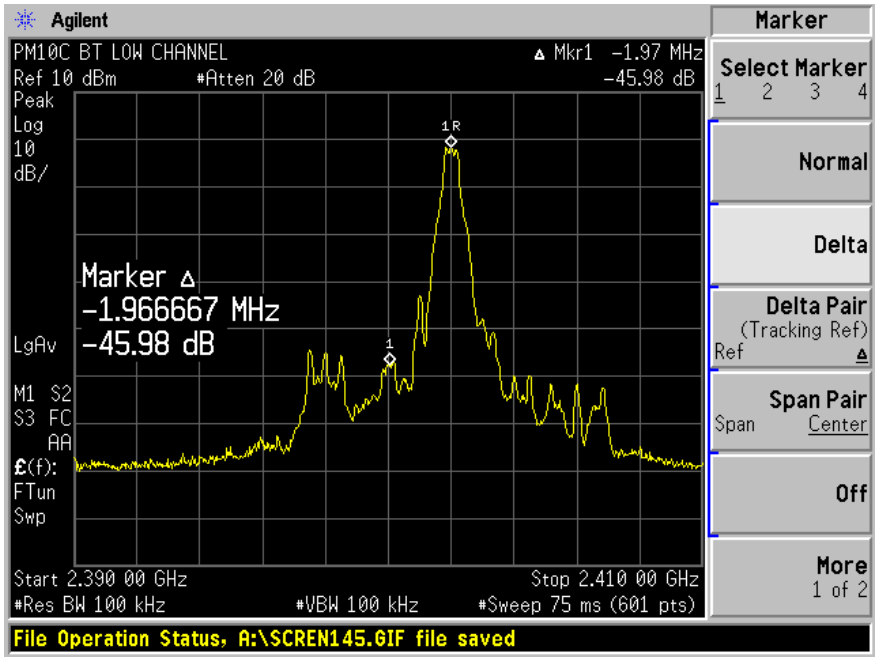
Environmental Conditions

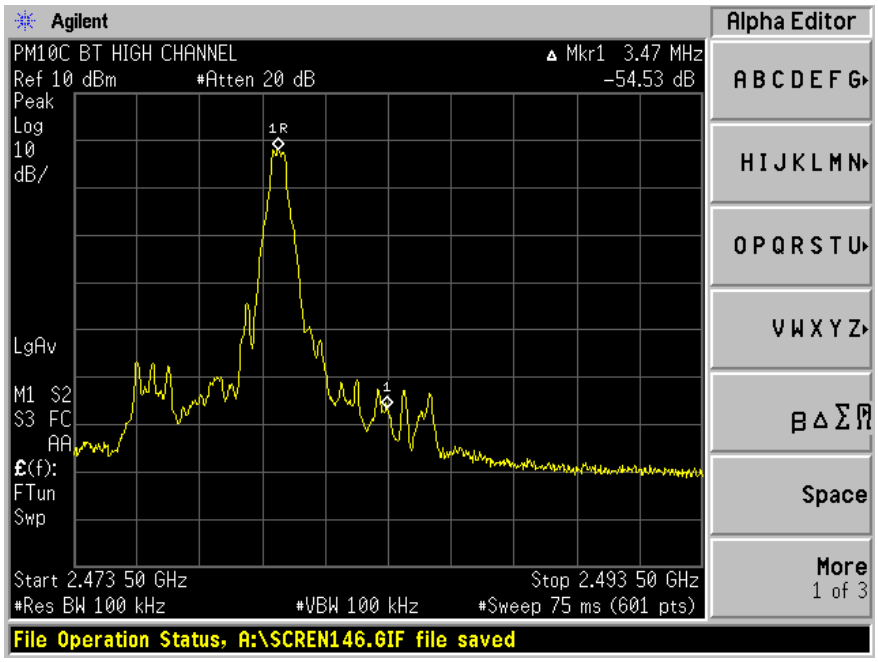
Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

The testing was performed by Daniel Deng on 2004-12-16.

Plots of 100kHz Bandwidth of Band Edge

Please refer the following plots.


Agilent
PM10C BT LOW CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 -1.97 MHz
-45.98 dB
Peak
Log
10
dB/
Marker Δ
-1.966667 MHz
-45.98 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.390 00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.410 00 GHz
#Sweep 75 ms (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN145.GIF file saved


Agilent
PM10C BT HIGH CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 3.47 MHz
-54.53 dB
Peak
Log
10
dB/
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 2.473 50 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 2.493 50 GHz
#Sweep 75 ms (601 pts)
Alpha Editor
A B C D E F G
H I J K L M N
O P Q R S T U
V W X Y Z
Space
More
1 of 3
File Operation Status, A:\SCREN146.GIF file saved

SPURIOUS EMISSION AT ANTENNA PORT

Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation f a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

2. Position the EUT on a bench without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.

4. Set the SA on View mode and then plot the result on SA screen.

5. Repeat above procedures until all frequencies measured were complete.

Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Date
Agilent	E4446A	Spectrum Analyzer	2004-11-10

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

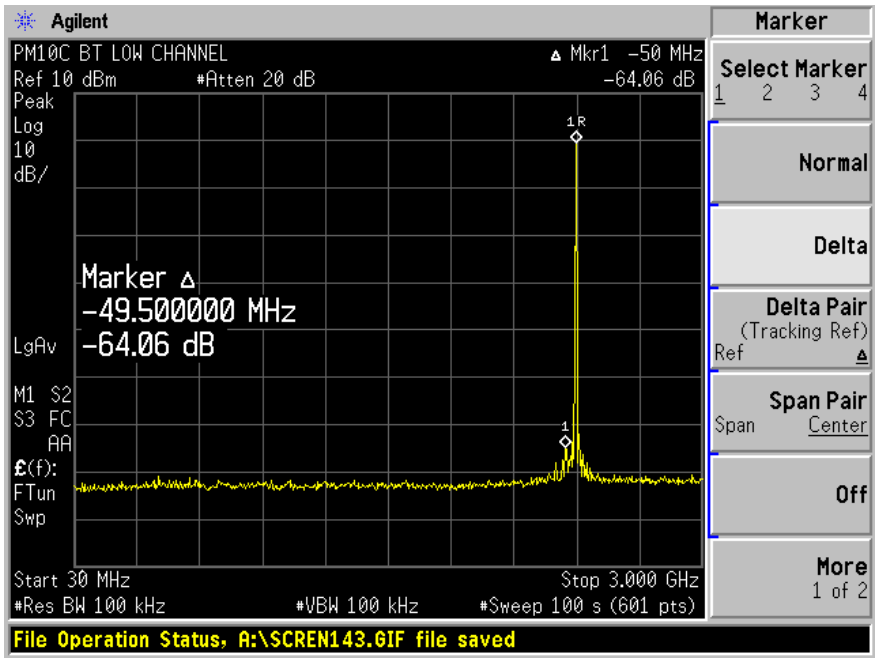
Environmental Conditions

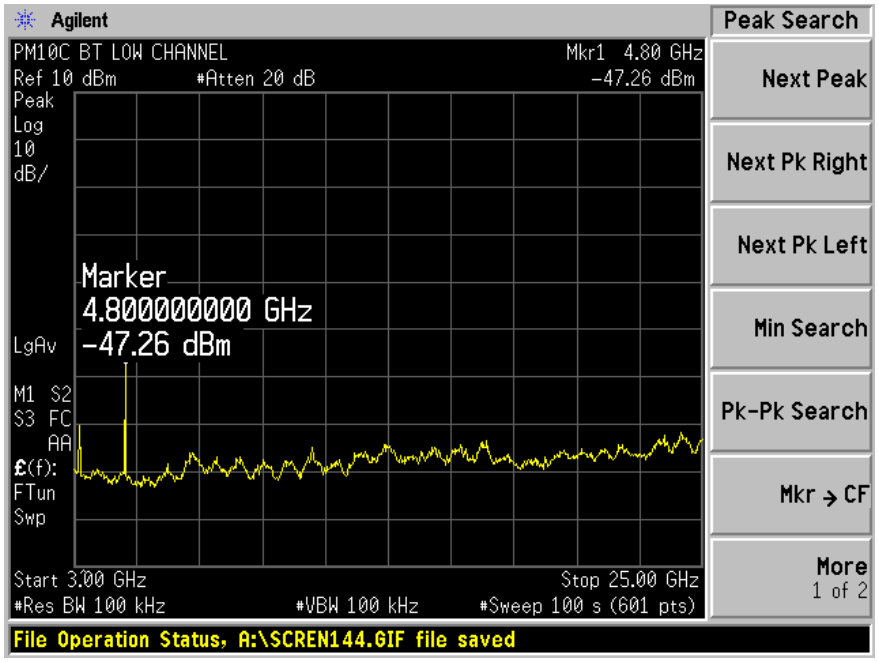
Temperature:	13° C
Relative Humidity:	42%
ATM Pressure:	1028 mbar

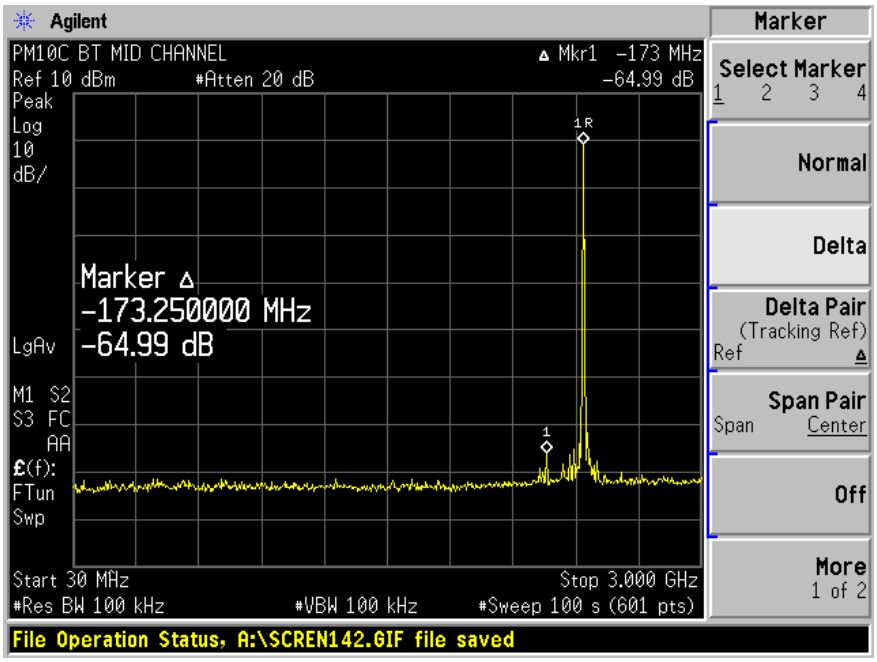
The testing was performed by Daniel Deng on 2004-12-16.

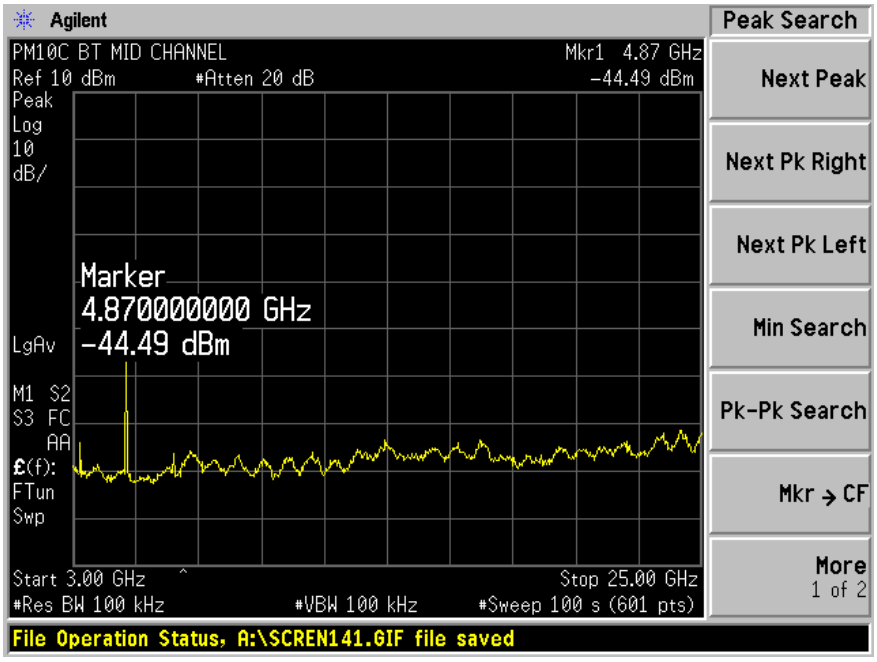
Measurement Results

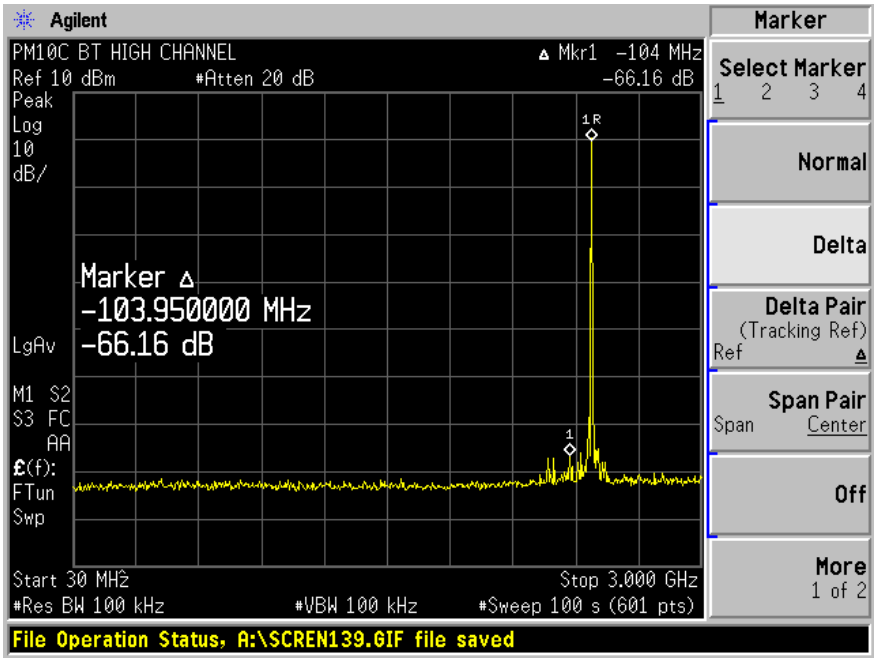
Please refer to the following plots.

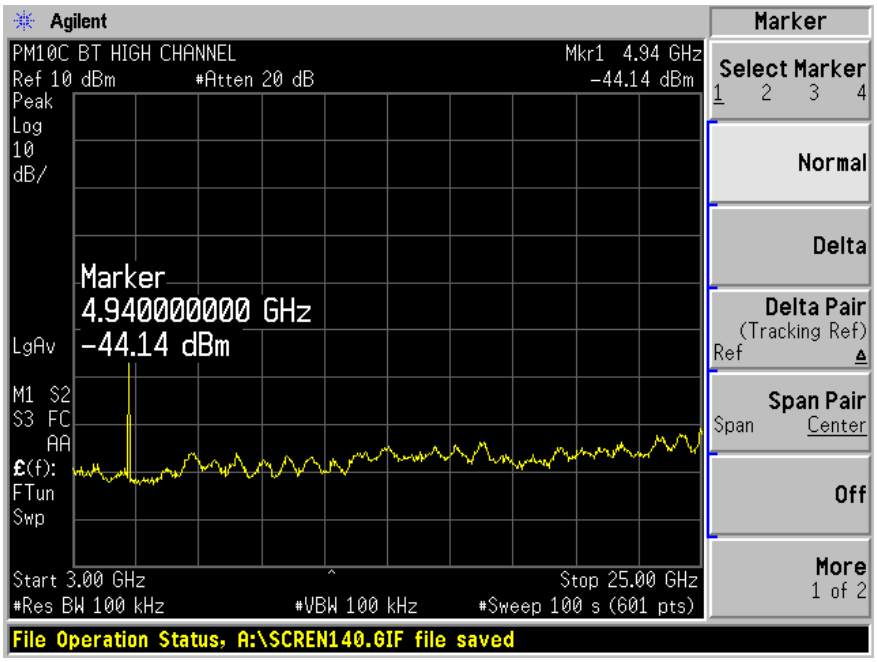

Agilent
PM10C BT LOW CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 -50 MHz
-64.06 dB
Peak
Log
10
dB/
1R
Marker Δ
-49.500000 MHz
-64.06 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 3.000 GHz
#Sweep 100 s (601 pts)
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
File Operation Status, A:\SCREN143.GIF file saved


Agilent
PM10C BT LOW CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 4.80 GHz
-47.26 dBm
Peak
Log
10
dB/
Marker
4.800000000 GHz
-47.26 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 3.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 100 s (601 pts)
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2
File Operation Status, A:\SCREN144.GIF file saved


Agilent
PM10C BT MID CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 -173 MHz
-64.99 dB
Peak
Log
10
dB/
1R
Marker Δ
-173.250000 MHz
-64.99 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 3.000 GHz
#Sweep 100 s (601 pts)
File Operation Status, A:\SCREN142.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2


Agilent
PM10C BT MID CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 4.87 GHz
-44.49 dBm
Peak
Log
10
dB/
Marker
4.870000000 GHz
-44.49 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 3.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 100 s (601 pts)
File Operation Status, A:\SCREN141.GIF file saved
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
Mkr → CF
More
1 of 2


Agilent
PM10C BT HIGH CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 -104 MHz
-66.16 dB
Peak
Log
10
dB/
1R
Marker Δ
-103.950000 MHz
-66.16 dB
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
1
Start 30 MHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 3.000 GHz
#Sweep 100 s (601 pts)
File Operation Status, A:\SCREN139.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2


Agilent
PM10C BT HIGH CHANNEL
Ref 10 dBm
#Atten 20 dB
Mkr1 4.94 GHz
-44.14 dBm
Peak
Log
10
dB/
Marker
4.940000000 GHz
-44.14 dBm
LgAv
M1 S2
S3 FC
AA
£(f):
FTun
Swp
Start 3.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Stop 25.00 GHz
#Sweep 100 s (601 pts)
File Operation Status, A:\SCREN140.GIF file saved
Marker
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2

SUMMARY OF TEST RESULTS FOR FCC PART 22 & 24

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1093	RF Exposure (SAR)	Compliant
§ 2.1046, § 22.912 (d) § 24.232	RF Output Power	Compliant
§ 2.1046, § 22.913 (a) § 24.232	Conducted Output Power	Compliant
§ 2.1049 § 22.917 § 22.905 § 24.238	Out of Band Emission, 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

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

CDMA digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

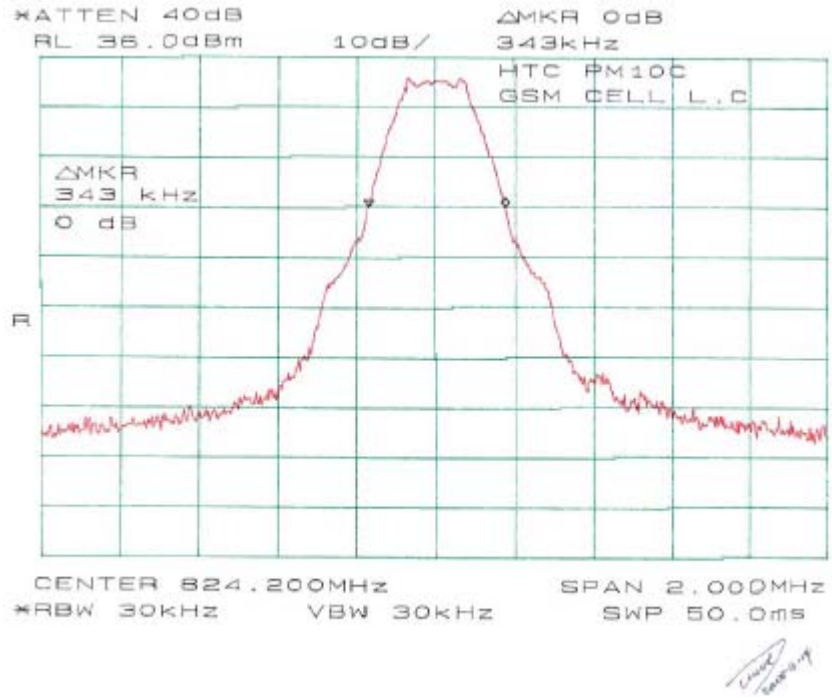
Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

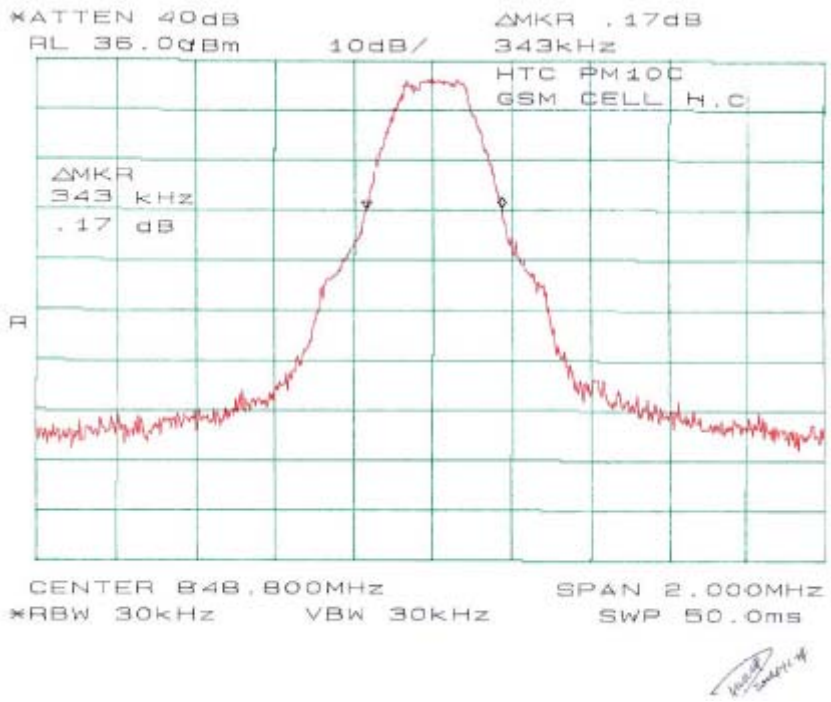
The testing was performed by Daniel Deng on 2004-12-14.

Test Results

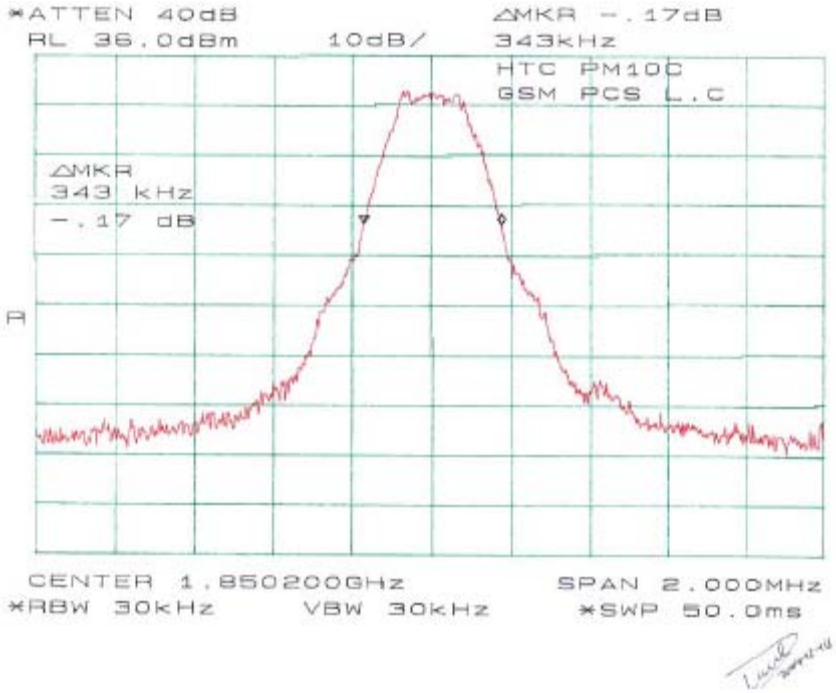
Please refer to the hereinafter plots.

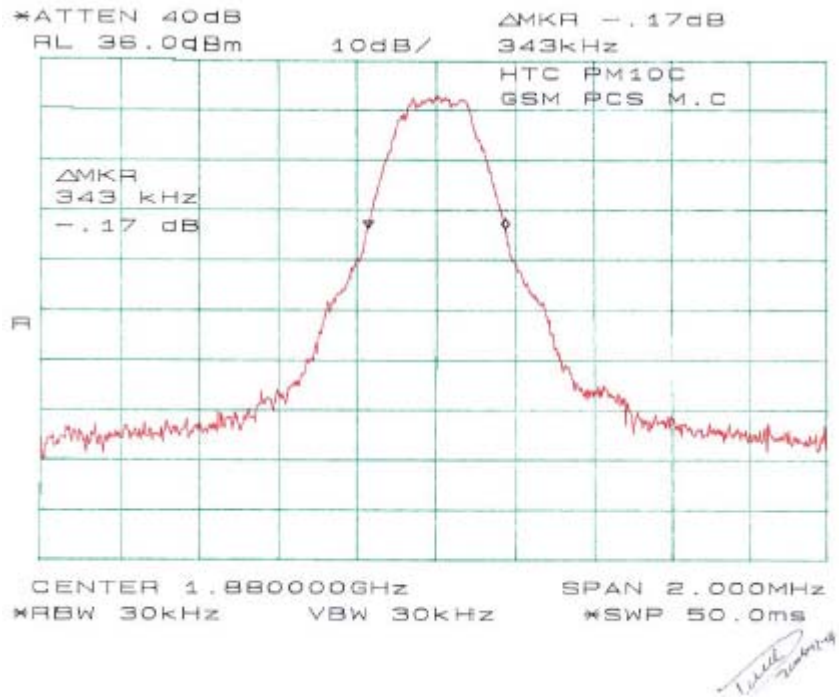
Plots of Modulation Characteristic for GSM850, Part22

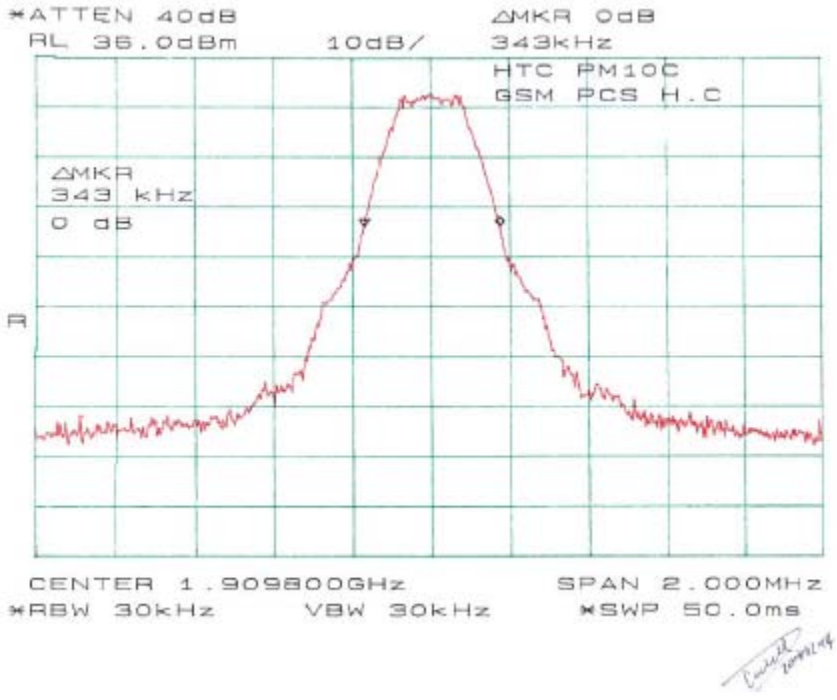




Plots of Modulation Characteristic for GSM1900, Part24




*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -.17dB
343kHz
HTC PM10C
GSM PCS M.C
ΔMKR
343 kHz
-.17 dB
A
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR 0dB
343kHz
HTC PM10C
GSM PCS H.C
ΔMKR
343 kHz
0 dB
A
CENTER 1.909800GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms

§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 (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log_{10} (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US443000386	2004-11-10
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
Com-Power	Antenna, Dipole	AD-100	2229	2004-09-26

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

The testing was performed by Daniel Deng on 2004-12-14.

Test Result

FCC Part 22: GSM850

Low Frequency: -31.2 dB at 2472.39 MHz
Middle Frequency: -28.7 dB at 2509.80 MHz
High Frequency: -19.0 dB at 2546.61 MHz

FCC Part 24: GSM1900

Low Frequency: -29.3 dB at 3700.60 MHz
Middle Frequency: -23.4 dB at 3760.00 MHz
High Frequency: -23.8 dB at 3819.60 MHz

Test Data for GSM850 (Cellular Band, part22)

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain dB	Loss dB	Level dBm	Limit dBm	Margin dB
LOW CHANNEL											
824.13	128.25	0	1.5	v	824.13	27.3	6.3	0.8	32.8		
824.13	127.59	90	1.5	h	824.13	26.7	6.3	0.8	32.2		
2472.39	43.56	120	1.5	h	2472.39	-50.4	7.6	1.4	-44.2	-13	-31.2
2472.39	42.91	180	1.3	v	2472.39	-51.1	7.6	1.4	-44.9	-13	-31.9
1648.26	43.68	200	2.1	h	1648.26	-60.5	9.9	1.2	-51.8	-13	-38.8
1648.26	41.74	90	1.7	v	1648.26	-62.4	9.9	1.2	-53.7	-13	-40.7
1695.70	39.46	90	1.7	v	1695.70	-61.9	8.8	1.2	-54.3	-13	-41.3
1695.70	38.79	90	1.3	h	1695.70	-62.6	8.8	1.2	-55	-13	-42.0
MIDDLE CHANNEL											
836.60	128.38	0	1.6	v	836.40	27.3	6.3	0.8	32.8		
836.60	127.75	90	1.3	h	836.40	26.8	6.3	0.8	32.3		
2509.80	43.02	270	1.6	h	2509.20	-47.9	7.6	1.4	-41.7	-13	-28.7
2509.80	40.85	150	1.5	v	2509.20	-50.1	7.6	1.4	-43.9	-13	-30.9
1673.20	48.40	180	1.5	v	1672.80	-58.6	9.9	1.2	-49.9	-13	-36.9
1673.20	44.52	330	1.7	h	1672.80	-62.5	9.9	1.2	-53.8	-13	-40.8
HIGH CHANNEL											
848.87	128.50	90	1.4	v	848.19	27.4	6.3	0.8	32.9		
848.87	128.45	180	1.3	h	848.19	27.3	6.3	0.8	32.8		
2546.61	43.85	150	1.5	h	2544.57	-38.2	7.6	1.4	-32	-13	-19.0
2546.61	42.14	0	2.1	v	2544.57	-39.9	7.6	1.4	-33.7	-13	-20.7
1697.74	52.08	180	1.5	v	1696.38	-47.3	9.9	1.2	-38.6	-13	-25.6
1697.74	50.23	30	1.5	h	1696.38	-49.2	9.9	1.2	-40.5	-13	-27.5

Test Data for GSM1900 (PCS band, part24)

EUT							Generator			Standard	
Indicated		Table	Test Antenna		Substitution		Antenna	Cable	Absolute	FCC	FCC
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Gain dB	Loss dB	Level dBm	Limit dBm	Margin dB
LOW CHANNEL											
1850.30	125.25	30	1.4	v	1850.30	22.3	8.3	1.3	29.3		
1850.30	125.45	0	1.6	h	1850.30	22.4	8.3	1.3	29.4		
3700.60	40.89	90	2.0	h	3700.60	-50.8	10.3	1.8	-42.3	-13	-29.3
3700.60	39.45	30	1.9	v	3700.60	-52.2	10.3	1.8	-43.7	-13	-30.7
5550.90	39.92	30	1.5	h	5550.90	-52.5	10.6	2.3	-44.2	-13	-31.2
5550.90	38.57	180	1.3	v	5550.90	-53.9	10.6	2.3	-45.6	-13	-32.6
MIDDLE CHANNEL											
1880.00	125.72	0	1.4	v	1880.00	22.5	8.3	1.3	29.5		
1880.00	126.13	180	1.4	h	1880.00	22.9	8.3	1.3	29.9		
3760.00	46.79	180	2.8	h	3760.00	-44.9	10.3	1.8	-36.4	-13	-23.4
3760.00	44.27	90	2.1	v	3760.00	-47.4	10.3	1.8	-38.9	-13	-25.9
5640.00	42.23	150	2.0	v	5640.00	-50.2	10.6	2.3	-41.9	-13	-28.9
5640.00	43.55	180	1.3	h	5640.00	-51.5	10.6	2.3	-43.2	-13	-30.2
3230.50	40.12	0	1.8	v	3230.50	-52.3	9.6	1.7	-44.4	-13	-31.4
3230.50	40.08	180	2.2	h	3230.50	-52.3	9.6	1.7	-44.4	-13	-31.4
HIGH CHANNEL											
1909.80	125.91	90	1.9	v	1909.80	22.6	8.3	1.3	29.6		
1909.80	125.98	150	2.0	h	1909.80	22.6	8.3	1.3	29.6		
3819.60	46.42	120	1.5	v	3819.60	-45.3	10.3	1.8	-36.8	-13	-23.8
3819.60	44.45	180	1.6	h	3819.60	-47.2	10.3	1.8	-38.7	-13	-25.7
5729.40	43.32	150	2.2	v	5729.40	-49.1	10.6	2.3	-40.8	-13	-27.8
5729.40	42.51	180	2.5	h	5729.40	-49.9	10.6	2.3	-41.6	-13	-28.6

§2.1046, §22.912(d), & §24.232 - RF POWER OUTPUT

Applicable Standard

According to FCC §2.1046 and §24.232 (1), mobile/portable stations are limited to 2 watts EIRP.
According to FCC §22.912(d), the ERP of mobile transmitters must not exceed 7 watts.

Test Procedure

1. On a test site, the EUT shall be placed at 1.5m height on a turn table, and in the position closest to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3m from EUT to correspond to the frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the quasi-peak detector is used for the measurement.
4. The transmitter shall be switched on, if possible, without modulation and the measuring receiver shall be tuned to the frequency of the transmitter under test.
5. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
6. The transmitter shall then the rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
7. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
8. The maximum signal level detected by the measuring receiver shall be noted.
9. The transmitter shall be replaced by a horn (substitution antenna) for Part24 (EIRP) and replaced by dipole antenna for Part22 (ERP).
10. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
11. The substitution antenna shall be connected to a calibrated signal generator.
12. In necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
13. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
14. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring received, which is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
15. The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
16. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

17. The measure of the effective radiated power is the large of the two levels recorded, at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-07-03
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
Com-Power	Antenna, Dipole	AD-100	2229	2004-09-26
Agilent	Spectrum Analyzer	E4446A	US443000386	2004-11-10

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

The testing was performed by Daniel Deng on 2004-12-14.

Test Results

Test Data for GSM850 (Cellular Band, part22)

Frequency MHz	Level dBm	Gain dB	Loss dB	Level dBm (ERP)
824.13	33.6	0	0.8	32.8
836.40	33.6	0	0.8	32.8
848.19	33.7	0	0.8	32.9

Test Data for GSM1900 (PCS band, part24)

Frequency MHz	Level dBm	Gain dB	Loss dB	Level dBm (EIRP)
1850.30	22.4	8.3	1.3	29.4
1880.00	22.9	8.3	1.3	29.9
1909.80	22.6	8.3	1.3	29.6

Sample calculation:

Absolute level = substitution reading + antenna gain - cable loss

For example:

27.4 + 6.3 – 0.8 = 32.9

§2.1046, §22.913(a), & §24.232 – CONDUCTED 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.

According to FCC §2.1046 and §24.232 (b), Mobile/portable stations are limited to 2 watts e.i.r.p. peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

The testing was performed by Daniel Deng on 2004-12-14.

Test Results

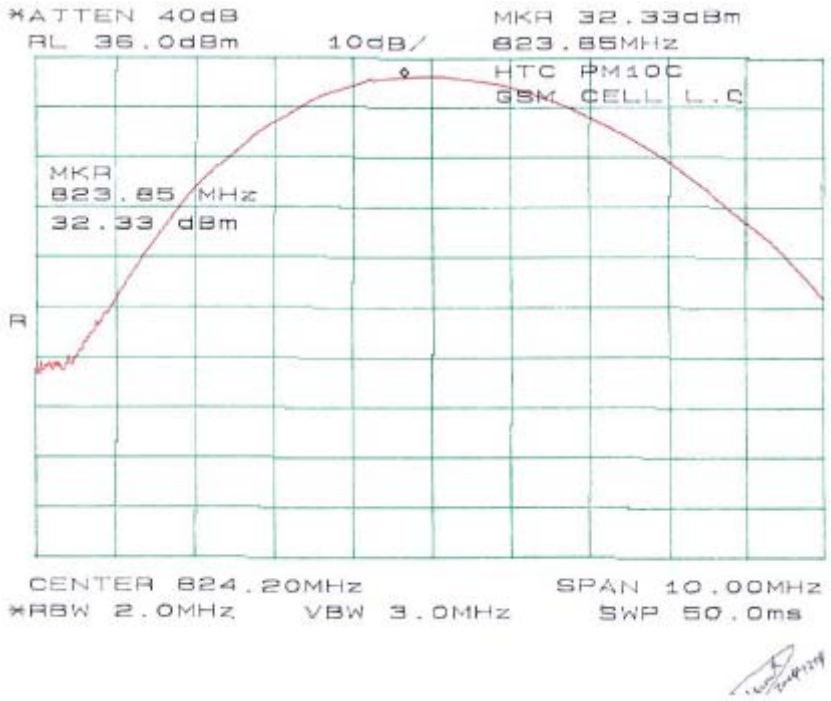
CDMA800, Cellular band, Part 22:

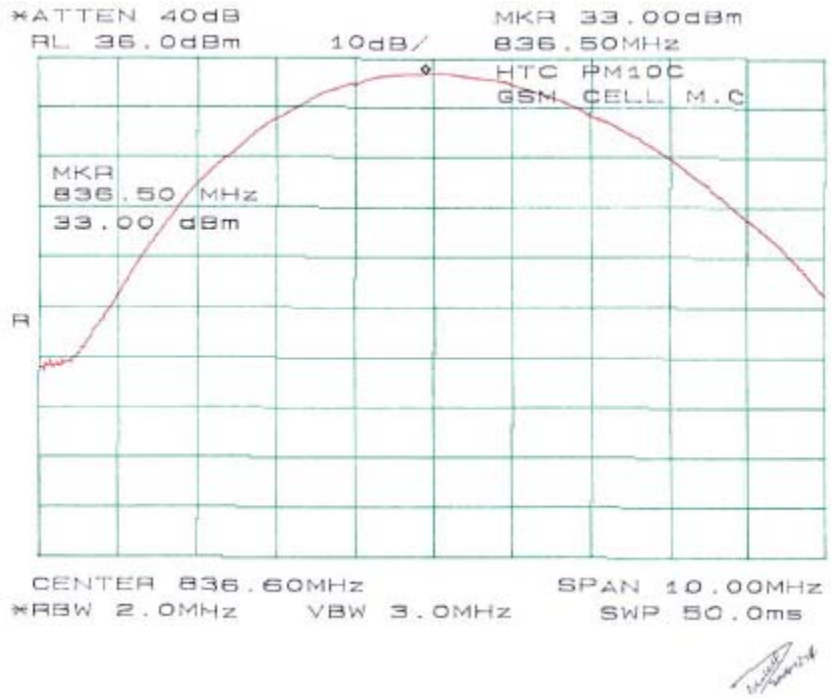
Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	824.20	32.33	1.710	7
MIDDLE	836.60	33.00	1.995	7
HIGH	848.80	33.00	1.995	7

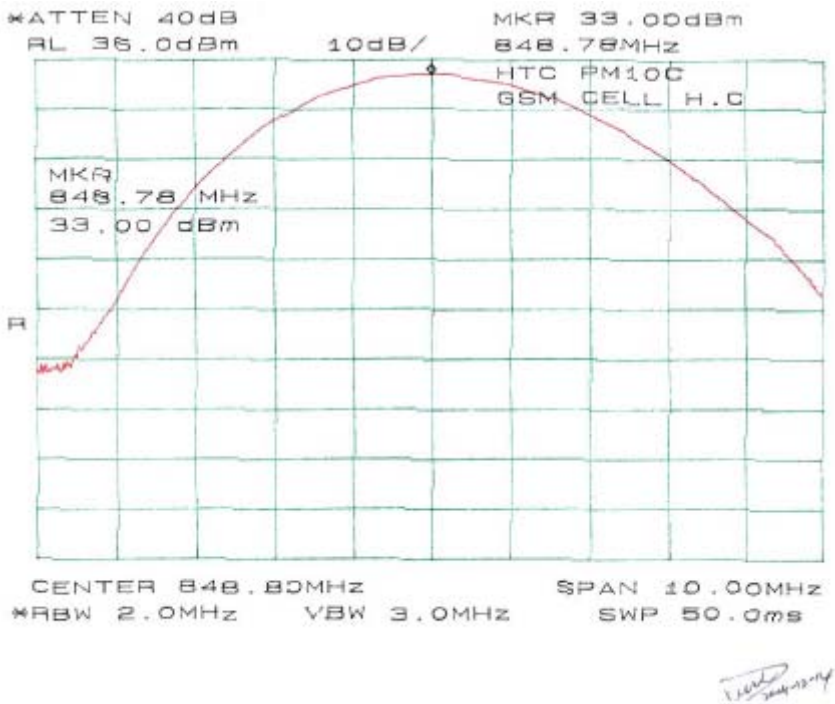
CDMA1900, PCS band, Part 24:

Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
LOW	1850.20	29.33	0.857	2
MIDDLE	1880.00	29.50	0.891	2
HIGH	1909.80	29.50	0.891	2

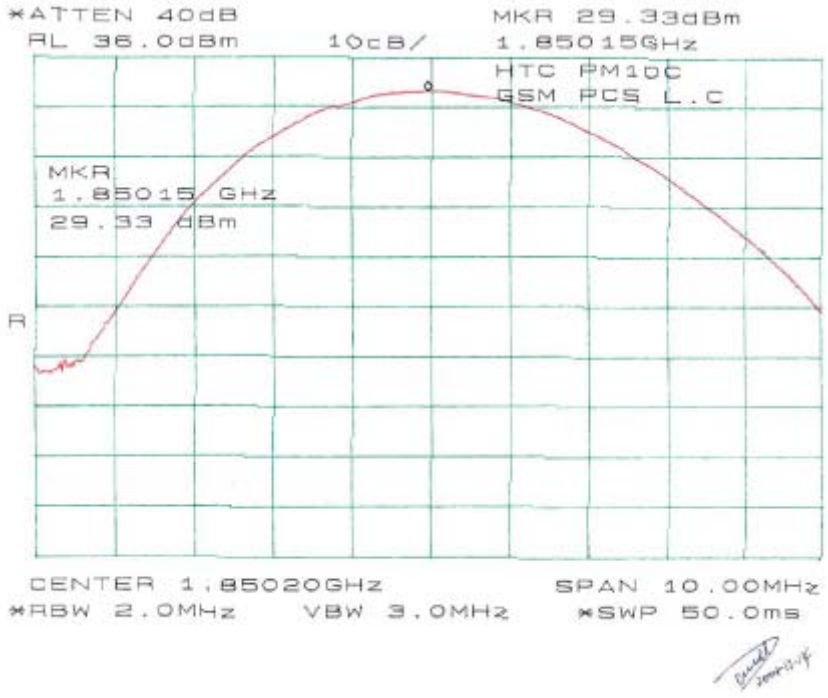
Plots of Conducted Output Power for GSM850, Cellular band, Part 22

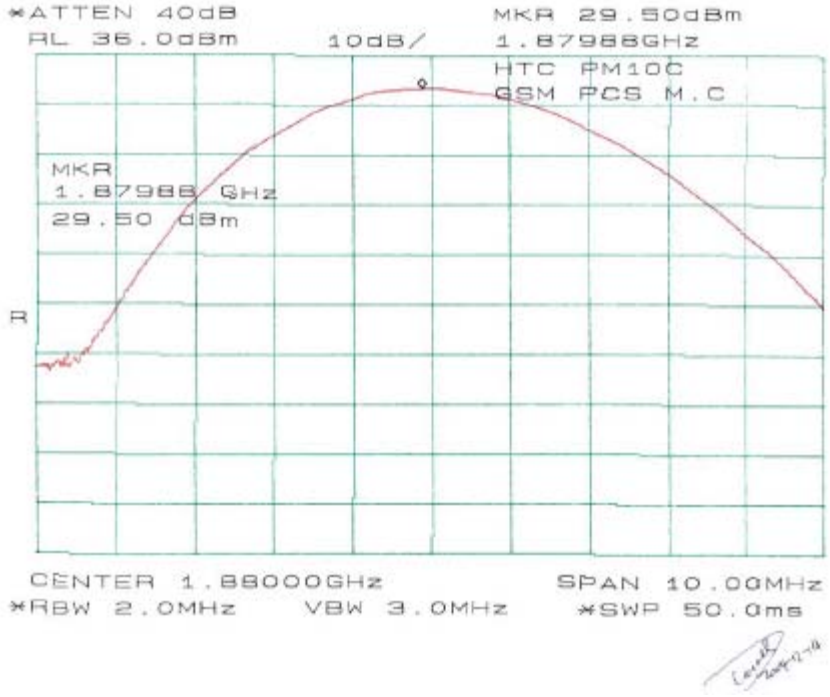


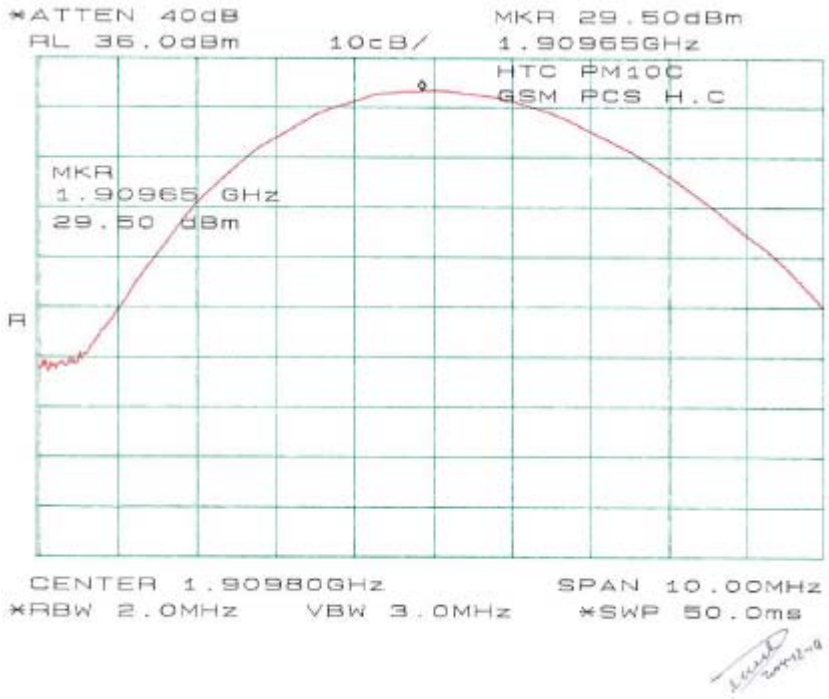

*ATTEN 40dB
RL 36.0dBm
10dB/
MKR 33.00dBm
836.50MHz
HTC PM10C
GSM CELL M.C
MKR
836.50 MHz
33.00 dBm
R
CENTER 836.60MHz
SPAN 10.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms


*ATTEN 40dB
RL 36.0dBm
10dB/
MKR 33.00dBm
848.78MHz
HTC PM10C
GSM CELL H.C
MKR
848.78 MHz
33.00 dBm
R
CENTER 848.80MHz
SPAN 10.00MHz
*RBW 2.0MHz
VBW 3.0MHz
SWP 50.0ms

Plots of Conducted Output Power for GSM1900, PCS band, Part 24






*ATTEN 40dB
RL 36.0dBm
10dB/
MKR 29.50dBm
1.90965GHz
HTC PM10C
GSM PCS H.C
MKR
1.90965 GHz
29.50 dBm
A
CENTER 1.90980GHz
SPAN 10.00MHz
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms

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

Applicable Standard

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

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

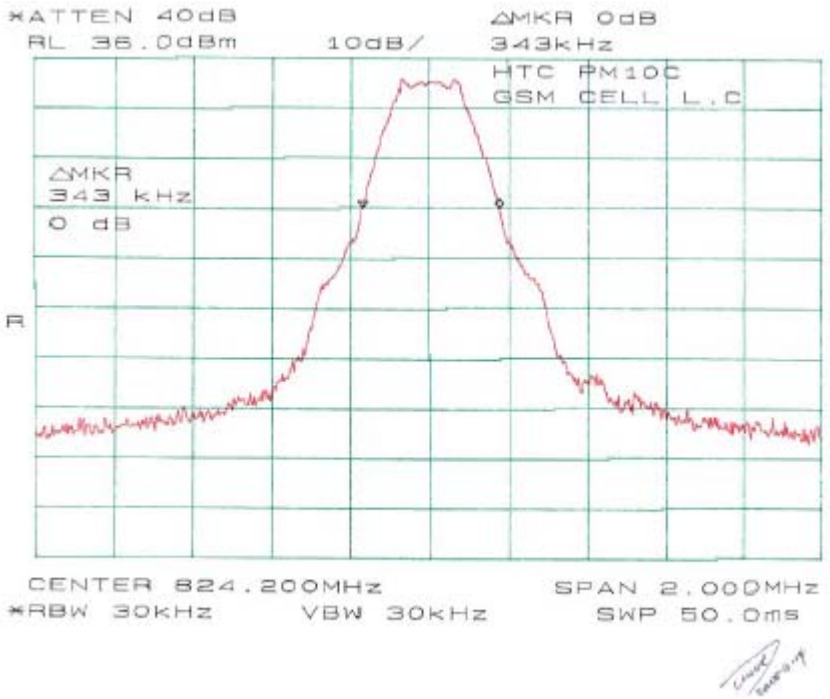
The testing was performed by Daniel Deng on 2004-12-14.

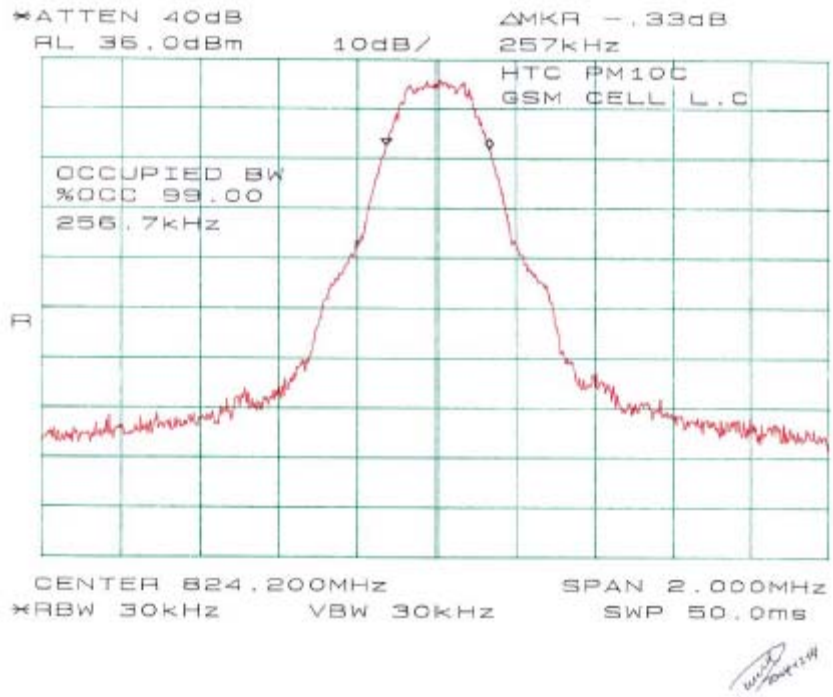
Test Results

Please refer to the following plots.

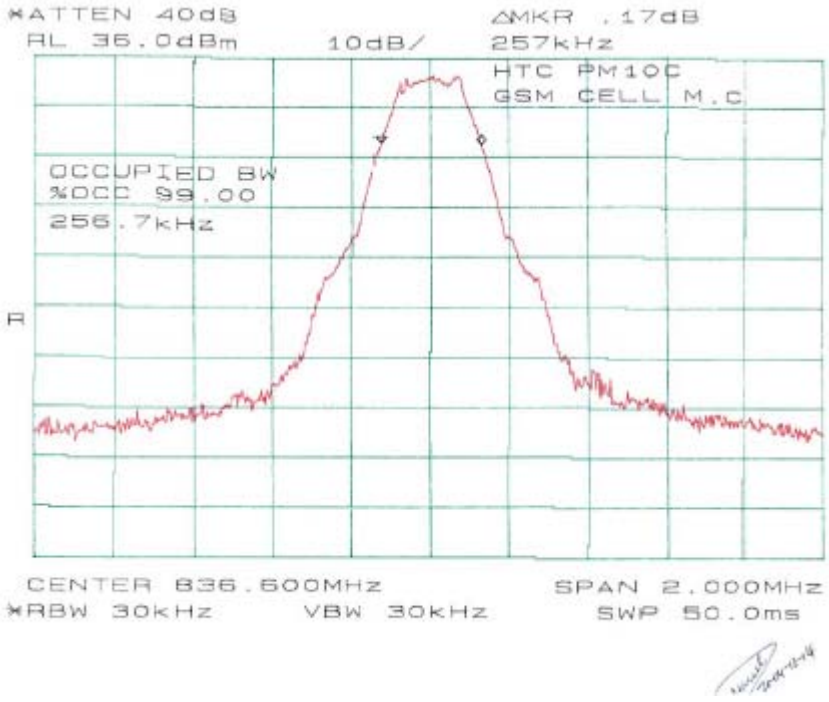
MODE	Channel	Frequency (MHz)	Bandwidth (KHz)
PART22	LOW	824.20	343
	MIDDLE	836.60	343
	HIGH	848.80	343
PART24	LOW	1850.20	343
	MIDDLE	1880.00	343
	HIGH	1909.80	343

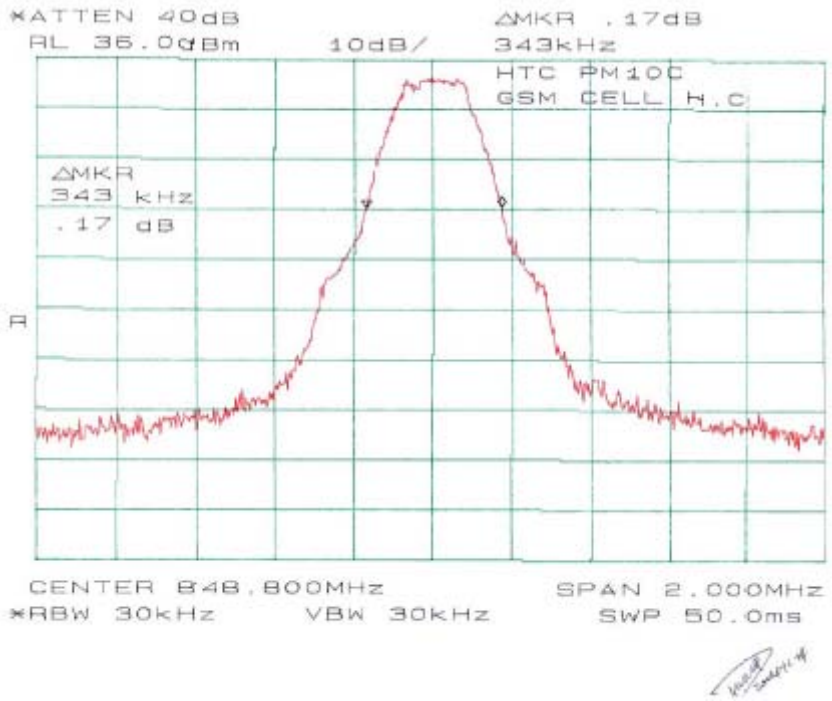
Plots of Occupied Bandwidth and 99% Bandwidth for GSM850, Part22:

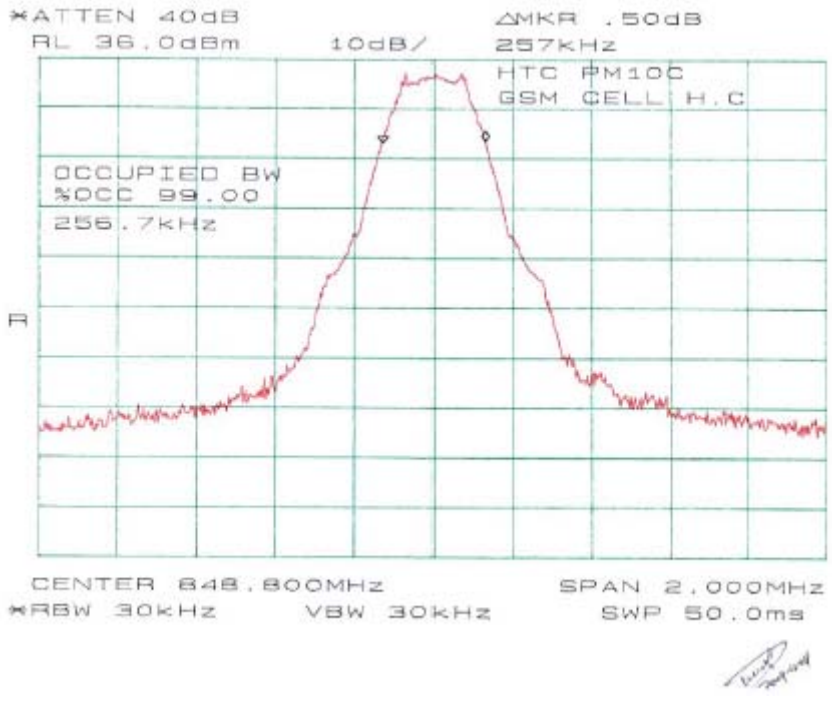




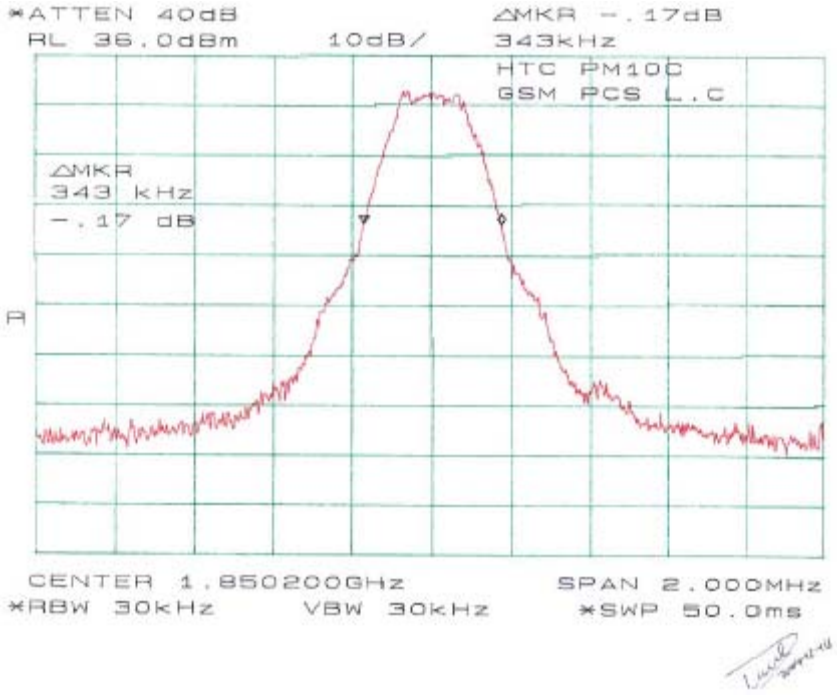

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR 0dB
343kHz
HTC PM10C
GSM CELL M.C
ΔMKR
343 kHz
0 dB
CENTER 836.600MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

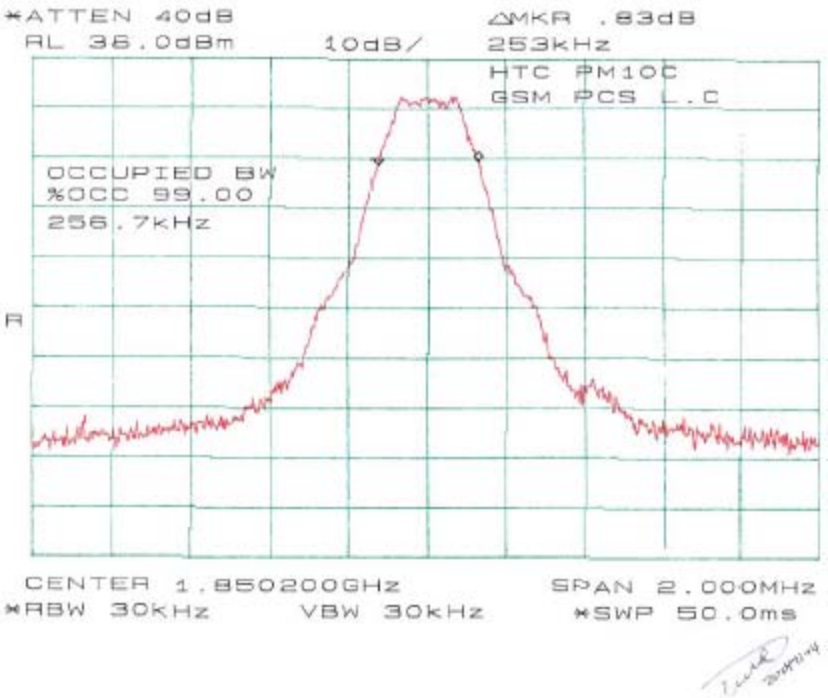

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR .17dB
257kHz
HTC PM10C
GSM CELL M.C
OCCUPIED BW
%OCC 99.00
256.7kHz
CENTER 836.600MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

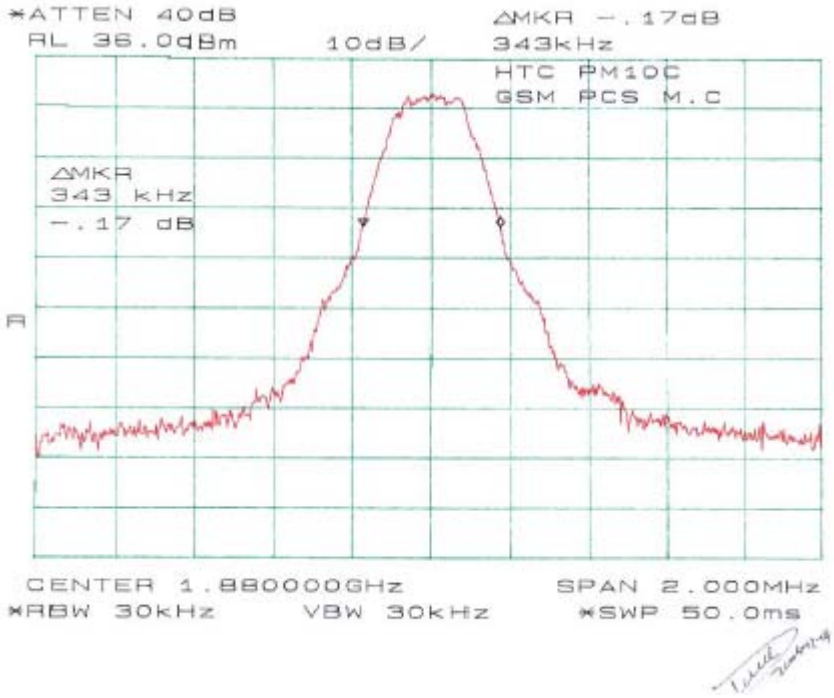

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR .17dB
343kHz
HTC PM10C
GSM CELL H.C
ΔMKR
343 kHz
.17 dB
A
CENTER 848.800MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

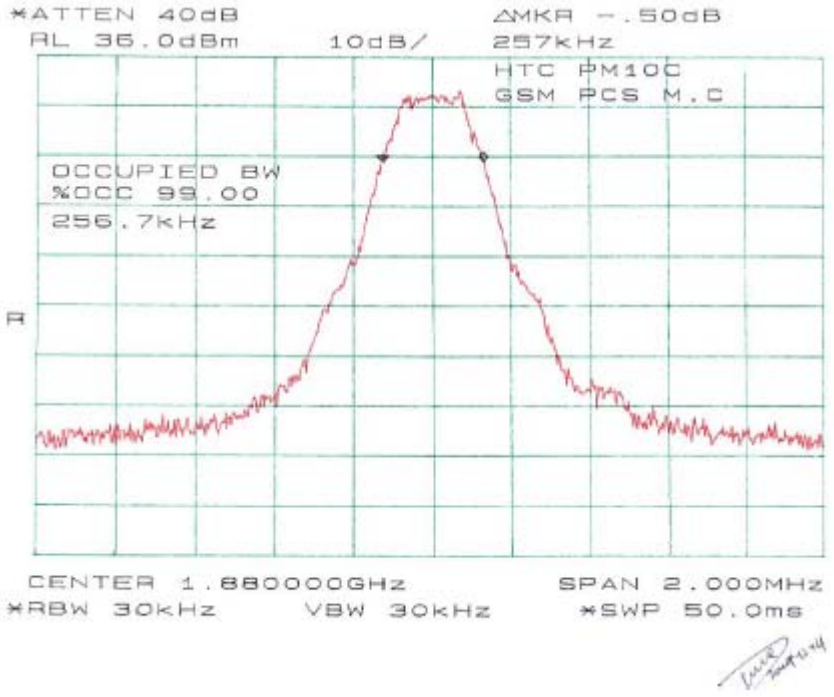

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR .50dB
257kHz
HTC PM10C
GSM CELL H.C
OCCUPIED BW
%OCC 99.00
256.7kHz
A
CENTER 848.800MHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
SWP 50.0ms

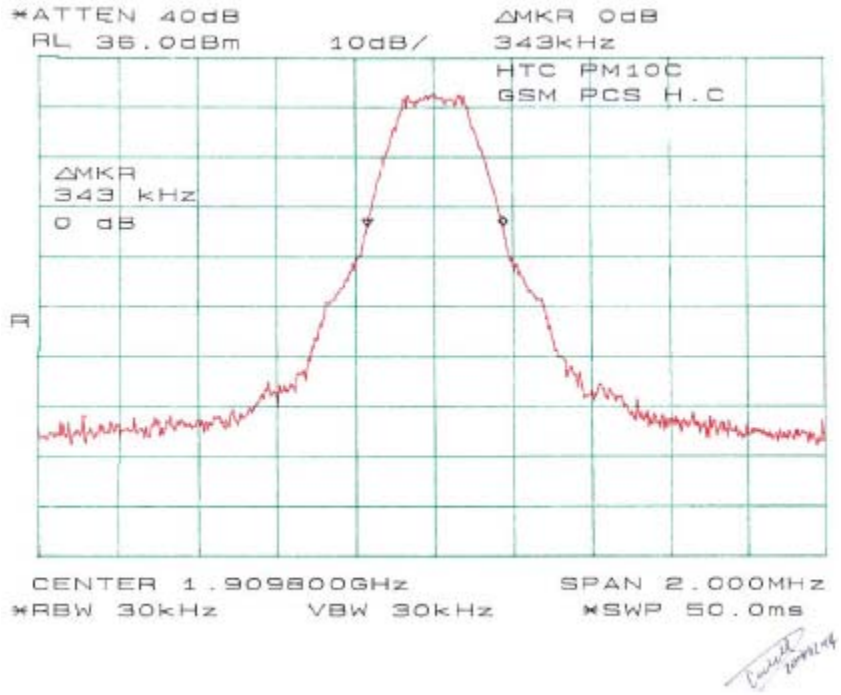
Plots of Occupied Bandwidth and 99% Bandwidth for GSM1900, Part24

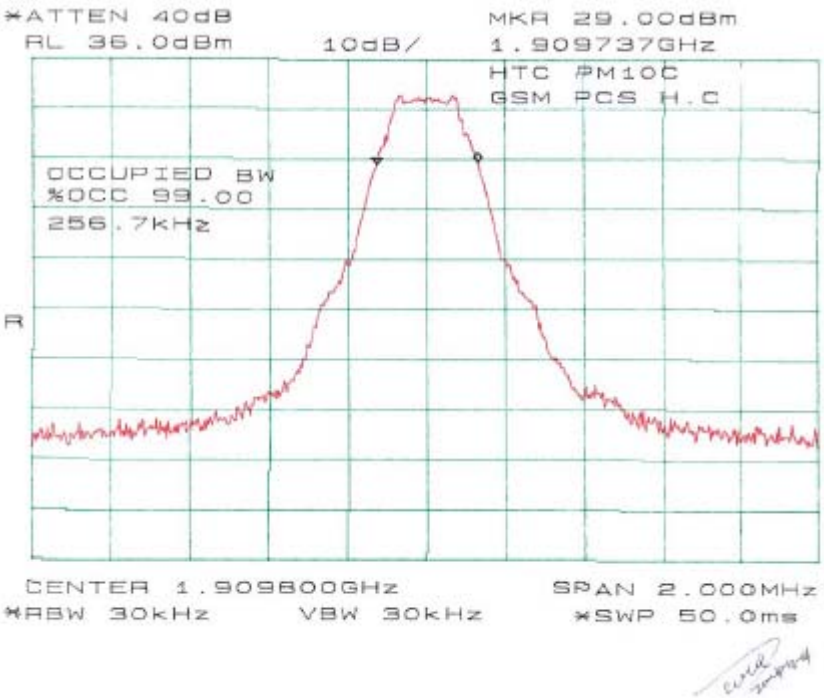





*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -.17dB
343kHz
HTC PM10C
GSM PCS M.C
ΔMKR
343 kHz
-.17 dB
A
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -.50dB
257kHz
HTC PM10C
GSM PCS M.C
OCCUPIED BW
%OCC 99.00
256.7kHz
A
CENTER 1.880000GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR 0dB
343kHz
HTC PM10C
GSM PCS H.C
ΔMKR
343 kHz
0 dB
R
CENTER 1.909800GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms


*ATTEN 40dB
RL 36.0dBm
10dB/
MKR 29.00dBm
1.909737GHz
HTC PM10C
GSM PCS H.C
OCCUPIED BW
%OCC 99.00
256.7kHz
R
CENTER 1.909800GHz
SPAN 2.000MHz
*RBW 30kHz
VBW 30kHz
*SWP 50.0ms

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

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.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 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
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

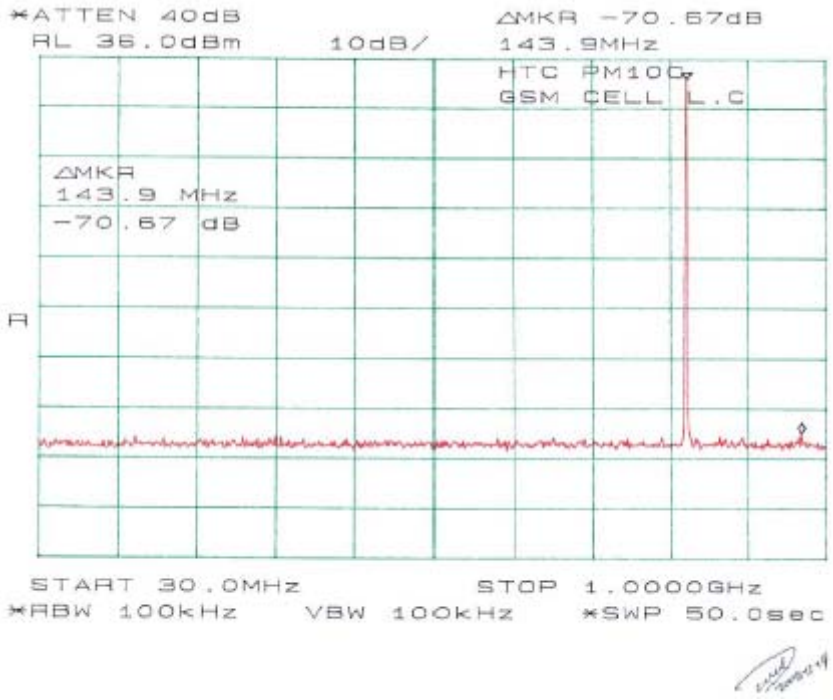
Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

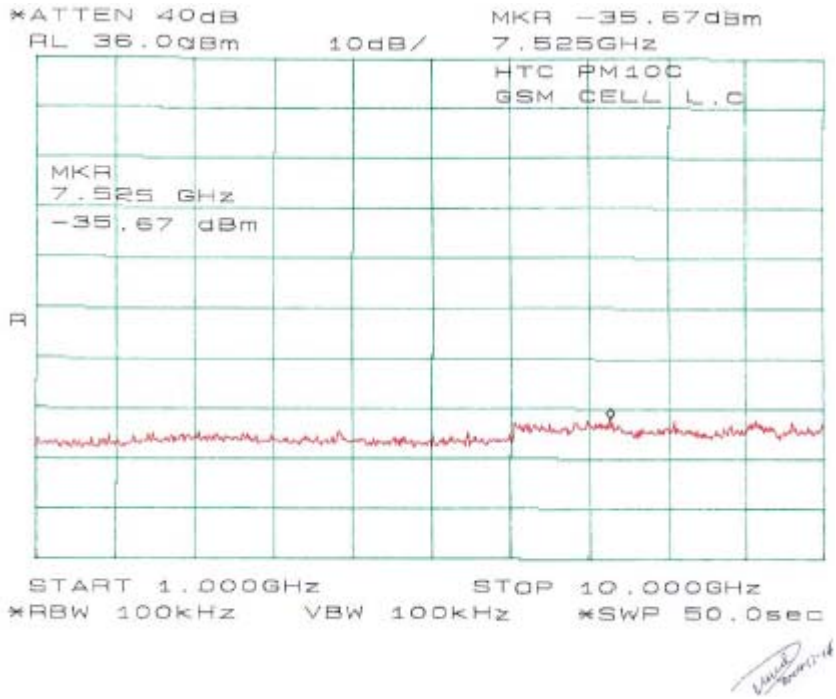
The testing was performed by Daniel Deng on 2004-12-14.

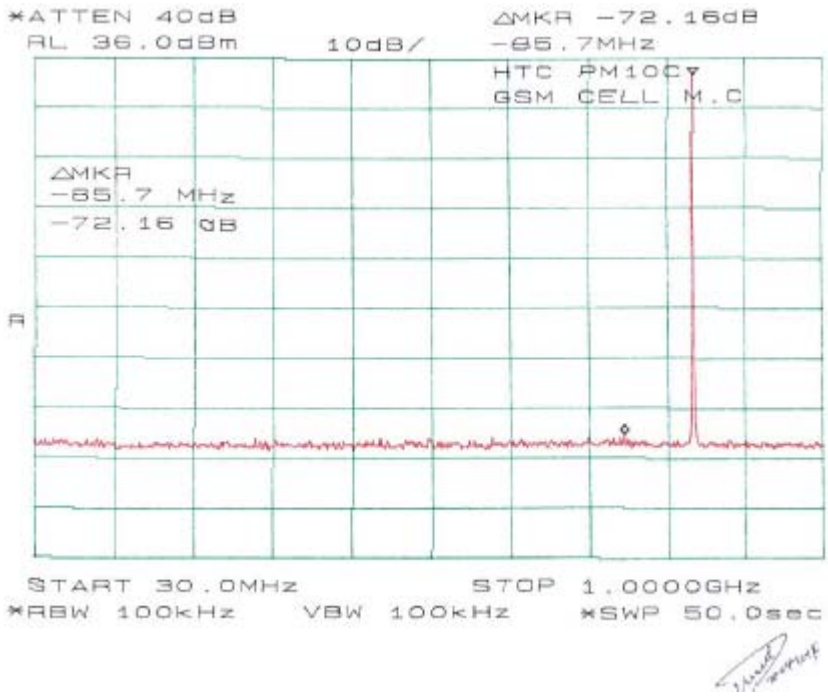
Test Results

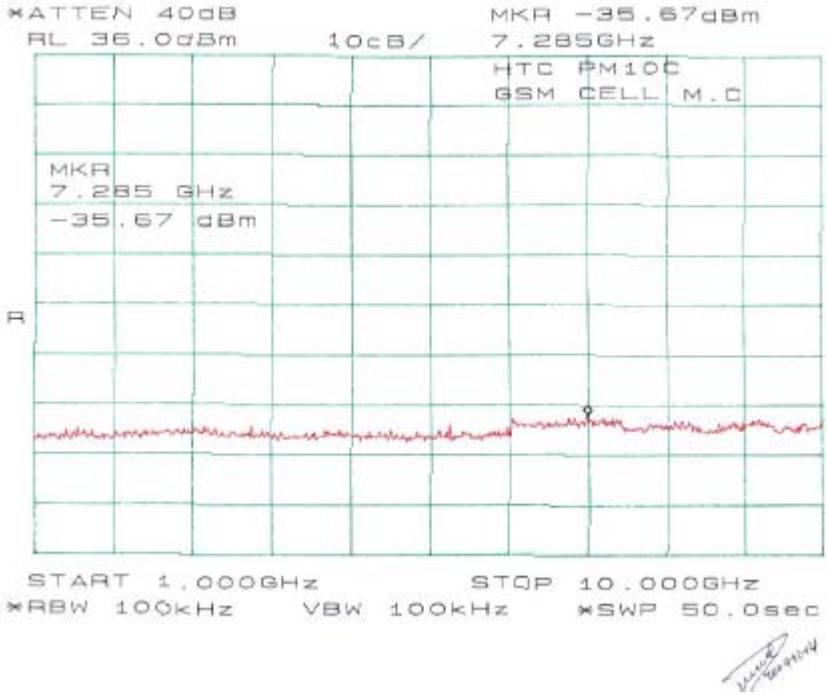
Please refer to the hereinafter plots.

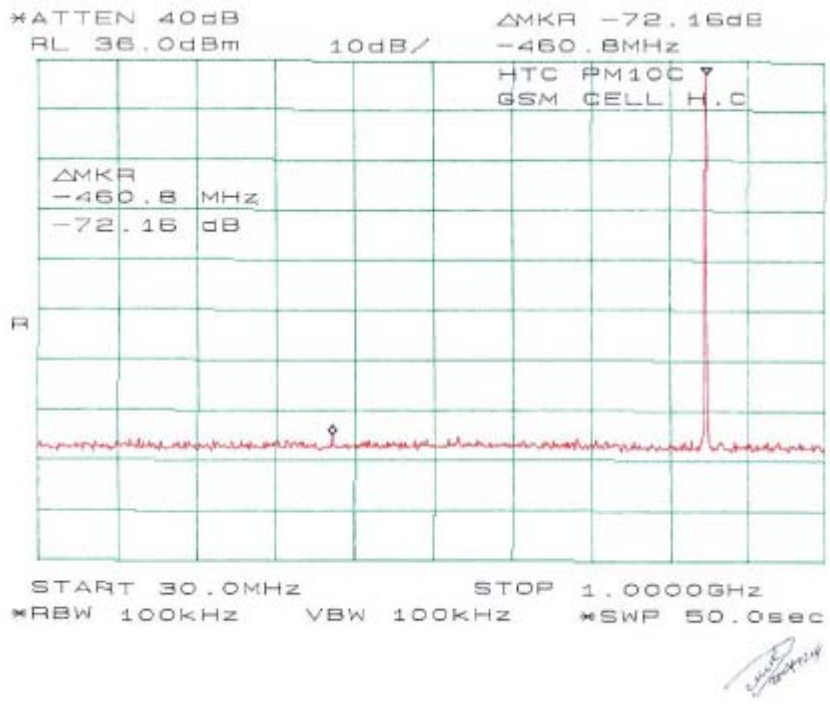
Plots of Spurious Emission for GSM850, Part22

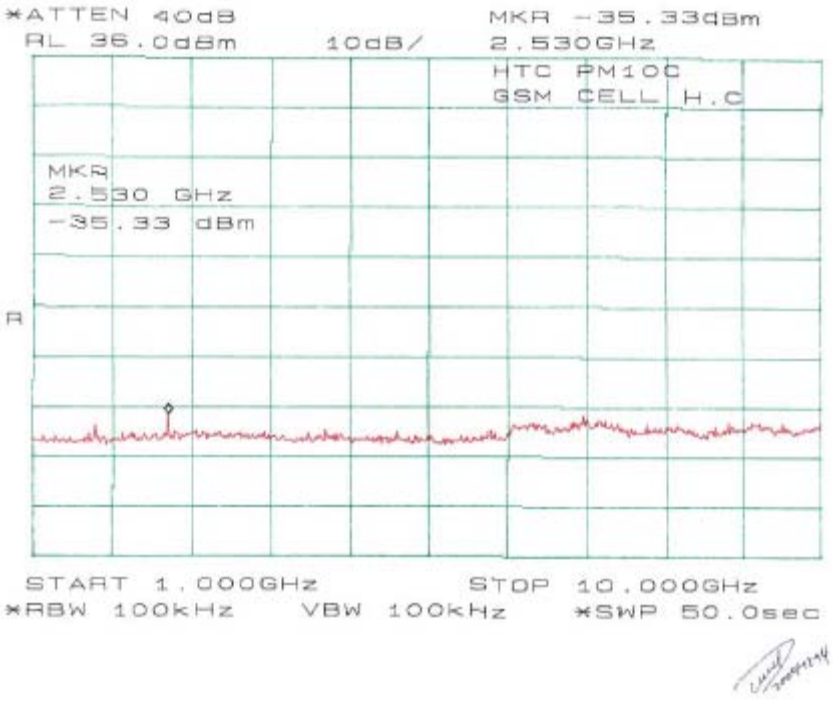




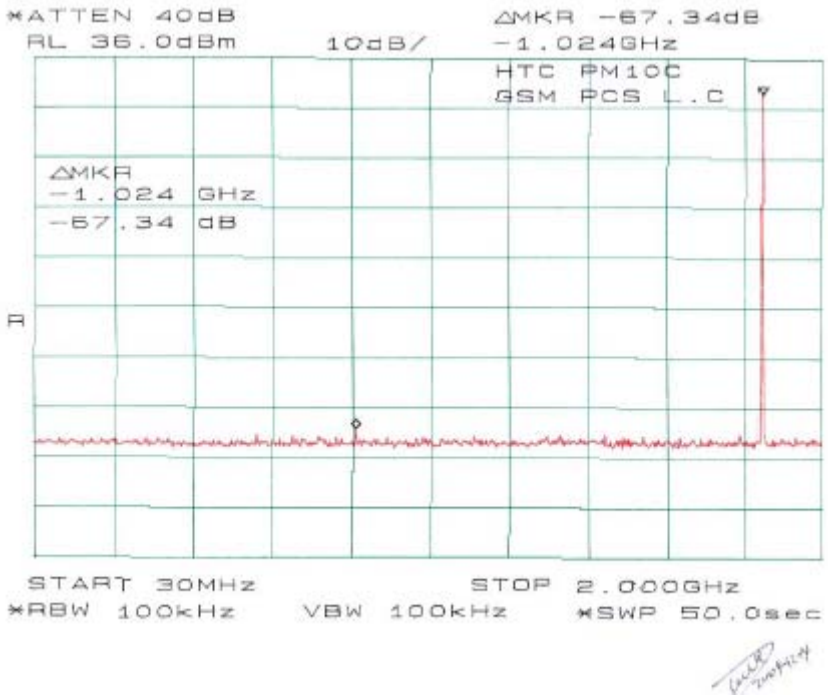

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -72.16dB
-85.7MHz
HTC PM10C
GSM CELL M.C
ΔMKR
-85.7 MHz
-72.16 dB
A
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

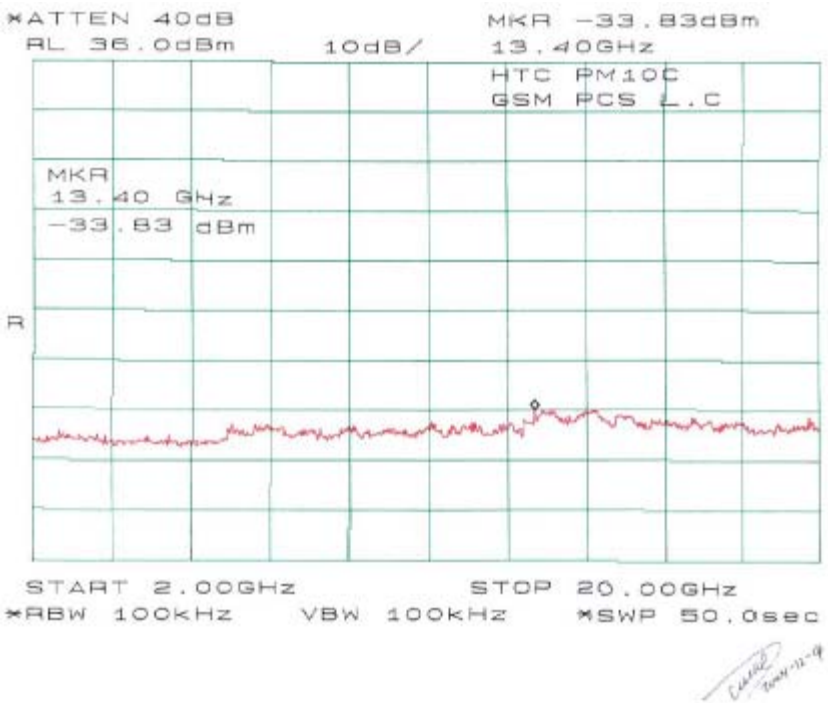

*ATTEN 40dB
RL 36.0dBm
10dB/
MKR -35.67dBm
7.285GHz
HTC PM10C
GSM CELL M.C
MKR
7.285 GHz
-35.67 dBm
A
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

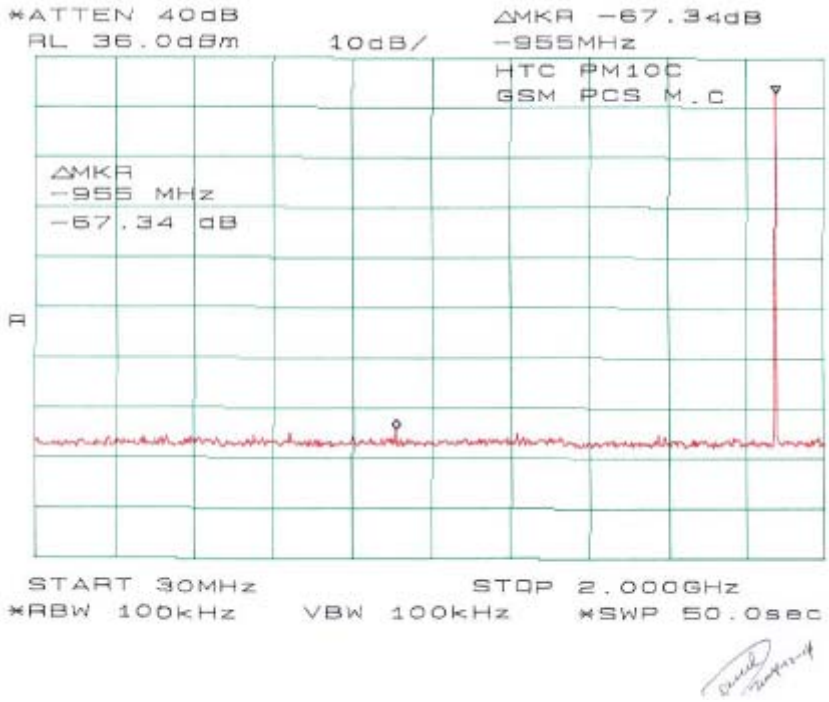

*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -72.16dB
-460.8MHz
HTC PM10C
GSM CELL H.C
ΔMKR
-460.8 MHz
-72.16 dB
R
START 30.0MHz
STOP 1.0000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


*ATTEN 40dB
RL 36.0dBm
10dB/
MKR -35.33dBm
2.530GHz
HTC PM10C
GSM CELL H.C
MKR
2.530 GHz
-35.33 dBm
R
START 1.000GHz
STOP 10.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

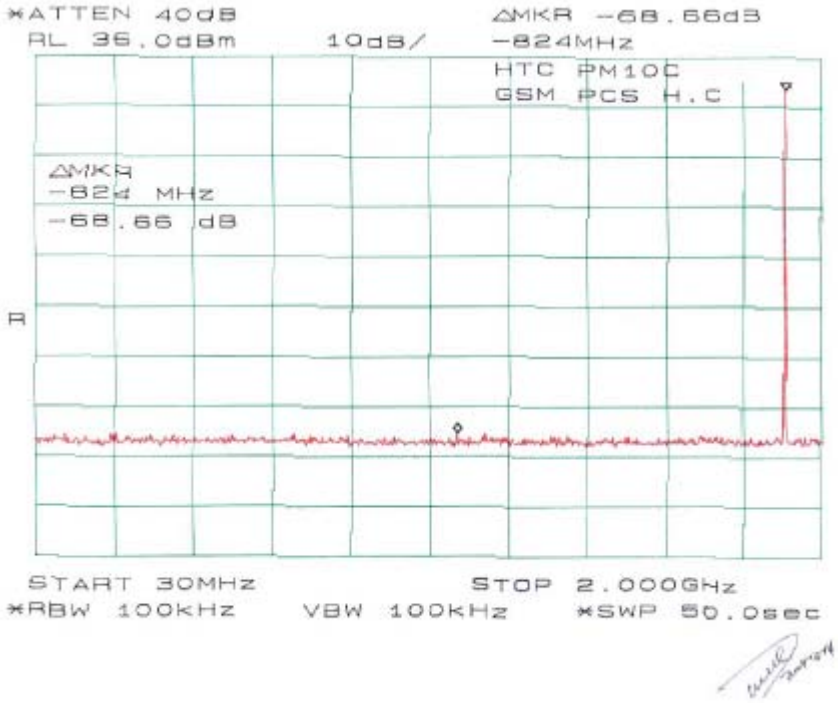
Plots of Spurious Emission for GSM1900, Part24






*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -67.34dB
-955MHz
HTC PM10C
GSM PCS M.C
ΔMKR
-955 MHz
-67.34 dB
R
START 30MHz
STOP 2.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


*ATTEN 40dB
RL 36.0dBm
10dB/
MKR -33.33dBm
14.54GHz
HTC PM10C
GSM PCS M.C
MKR
14.54 GHz
-33.33 dBm
R
START 2.00GHz
STOP 20.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


*ATTEN 40dB
RL 36.0dBm
10dB/
ΔMKR -68.66dB
-824MHz
HTC PM10C
GSM PCS H.C
ΔMKR
-824 MHz
-68.66 dB
R
START 30MHz
STOP 2.000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec


*ATTEN 40dB
RL 36.0dBm
10dB/
MKR -33.50dBm
14.87GHz
HTC PM10C
GSM PCS H.C
MKR
14.87 GHz
-33.50 dBm
R
START 2.00GHz
STOP 20.00GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0sec

§2.1055 (a), §2.1055 (d), §22.355, & §24.235 - 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

Frequency range (MHz)	Base, fixed (ppm)	Mobile [SU][le][/ SU]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 a frequency counter 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 counter.

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. Due Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required
Tenney	Oven, Temperature	VersaTenn	12.222-193	2004-06-04

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

Environmental Conditions

Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

The testing was performed by Daniel Deng on 2004-12-14.

Test Results

Test Result for GSM850 Cellular Band

Frequency Stability Versus Temperature

Reference Frequency: 836.4 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MHz	PPM Error
50	3.7	836.599955	-0.054
40	3.7	836.599962	-0.045
30	3.7	836.599969	-0.037
20	3.7	836.599959	-0.049
10	3.7	836.599954	-0.055
0	3.7	836.599924	-0.091
-10	3.7	836.599943	-0.068
-20	3.7	836.599928	-0.086
-30	3.7	836.599902	-0.117

Frequency Stability Versus Battery Voltage

Reference Frequency: 836.4MHz, Limit: 2.5ppm			
Power Supplied (Vdc)	Environment Temperature (°C)	MHz	ppm
3.45	20	836.599961	-0.047

Note: Battery normal operating voltage: 3.7 Vdc
Battery end point: 3.45 Vdc.

Test Result for GSM1900 PCS band

Frequency Stability Versus Temperature

Reference Frequency: 1880 MHz, Limit: 2.5ppm			
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed	
		MHz	PPM Error
50	3.7	1880.000023	0.012
40	3.7	1880.000021	0.011
30	3.7	1880.000019	0.010
20	3.7	1880.000015	0.008
10	3.7	1880.000023	0.012
0	3.7	1880.000013	0.007
-10	3.7	1879.999992	-0.004
-20	3.7	1879.999990	-0.005
-30	3.7	1879.999986	-0.007

Frequency Stability Versus Battery Voltage

Reference Frequency: 1880MHz, Limit: 2.5ppm			
Power Supplied (Vdc)	Environment Temperature (°C)	MHz	ppm
3.45	20	1880.000021	0.011

Note: Battery normal operating voltage: 3.7 Vdc
Battery end point: 3.45 Vdc.

§22.917 & §24.238 – 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.

According to §24.238, 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 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01
HP	Plotter	HP7470A	2541A49659	Not Required

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

Environmental Conditions

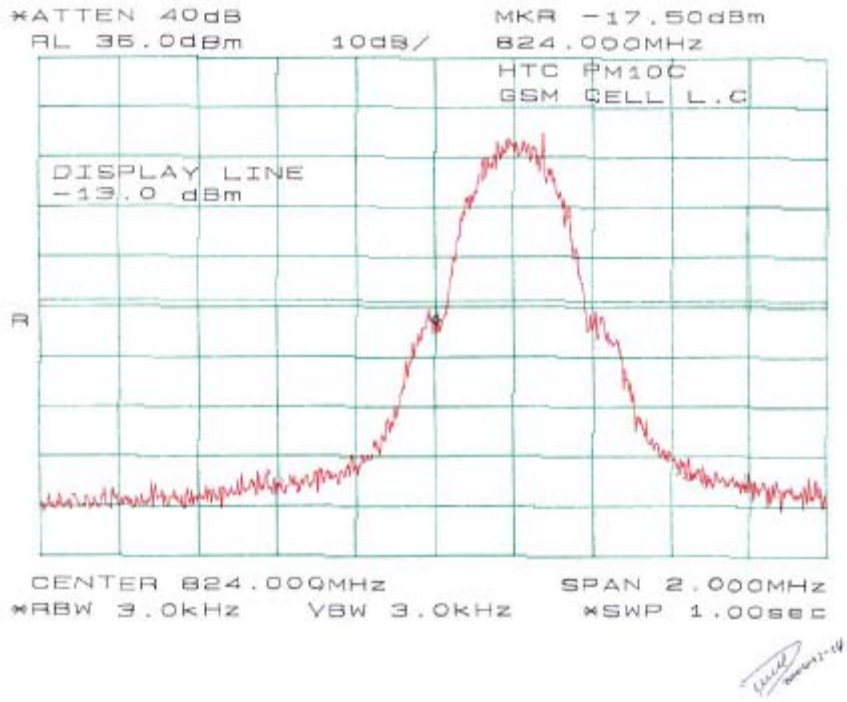
Temperature:	12° C
Relative Humidity:	51%
ATM Pressure:	1041 mbar

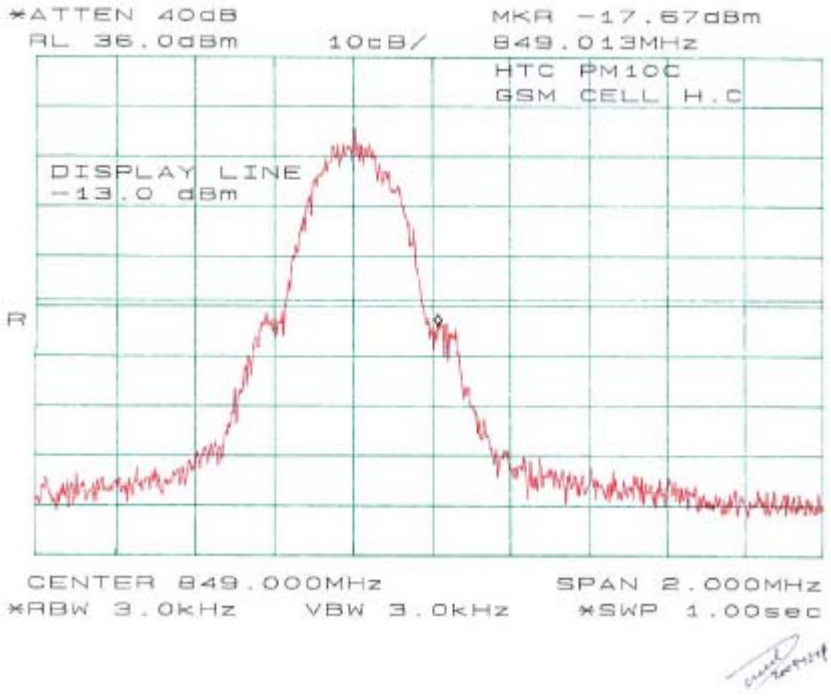
The testing was performed by Daniel Deng on 2004-12-14.

Test Results

Please refer to the following plots.

Plots of Band Edge for GSM850, Part 22





Plots of Band Edge for GSM1900, Part 24