QSEC-2700 FCC
Type Acceptance Report

November 3, 2003

80-R0946-1

Submit technical questions to:
regulatory.support@qualcomm.com

QUALCOMM®

QUALCOMM Incorporated
5775 Morehouse Drive
San Diego, CA 92121-1714

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List of Exhibits

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Exhibit 1 – Certification of Test Data

The data, data evaluation and equipment configuration represented herein are a true and accurate representation of the measurements of the sample's radio frequency interference emissions characteristics as of the dates and at the times of the test under the conditions herein specified. This applies to all tests that where performed that did not require an Open Area Test Site (OATS). Tests that required an OATS site were performed by TUV Product Services.

Equipment Tested: QSec-2700

Dates of Test: 8/20 -10/30, 2003

Test Performed by:

EMC Engineer, Senior Staff:
Robert J Scodellaro

Exhibit 2 – General Information

1. Production Plans

Limited low level production for government contract.

2. Technical Description - Section 2.1033 (c)

(1) The full name and mailing address of the manufacturer of the device and the applicant

Applicant: Qualcomm Inc.
5775 Morehouse Drive
San Diego, CA 92121-1714

Manufacture: Qualcomm Inc.
5525 Morehouse Drive
San Diego, CA 92121-1710

(2) FCC Identifier

FCC ID: J9CQSEC2700

(3) User's Manual

See separate attachment

(4) Types of Emission

1M25F9W

(5) Frequency range

The frequency range of the equipment in Domestic Public Cellular Radio Telecommunications Service bands, 824 - 849 MHz and 869 - 894 MHz for cellular CDMA. The channel spacing is 1.25 MHz for CDMA.

The frequency range of the equipment in the Personal Communications Services (PCS) bands, 1850 – 1910 MHz and 1930 – 1990 MHz. The channel spacing is 1.25 MHz for CDMA.

(6) Operating power levels

The transmitter output power is independent of whether the equipment operates in the cellular system CDMA mode, or PCS system CDMA mode. The equipment supports Class 3 Cellular Mobile Station Power Class, and Class 2 PCS Mobile Station Power Class. Its power output capability is reported to the Land Station via Station Class Mark. The equipment will respond to commands from the Land Station to change power levels as defined in the EIA/TIA/IS-98 and ANSI J-STD-018 Specification.

(7) Maximum output power

The equipment supports the maximum output power for Class 3 Cellular Mobile Station which is in the range of -7 dBW to 0 dBW ERP for CDMA mode, and meets the 7 W ERP (+8.45 dBW) maximum power limitation of Section 22.913.

The equipment supports the maximum output power for Class 2 PCS Mobile Station which is in the range of -7dBW to 0 dBW EIRP, and is within the limited 2 watts E.I.R.P. peak power of CFR 47 Part 24.232 (b). The equipment is able to limit the output power to the minimum necessary for successful communications.

(8) Final RF amplifying device power consumption

The equipment is powered by lithium ion rechargeable batteries which have a voltage range of 3.4 to 4.2 Vdc.

In the Cellular band, the power consumption of the high power amplifier is about 26.1dBm watts. In the PCS band, the power consumption of the high power amplifier is about 25.3dBm.

(9) Tune-up procedure over the power range

All frequency and power adjustments are set at the factory and there are no field adjustments for this product. Under digital mode, frequency is locked to the base station and controlled by VCTCXO adjustments to offset any possible errors.

(10) Circuit description

(a) Circuit diagram and list of semiconductor device

See parts list that was sent separate

(b) Circuit description for frequency determining and stabilizing

The circuit provided for determining and stabilizing frequency is shown in the schematics.

A voltage controlled, temperature compensated, crystal oscillator (VCTCXO) is employed as a frequency reference for all of the transceiver local oscillators. This crystal oscillator is specified to remain within +/- 2.5 ppm over temperature and voltage variations. The lock status indicator of all synthesizers is monitored by the microprocessor and an out of lock condition will inhibit transmission. In all modes, the mobile receiver monitors the received signal and adjusts the frequency of the VCTCXO, this corrects any errors between the mobile frequency and the base station transmitter. The mobile is locked to the base station.

(c) Circuit description for spurious radiation suppression

The circuit provided for suppression of spurious radiation is in the schematics.

The transmitter front end provides filtering of the RF signal in order to meet FCC specifications. For radiated spurious suppression, proper design techniques and the use of proper shielding techniques reduced the emission levels well below the permissible FCC limit.

(d) Circuit description for limiting modulation

The circuit provided for limiting modulation is in the schematics.

CDMA Mode

The CDMA mode is described in the following pages from the TIA/EIA /IS-95B Standard. The justification for the CDMA bandwidth of 1.25 MHz is that the chip rate is 1.2288 MHz (see page 6-35 of IS-95B). The 1.25MHz is measured at the 3dB down bandwidth. Channel spacing is normally set at this 1.25 MHz. In addition the reference baseband filtering requirements are shown on page 6-60 of IS95B. The Z-transform filter coefficient for the recommended baseband filter are shown on page 6-61, and also yield a “necessary bandwidth” of 1.25 MHz based on optimal detection and channel capacity theory.

6.1.3 Modulation Characteristics

6.1.3.1 Reverse CDMA Channel Signals

The Reverse CDMA Channel is composed of Access Channels and Reverse Traffic Channels. These channels shall share the same CDMA frequency assignment using direct-sequence CDMA techniques. Figure 6.1.3.1-1 shows an example of all of the signals received by a base station on the Reverse CDMA Channel. Each Traffic Channel is identified by a distinct user long code sequence; each Access Channel is identified by a distinct Access Channel long code sequence. Multiple Reverse CDMA Channels may be used by a base station in a frequency division multiplexed manner.

The Reverse CDMA Channel has the overall structure shown in Figure 6.1.3.1-2. Data transmitted on the Reverse CDMA Channel is grouped into 20 ms frames. All data transmitted on the Reverse CDMA Channel is convolutionally encoded, block interleaved. modulated by the 64-ary orthogonal modulation. and direct-sequence spread prior to transmission.

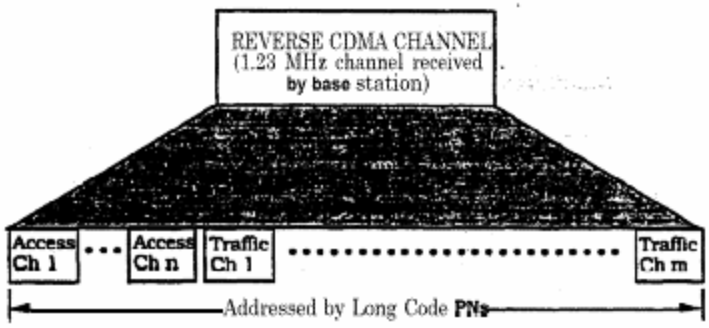


Figure 6.1.3.1-1. Example of Logical Reverse CDMA Channels Received at a Base Station

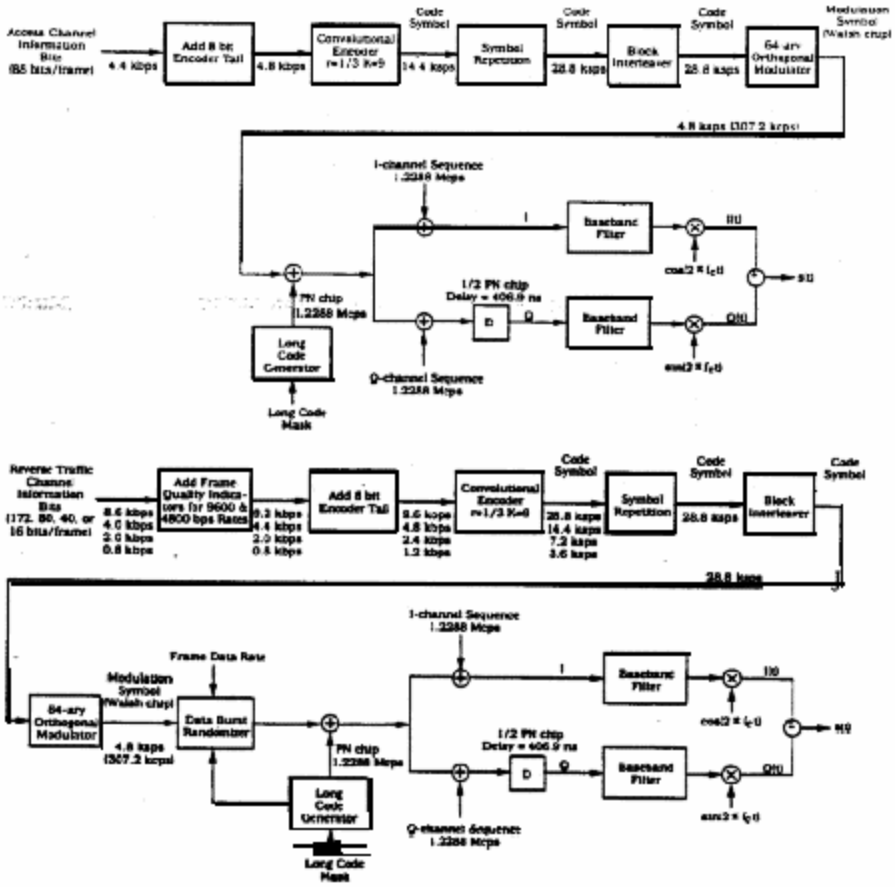


Figure 6.1.3.1-2. Reverse CDMA Channel Structure

After adding frame quality indicators for both the 9600 bps and 4800 bps rates (see 6.1.3.3.2.1) and adding eight Encoder Tail Bits (see 6.1.3.3.2.2). data frames may be transmitted on the Reverse **Traffic** Channel at data rates of 9600, **4800. 2400.** and 1200 bps. The Reverse **Traffic** Channel may use any of these **data** rates for transmission. The transmission duty cycle on the Reverse Traffic Channel varies with the transmission data rate. Specifically, the transmission duty cycle for 9600 bps frames is 100 percent. the transmission duty cycle for 4800 bps frames is 50 percent, the transmission duty cycle for 2400 bps frames is 25 percent, and the **transmission** duty **cycle** for 1200 bps frames is 12.5 percent as shown in Table 6.1.3.1.1-1. As the duty cycle for transmission varies **proportionately** with the data rate. the actual burst transmission rate is fixed at 28.800

code symbols per second. Since six code symbols are modulated as one of 64 modulation symbols for transmission. the modulation symbol transmission rate is fixed at 4800 modulation symbols per second. This results in a fixed Walsh chip rate of 307.2 kcps. The rate of the spreading PN sequence is fixed at 1.2288 Mcps, so that each Walsh chip is spread by four PN chips. Table 6.1.3.1.1- 1 defmes the signal rates and their relationship for the various transmission rates on the Reverse Traffic Channel.

The numerology is identical for the Access Channel except that the transmission rate is fixed at 4800 bps after adding eight Encoder Tail Bits (see 6.1.3.2.2). Each code symbol is repeated once, and the transmission duty cycle is 100 percent. Table 6.1.3.1.1-2 defines the signal rates and their relationship on the Access Channel.

6.1.3.1.1 Modulation Parameters

The modulation parameters for the Reverse Traffic Channel and the Access Channel are shown in Table 6.1.3-1.1 - 1 and Table 6.1.3.1.1-2, respectively.

Table 6.1.3.1.1-l. Reverse Traffic Channel Modulation Parameters

	Data Rate (bps)				
Parameter	**9600**	**4800**	**2400**	**1200**	**Units**
PN Chip Rate	1.2288	1.2288	1.2288	1.2288	Mcps
Code Rate	1/3	1/3	1/3	1/3	bits/code sym
Transmit Duty Cycle	100.0	50.0	25.0	12.5	%
Code Symbol Rate	28,800	28,800	28,800	28,800	sps
Modulation	6	6	6	6	code sym/mod symbol
Modulation Symbol Rate	4800	4800	4800	4800	sps
Walsh Chip Rate	307.20	307.20	307.20	307.20	kcps
Mod Symbol Duration	208.33	208.33	208.33	208.33	µs
PN Chips/Code Symbol	42.67	42.67	42.67	42.67	PN chip/code symbol
PN Chips/Mod symbol	256	256	256	256	PN chip/mod symbol
PN Chips/Walsh Chip	4	4	4	4	PN chips/Walsh chip

(e) Circuit description for limiting power

Transmitted power is monitored by a RF detector diode which is coupled from the Power Amplifier (PA) output. The detected DC voltage is fed into a microprocessor which uses a calibration table along with an offset correction and temperature correction table to control power limits. When the RF power exceeds a predetermined limit the gain of the stage preceding the PA is reduced.

(11) Photograph of the identification label

See separate attachment

(12) Photograph to reveal equipment construction and layout

See separate attachment

Exhibit 3 ELECTRONIC SERIAL NUMBERS (ESN) Protection

The QSec-2700 Dual Band Phone, FCC ID: J9CQSEC-2700 uses ESN. The ESN is a unique identification number to each phone which is contained in the Numeric Assignment Module and is automatically transmitted to the base station whenever a call is placed. The ESN is stored in an EPROM and is isolated from fraudulent contact and tampering. Any attempt to change the ESN will render the portable phone inoperative.

The phone complies with all requirements for ESN under Part 22.919.

Exhibit 4 – Compliance With 911 Calling Requirements

When an emergency 911 call is originated by the user of the QSec-2700, the mobile will attempt to acquire any available system and originate the emergency call on that system, disregarding restrictions set by the roaming list. The FCC NPRM WT99-13, CC94-102 automatic analog A/B roaming option has been implemented for 911 emergency calls.

Exhibit 5 – Transmitter RF Power Output - FCC part 2, Paragraph 2.1046

Transmitter RF Power Output - FCC part 2, Paragraph 2.1046

9/08/2003

Conducted Power --
The RF output power was measured using a Gigatronics 8542C Power Meter.

		RF output power (W) - Cellular
		Measured
carrier frequency (MHz)	channel	CDMA
824.7	1013	0.257
836.49	383	0.265
848.31	777	0.258

Transmitter RF Power Output - FCC part 2, Paragraph 2.1046

Transmitter RF Power Output - FCC part 2, Paragraph 2.1046

9/08/2003

Radiated Power --
The RF output power (**ERP)** was measured in an antenna range anechoic chamber.

		RF output power (W) – Cellular
		Measured
carrier frequency (MHz)	channel	CDMA
824.7	1013	0.240
836.49	383	0.277
848.31	777	0.318

Exhibit 6

Transmitter RF Power Output - FCC part 24, Paragraph 2.1046, 24.232 (b)

Transmitter RF Power Output - FCC part 24, Paragraph 2.1046, 24.232 (b)

8/20/2003

Conducted power --
The RF output power was measured using a Gigatronics 8542C Power Meter.

		RF output power (W) - PCS
carrier frequency (MHz)	Channel	CDMA
		measured
1851.25	25	0.213
1880	600	0.210
1908.75	1175	0.211

Transmitter RF Power Output - FCC part 24, Paragraph 2.1046, 24.232 (b)

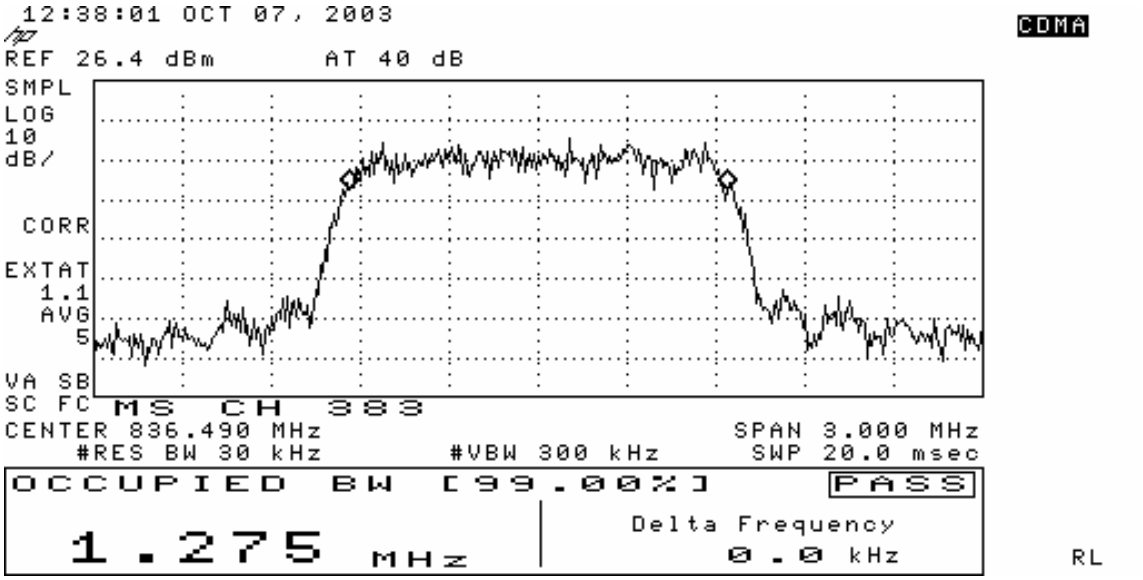
Transmitter RF Power Output - FCC part 24, Paragraph 2.1046, 24.232 (b)

8/20/2003

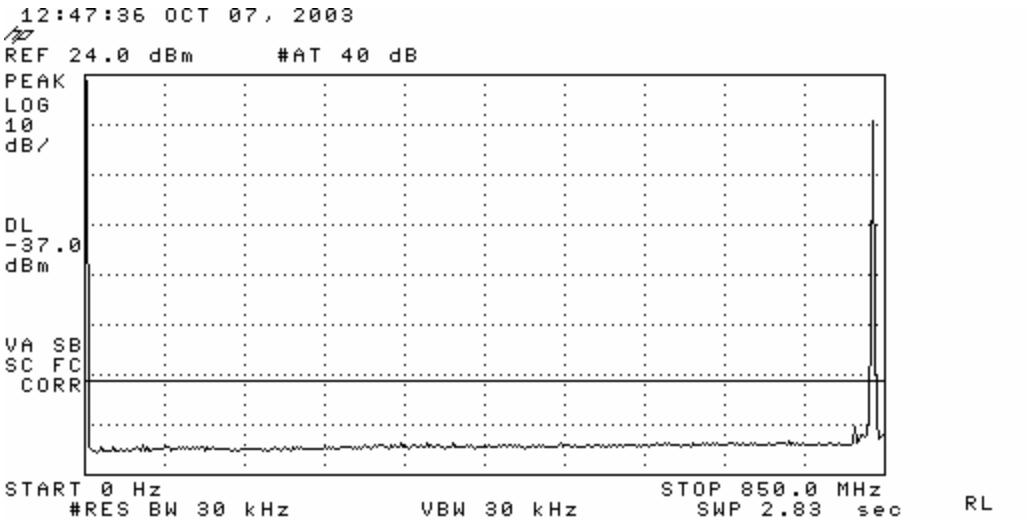
Radiated power --
The RF output power, **EIRP** was measured in an antenna range anechoic chamber.

		RF output power (W) - PCS
carrier frequency (MHz)	channel	CDMA
		Measured
1851.25	25	0.262
1880	600	0.290
1908.75	1175	0.335

Exhibit 7 – Occupied Bandwidth and Spurious Emission Measured Data - FCC Part 2.1049, 22.917



Channel 383



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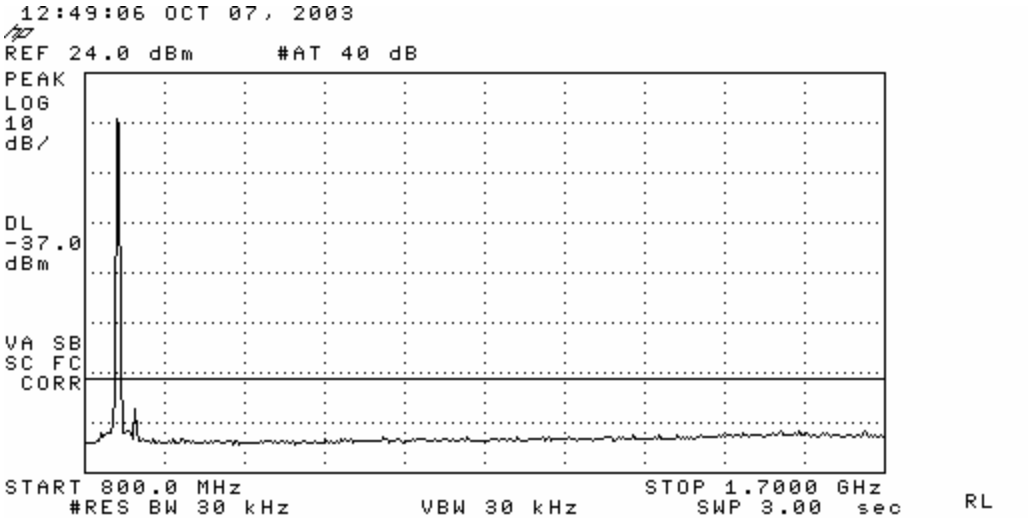

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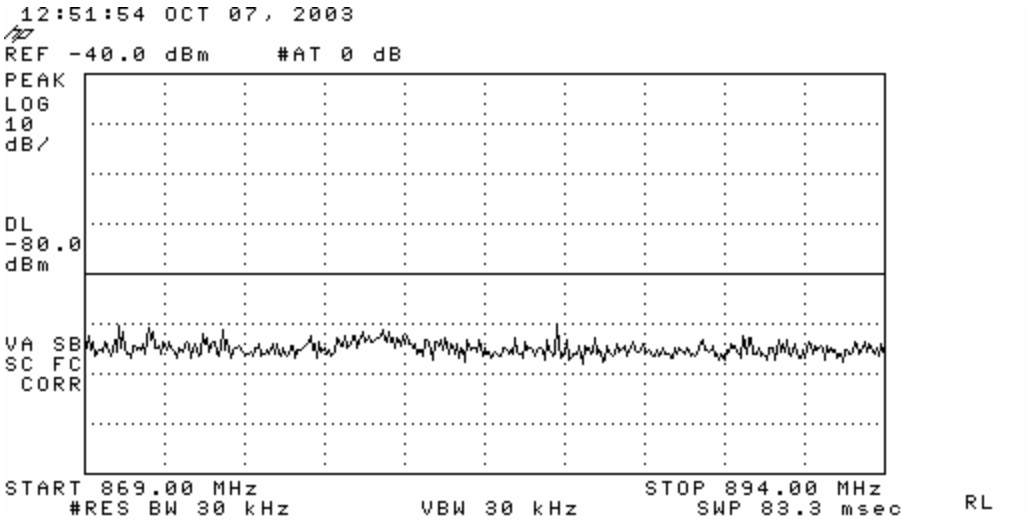
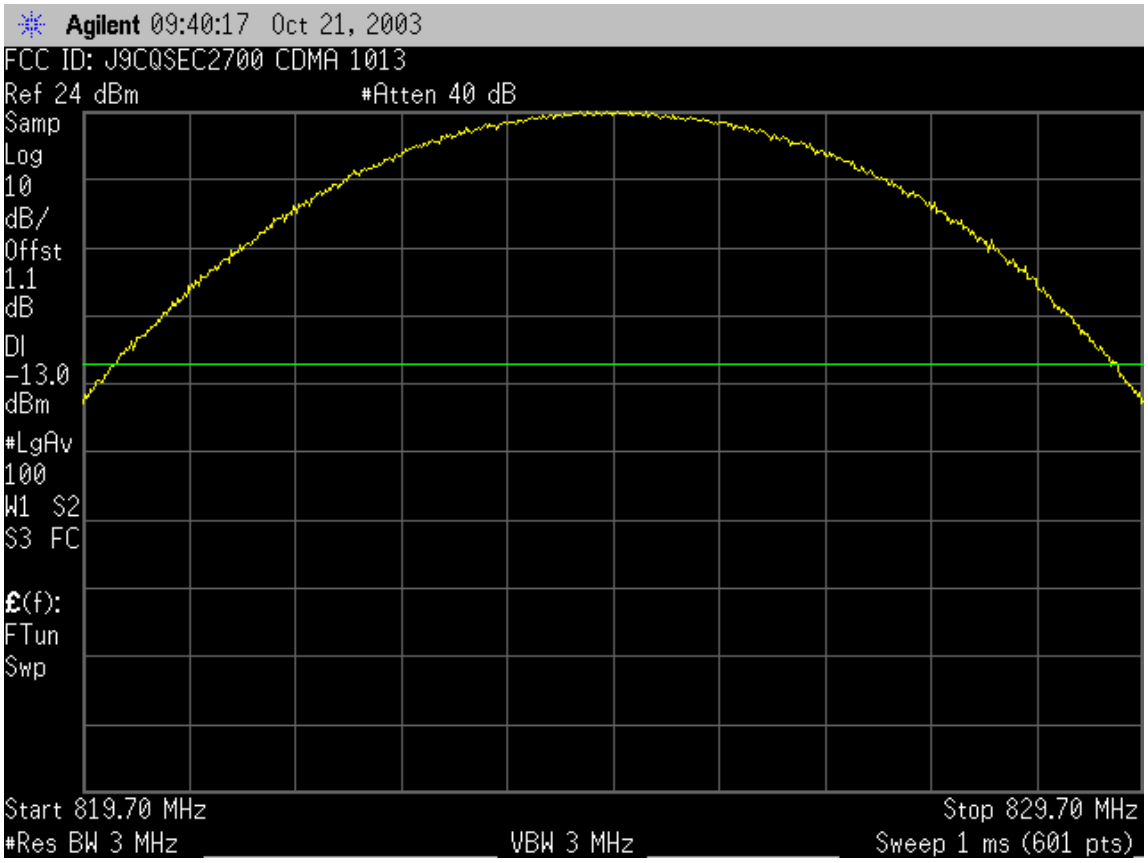
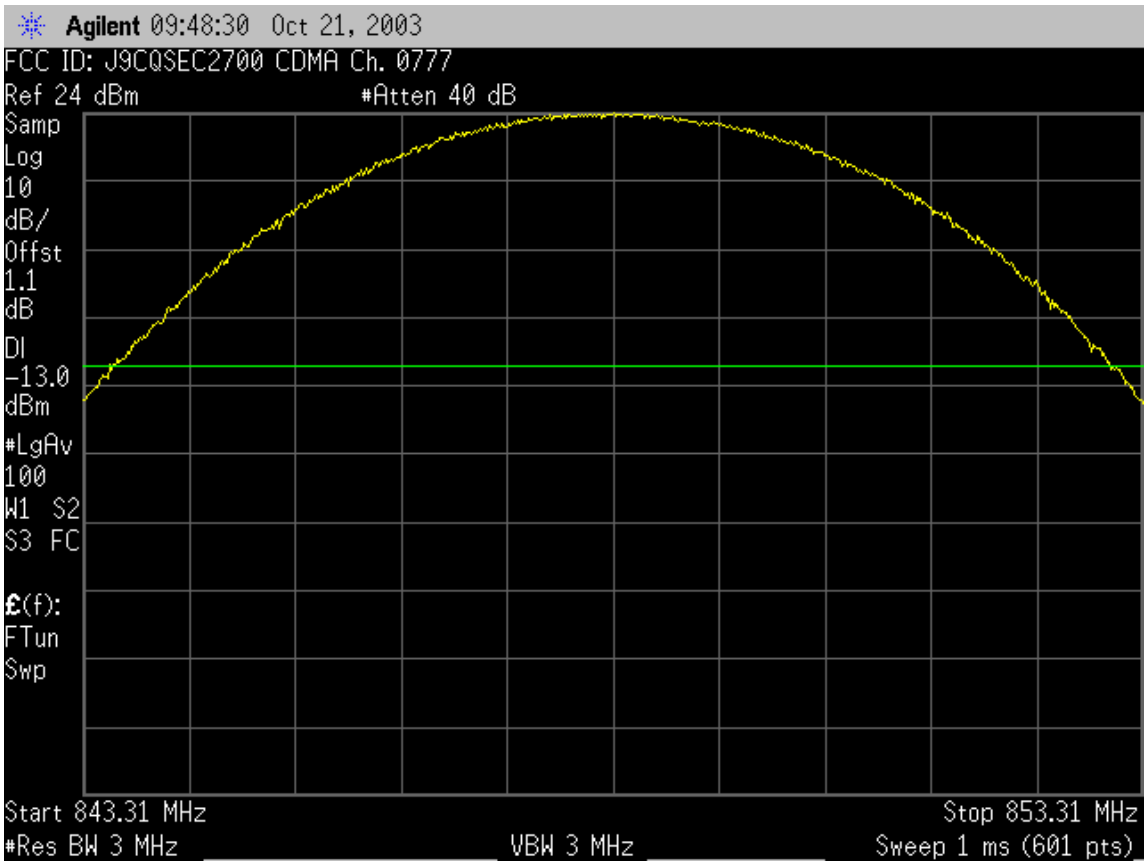


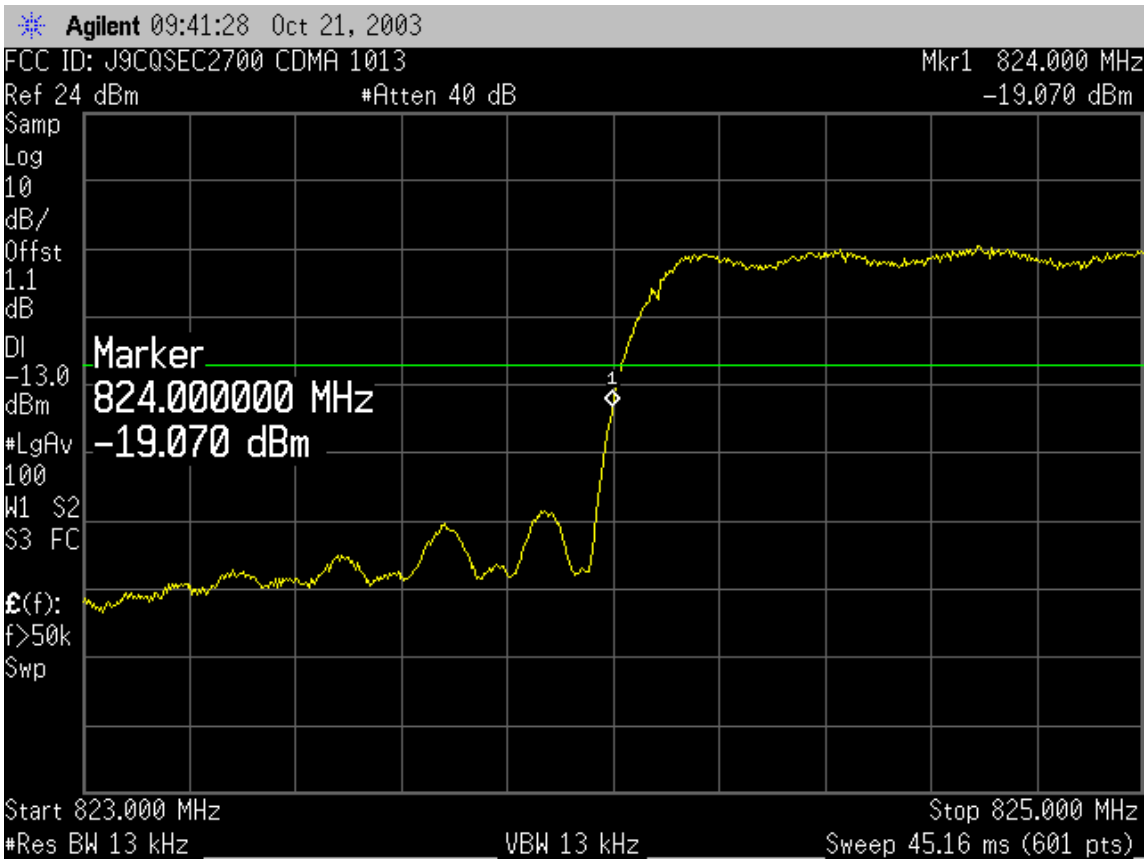
Channel 383



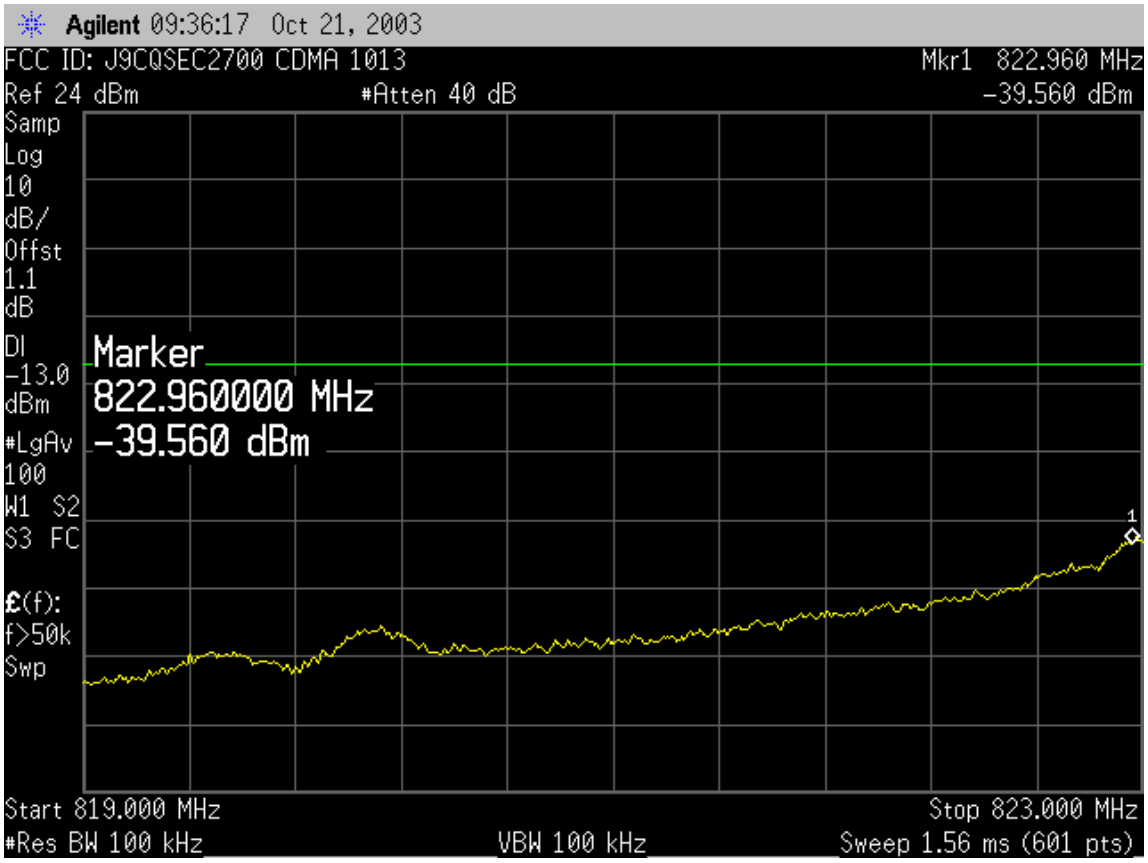
Channel 1013


Agilent 09:48:30 Oct 21, 2003
FCC ID: J9CQSEC2700 CDMA Ch. 0777
Ref 24 dBm
#Atten 40 dB
Samp
Log
10
dB/
Offst
1.1
dB
Dl
-13.0
dBm
#LgAv
100
W1 S2
S3 FC
£(f):
FTun
Swp
Start 843.31 MHz
#Res BW 3 MHz
VBW 3 MHz
Stop 853.31 MHz
Sweep 1 ms (601 pts)

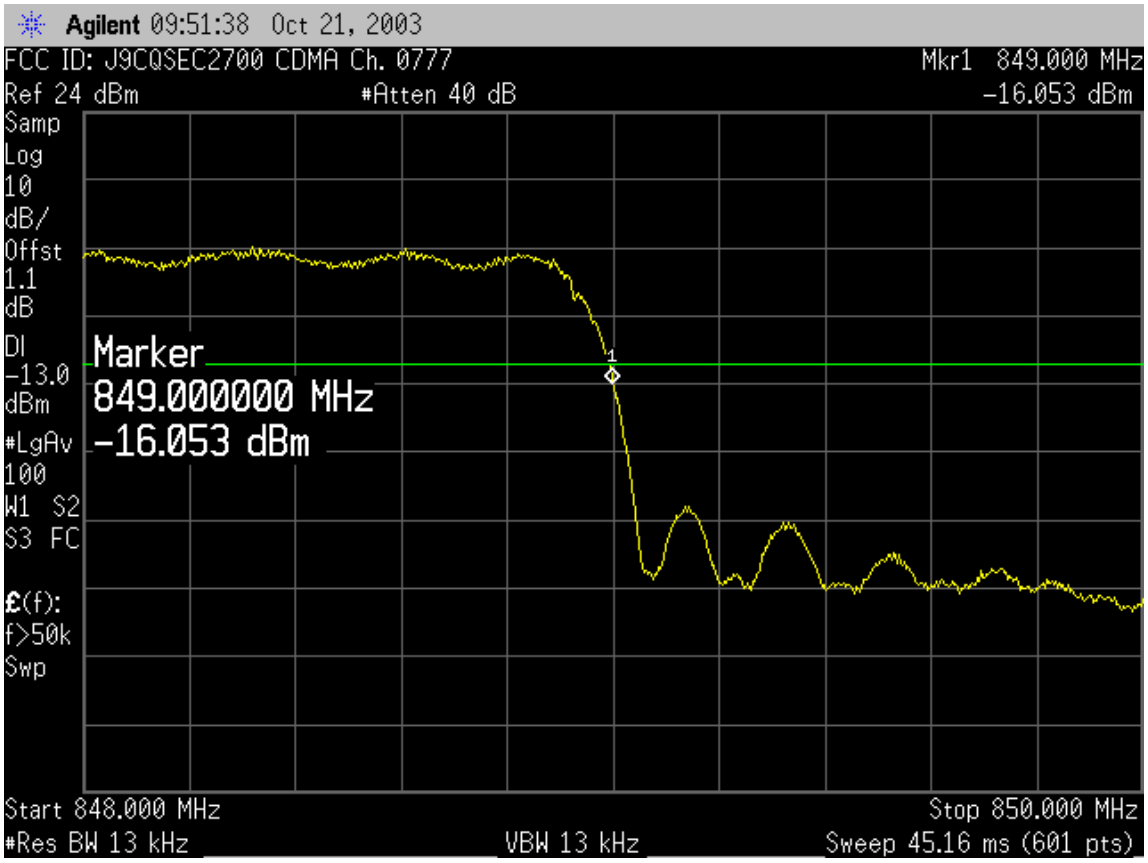
Channel 777



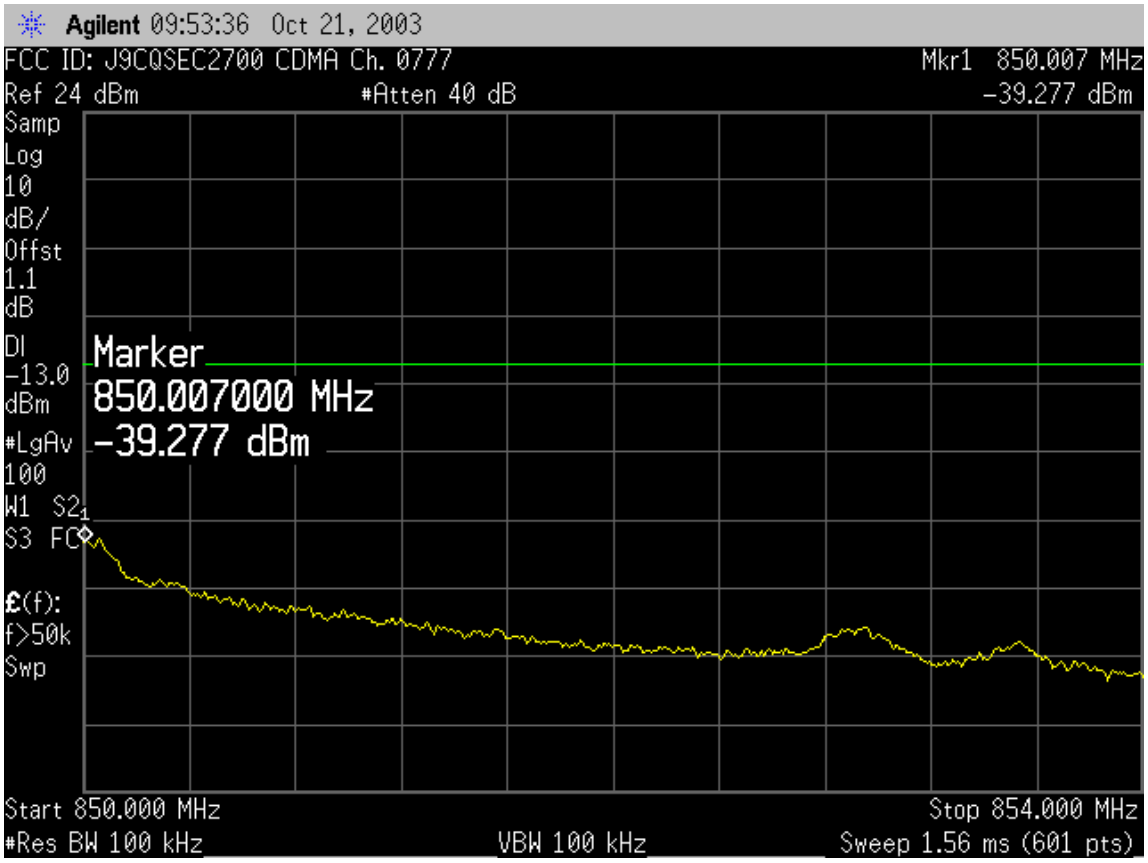
Channel 1013 Band Edge



Channel 1013 Band Edge

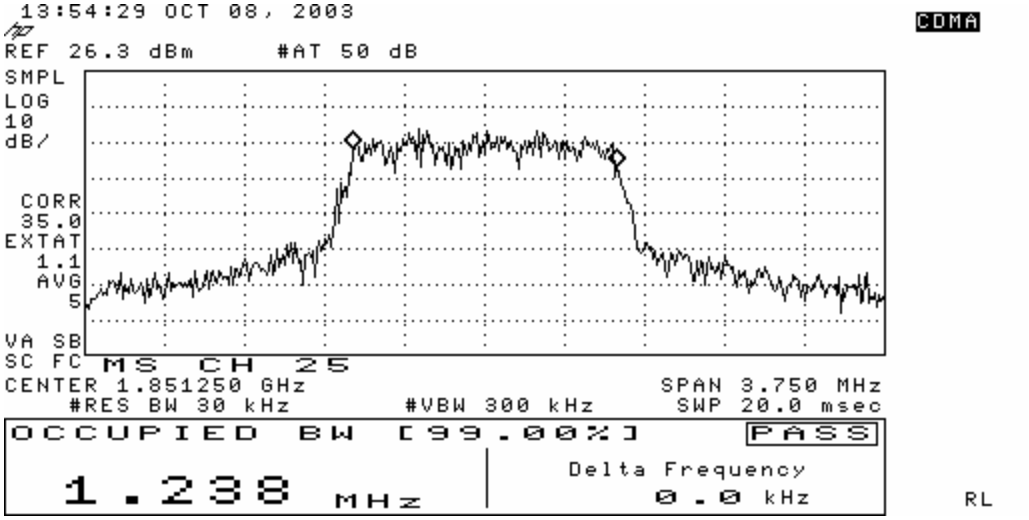


Channel 777 Band Edge

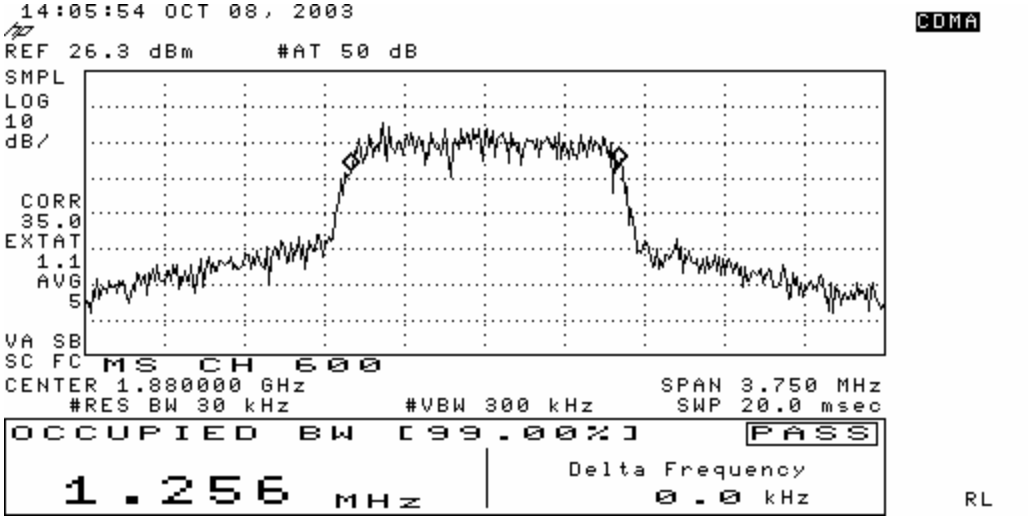


Channel 777 Band Edge

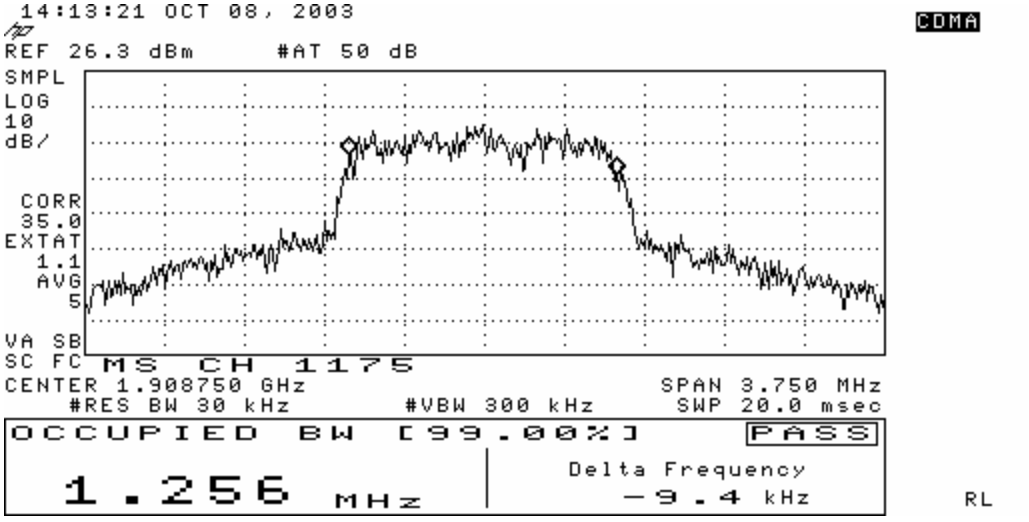
Exhibit 8 – Occupied Bandwidth and Spurious Emission Measured Data – FCC Part 2.1049, 24.238



Channel 25



Channel 600



Channel 1175

2. Spurious Emission at Antenna Terminals

Out of Band Spurious Emission Measurement Procedures

(a) 1 MHz band immediately adjacent to the PCS band

We performed a numerical integration of the power as performed by the spectrum analyzer (HP8594E) in the 1 MHz band immediately outside of the PCS block. As specified in Part 24.238 of the rules, we used a Resolution Bandwidth of 1% of the fundamental emission bandwidth, which in this instance equates to the measurement bandwidth of 12.5 kHz.

The ACPR (Adjacent Channel Power Ratio) function of the HP CDMA measurement personality was used on spectrum analyzer, which provides the power integration. The ACPR function and the spectrum analyzer settings used to complete the measurement will be addressed in section (c).

(b) 2nd 1 MHz band adjacent to PCS Block

As specified in Part 24.238 of the rules, the 2nd 1 MHz band outside of the PCS block was measured using a resolution bandwidth of 1 MHz.

The ACPR function of the HP CDMA measurement personality was used to complete the measurement. See section (c) for the ACPR function and the spectrum analyzer settings.

(c) ACPR measurement and spectrum analyzer settings

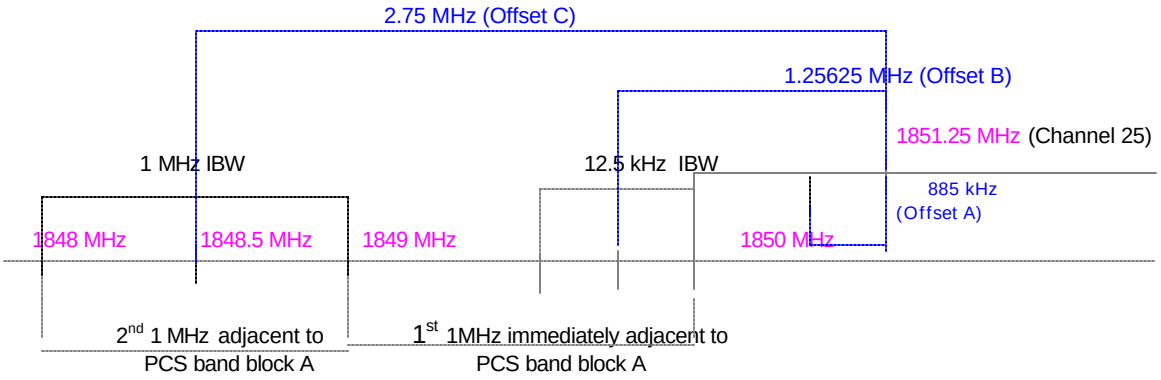
The ACPR (Adjacent Channel Power Ratio) is the power contained in a specified frequency-channel bandwidth relative to the total carrier power. It can measure up to three pairs of offset channels and relates them to the carrier power. ACPR measurement uses an integration bandwidth method (IBW) to measure the carrier power and the offset powers. IBW method performs a frequency sweep through the bandwidth of integration (set up by the user) using a resolution bandwidth (automatically set) much narrower than the channel bandwidth (e.g. 30 kHz RBW for a channel bandwidth of 1.25 MHz). The measurement computes an average power of the channel over a specified number of sweeps, automatically compensating for noise and scaling.

The following settings were used in the ACPR integration bandwidth method to complete the above measurements (a) and (b). An example to explain the settings is given.

Settings used in ACPR measurement

	Frequency (Hz)	Offset Limit	IBW (Hz)	Offset Span (Hz)	Comments
Offset A	± 885k	n/a	n/a	n/a	not required on a mobile station
Offset B	±1.25625M	-35dB (43+10logP)	12.5k	25k	setup for 1 MHz band immediately adjacent to PCS band
Offset C	± 2.75M	-35dB (43+10logP)	1M	2M	setup for 2nd 1 MHz band adjacent to PCS band

As an example of channel 25, the center frequency is 1851.25 MHz. The interpretation of the settings in the above table is shown in following drawing.



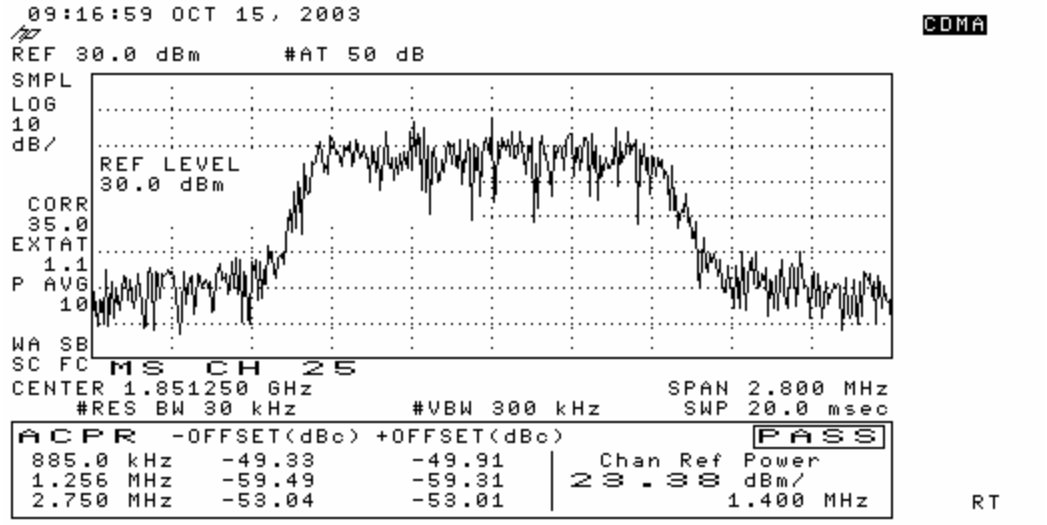
Note: The above drawing is not in scale.

(d) Spurious emission up to 10th harmonic of the transmitting frequency

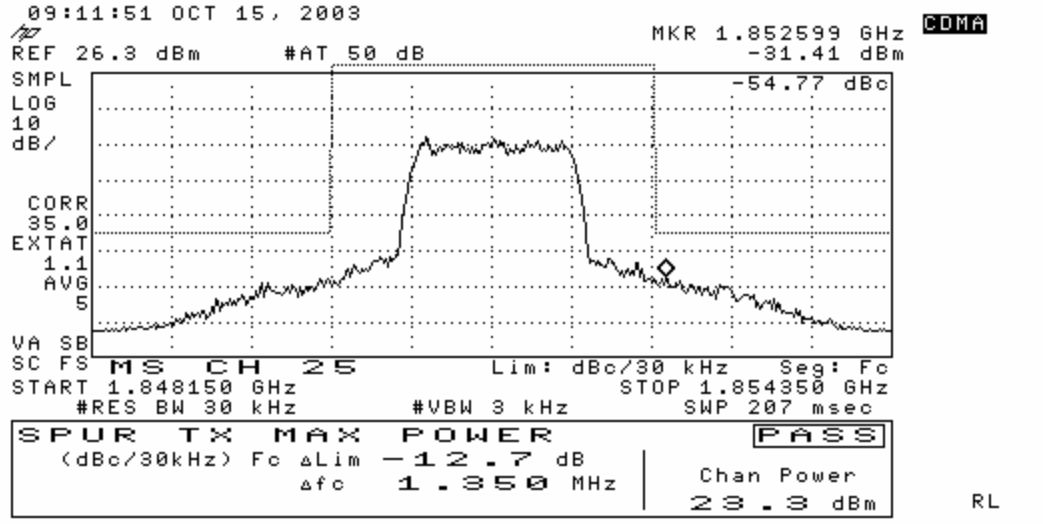
The harmonic and spurious emissions from 0 Hz to 22 GHz were measured using a RBW of 1 MHz and a VBW of 1 MHz on the spectral analyzer.

Test Results

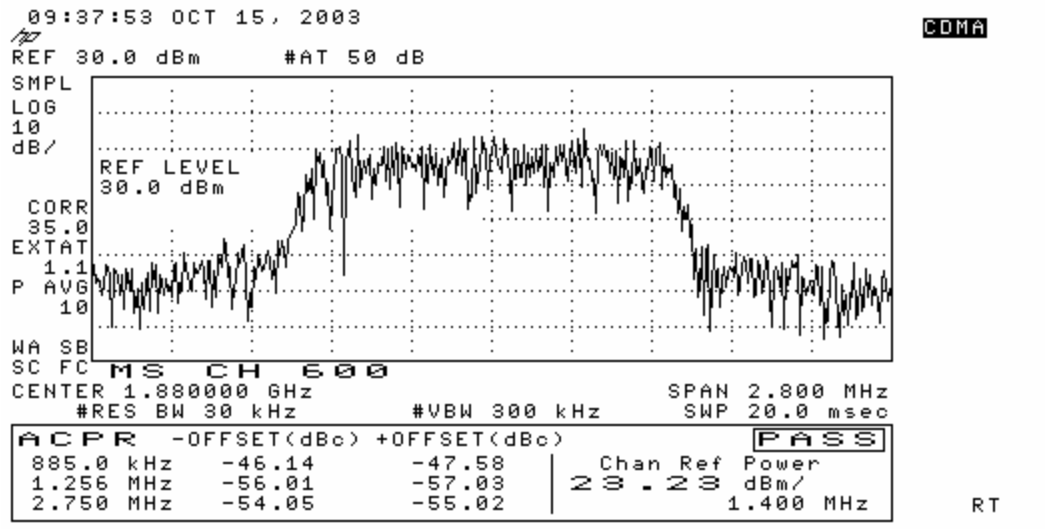
ACPR measurement (1st and 2nd 1MHz adjacent to PCS)



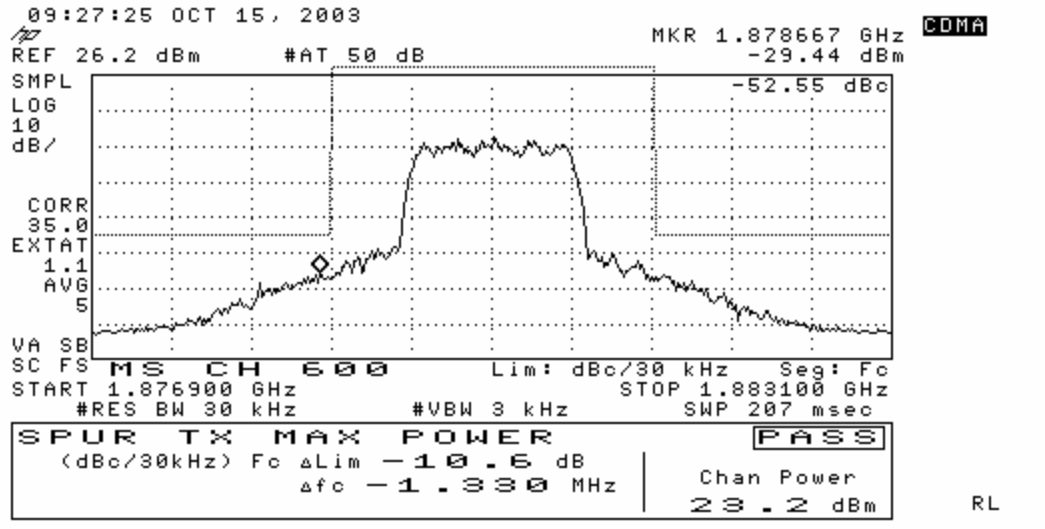
Channel 25



Channel 25



Channel 600



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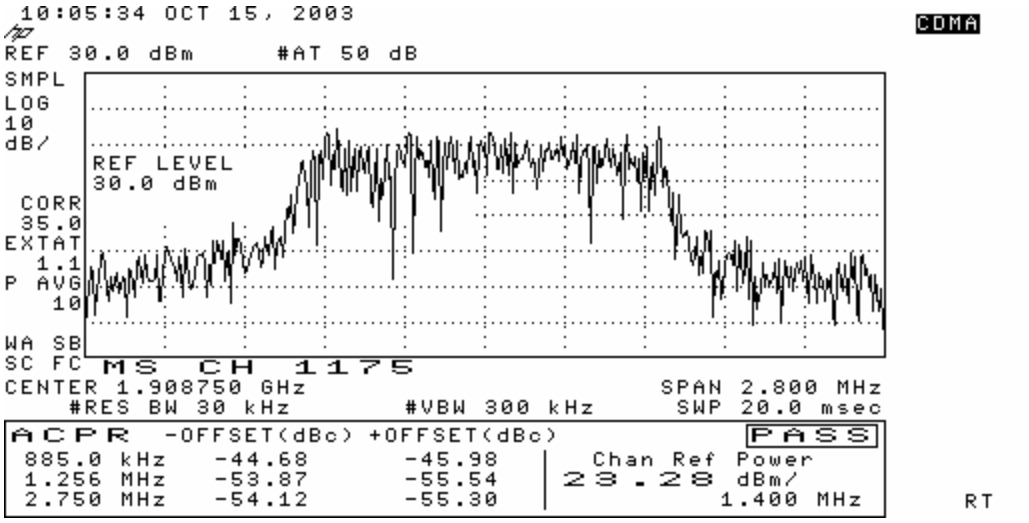
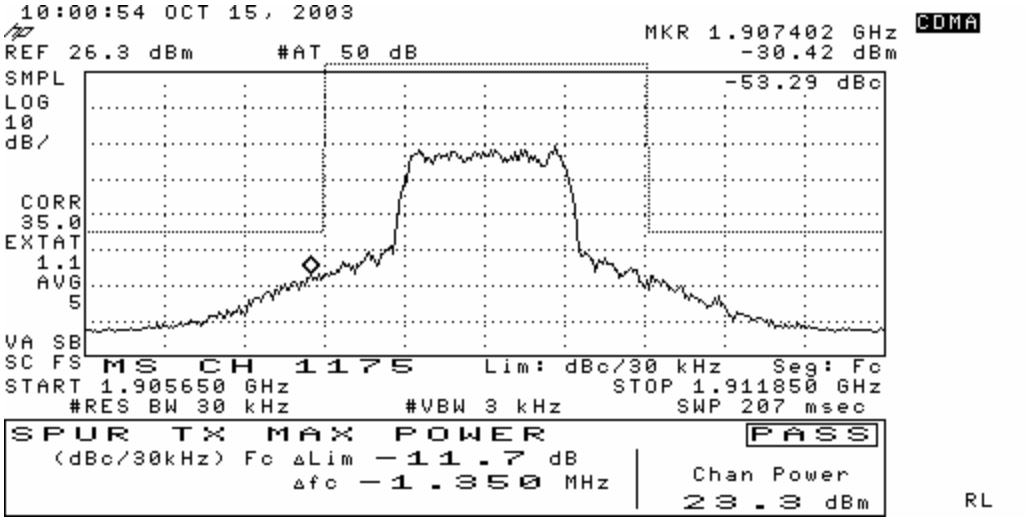
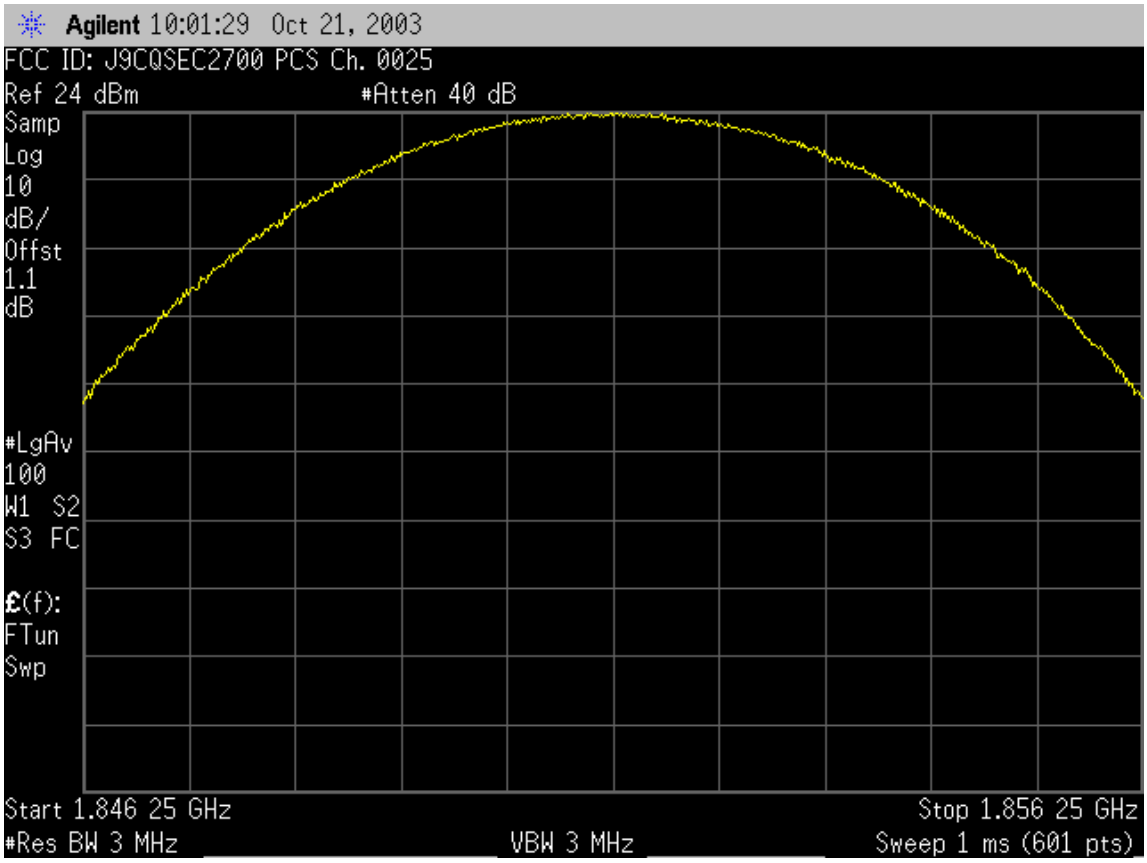


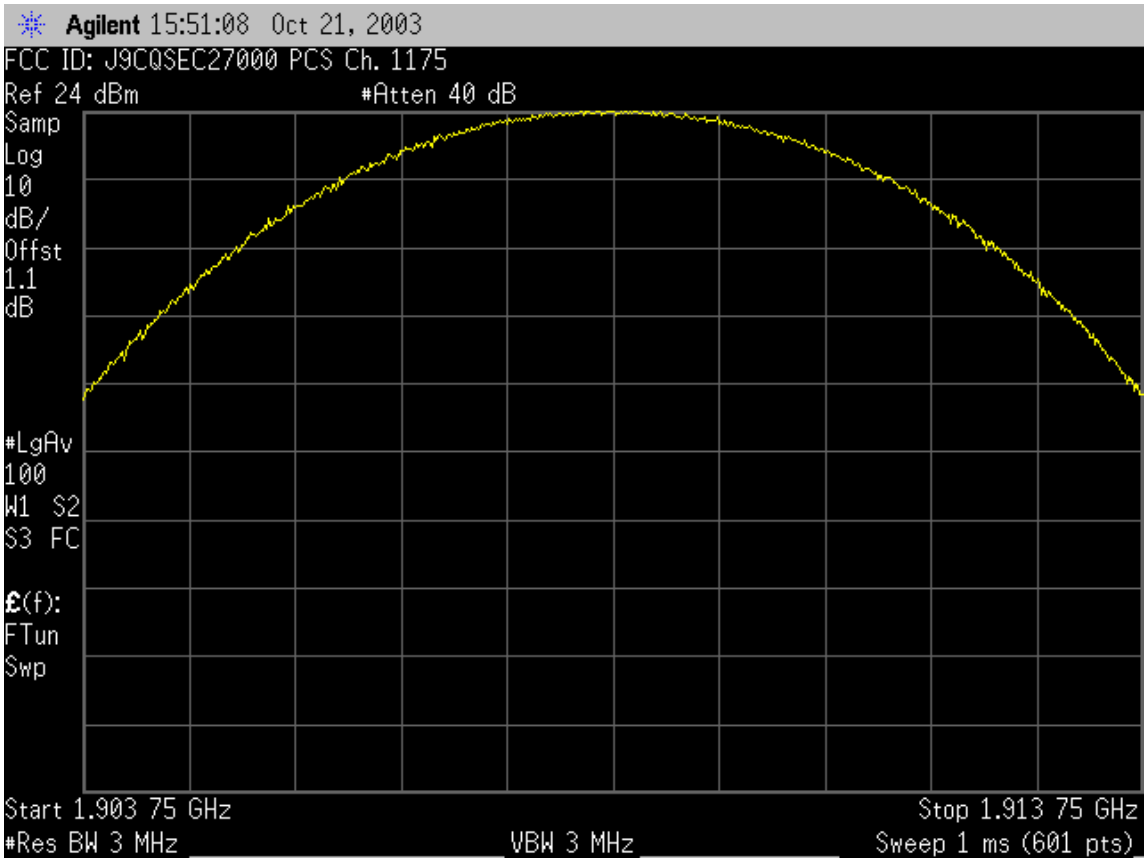
Channel 1175



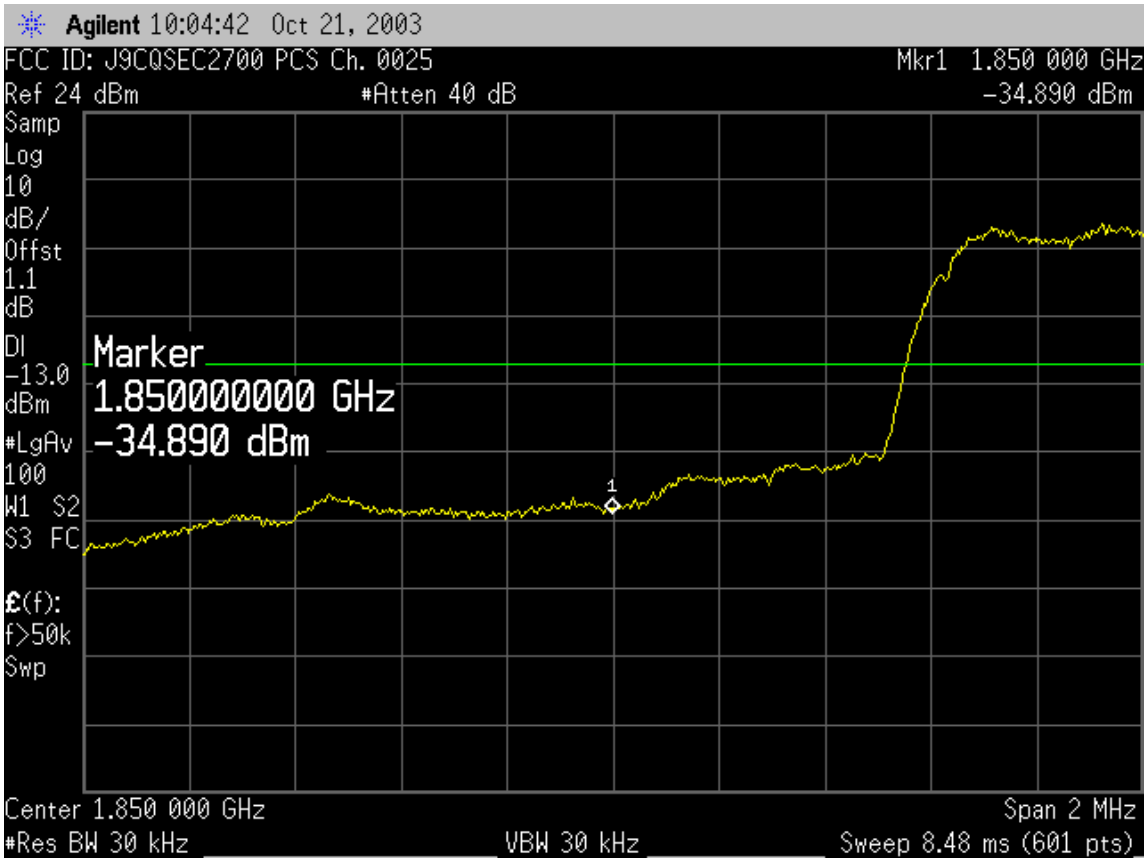
Channel 1175


Agilent 10:01:29 Oct 21, 2003
FCC ID: J9CQSEC2700 PCS Ch. 0025
Ref 24 dBm
#Atten 40 dB
Samp
Log
10
dB/
Offst
1.1
dB
#LgAv
100
W1 S2
S3 FC
£(f):
FTun
Swp
Start 1.846 25 GHz
#Res BW 3 MHz
VBW 3 MHz
Stop 1.856 25 GHz
Sweep 1 ms (601 pts)

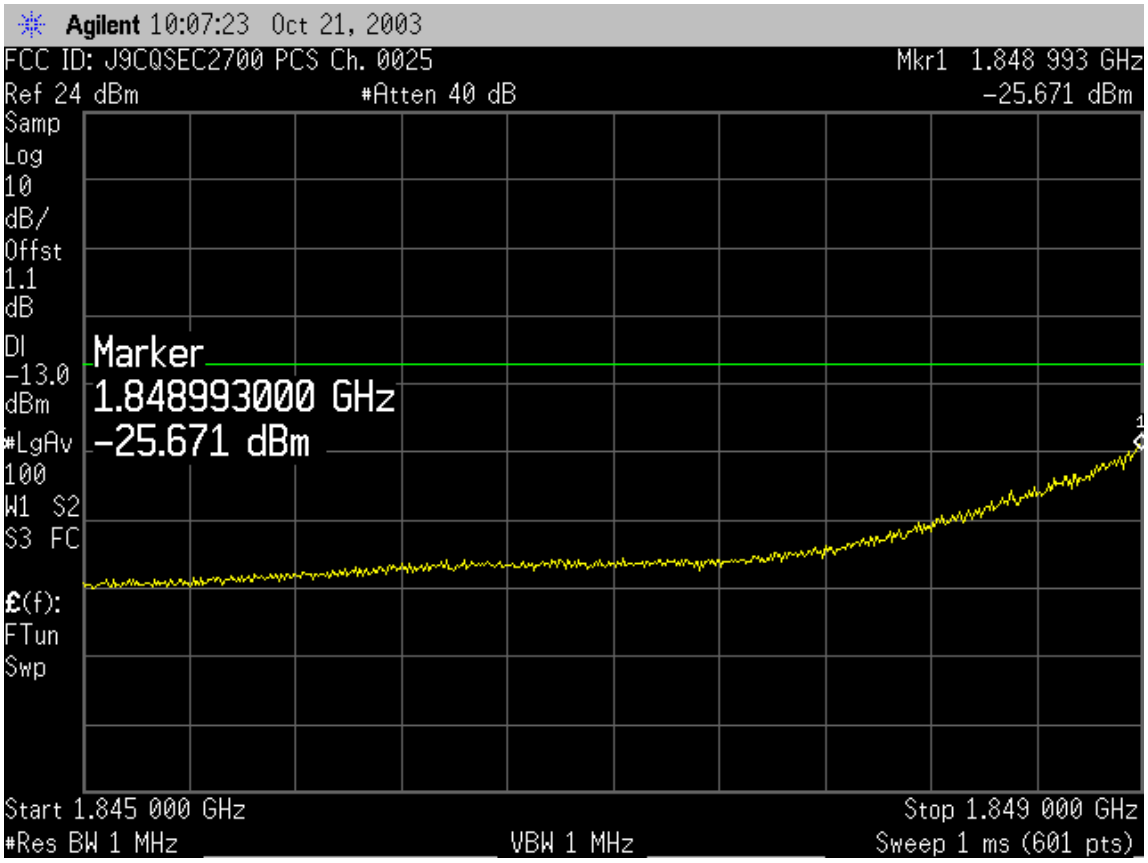
Channel 25



Channel 1175

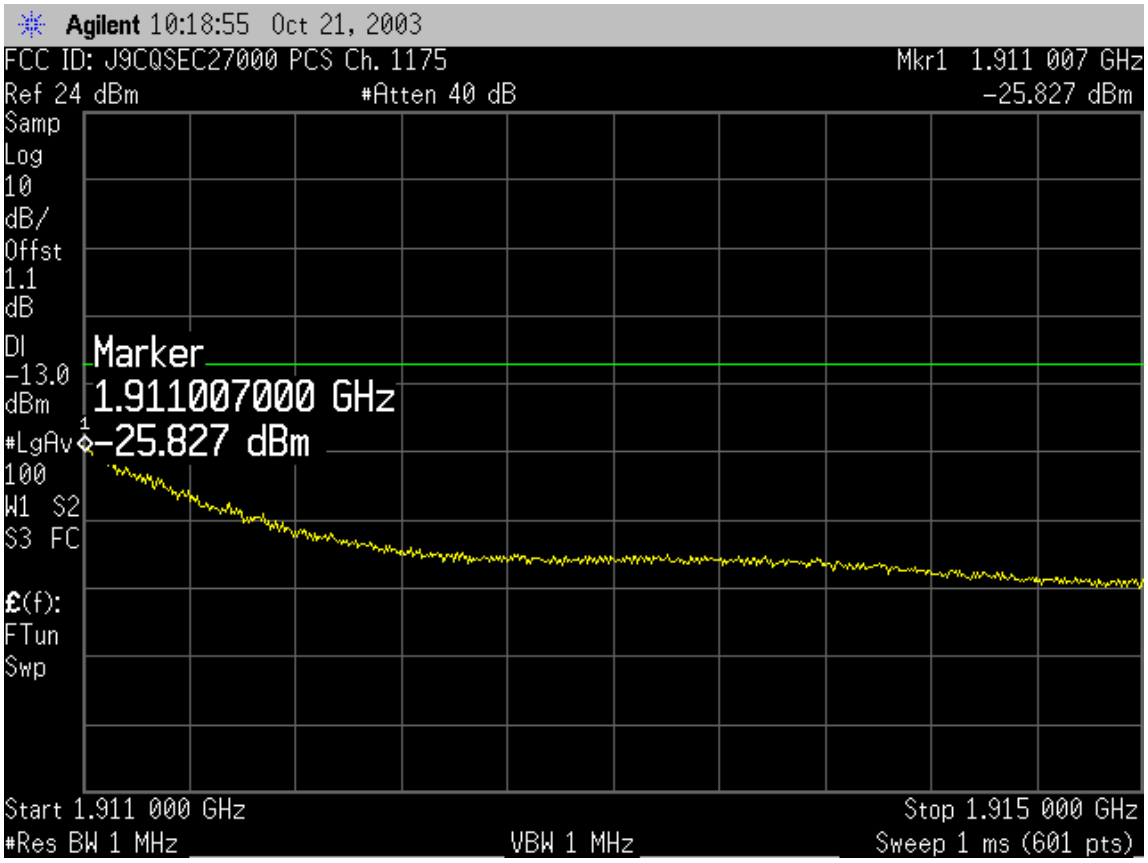


Channel 25 Band Edge



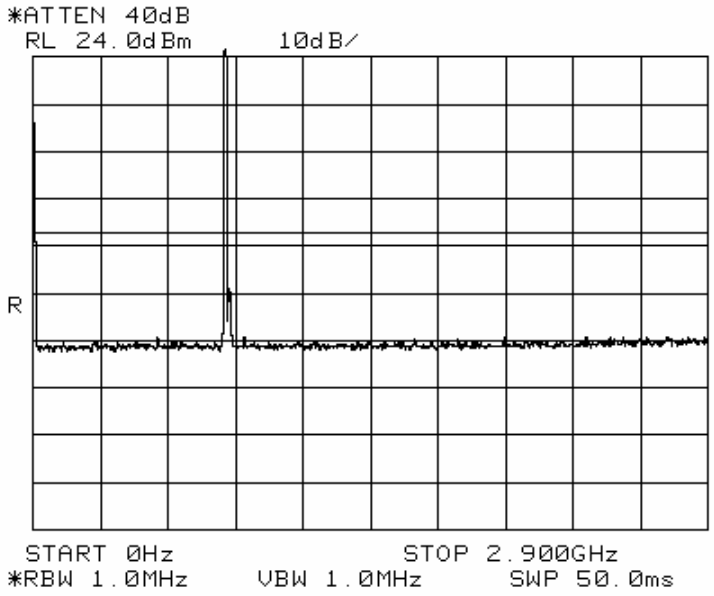
Channel 25 Band Edge

Channel 1175 Band Edge

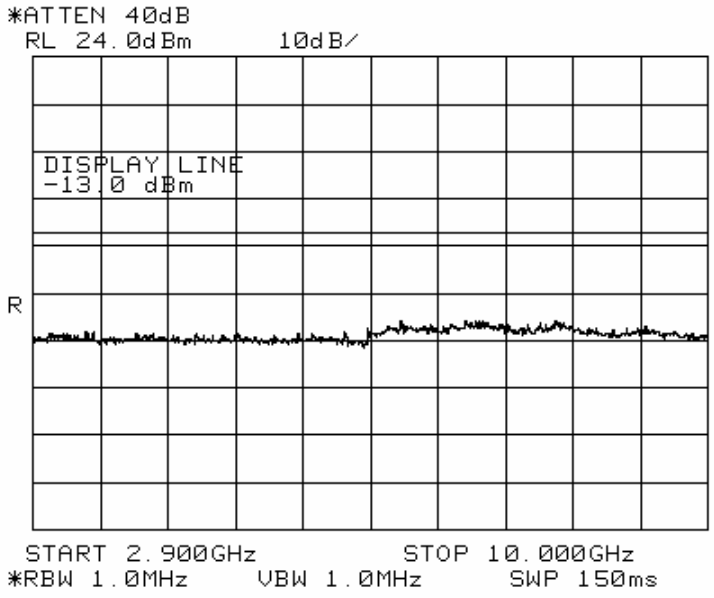


Channel 1175 Band Edge

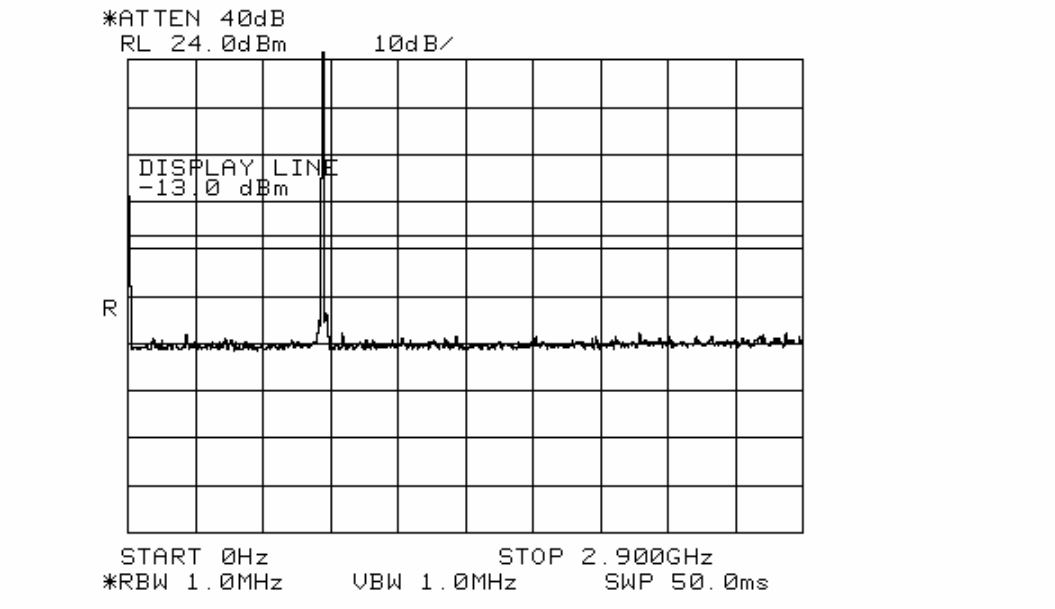
Exhibit 9 – Conducted Emissions Test Results (harmonics) - FCC Part 2 and 22, Paragraph 2.1051, 22.917



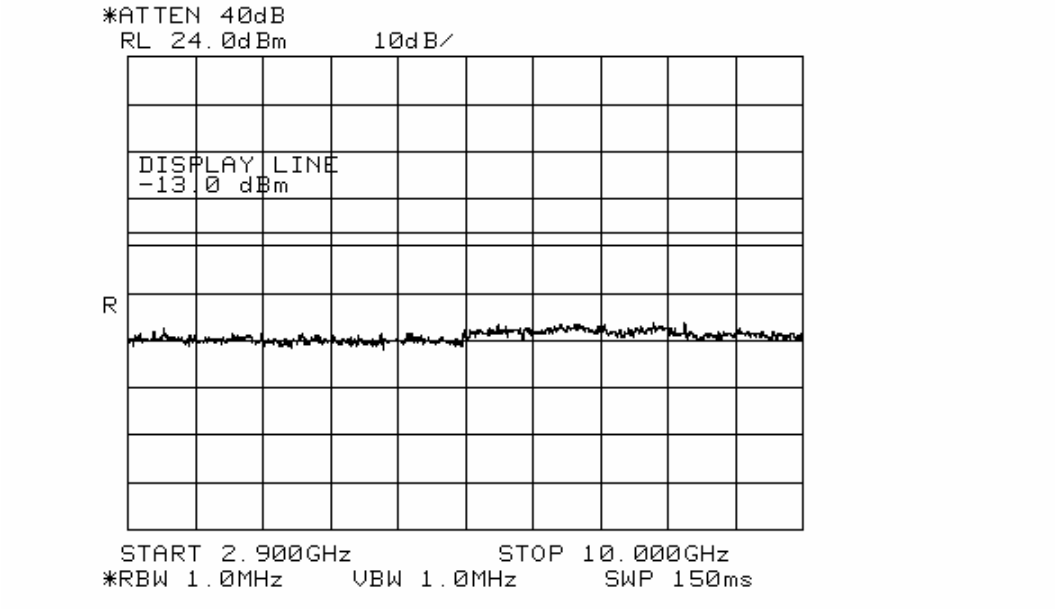
CDMA Channel 1013 TX Max Power



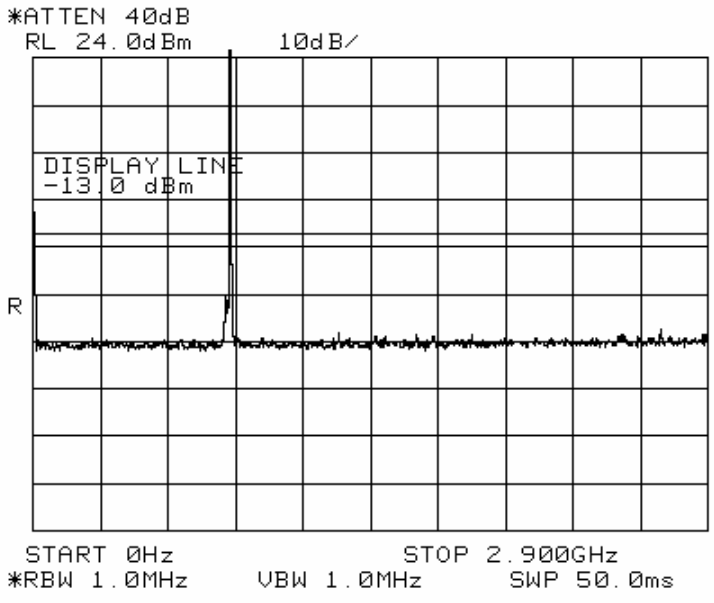
CDMA Channel 1013 TX Max Power



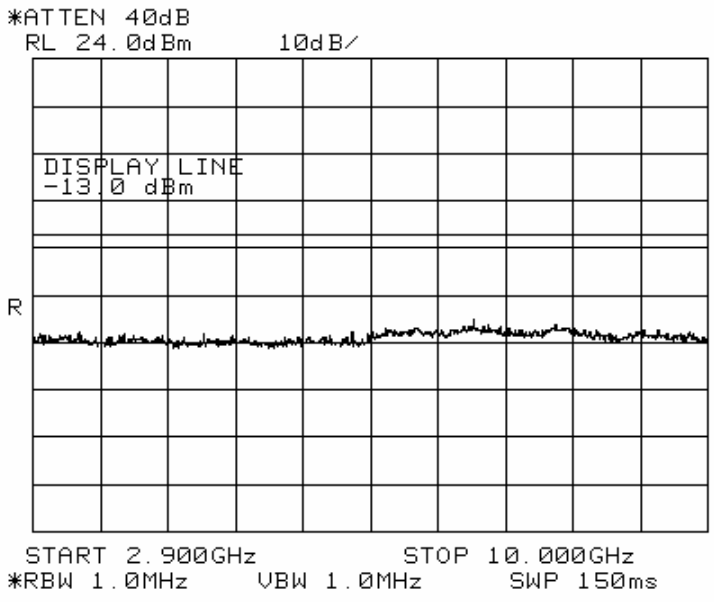
CDMA Channel 383 TX Max Power



CDMA Channel 383 TX Max Power

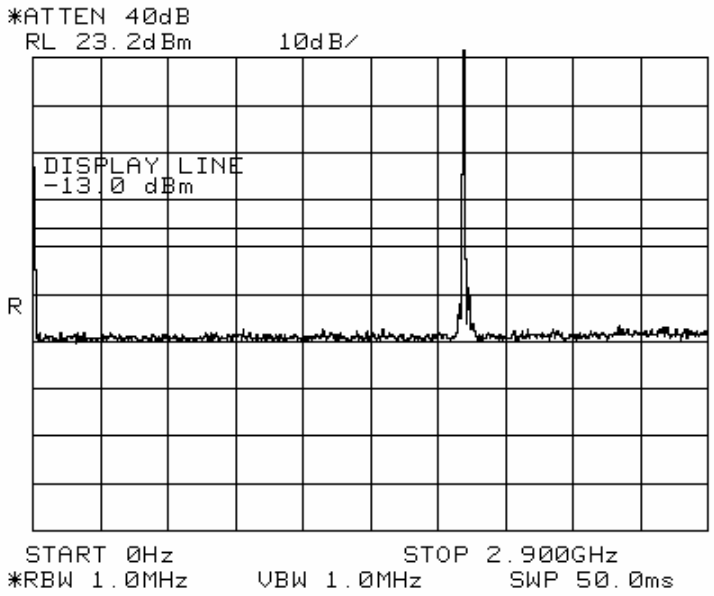


CDMA Channel 777 TX Max Power

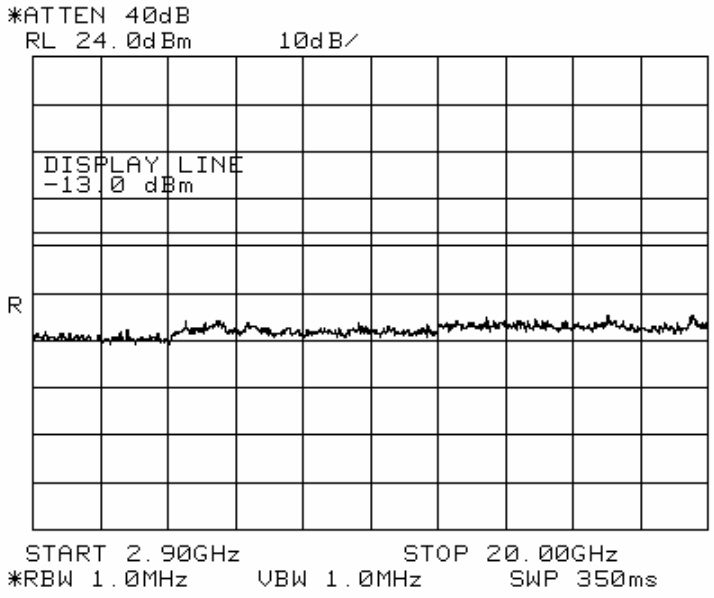


CDMA Channel 777 TX Max Power

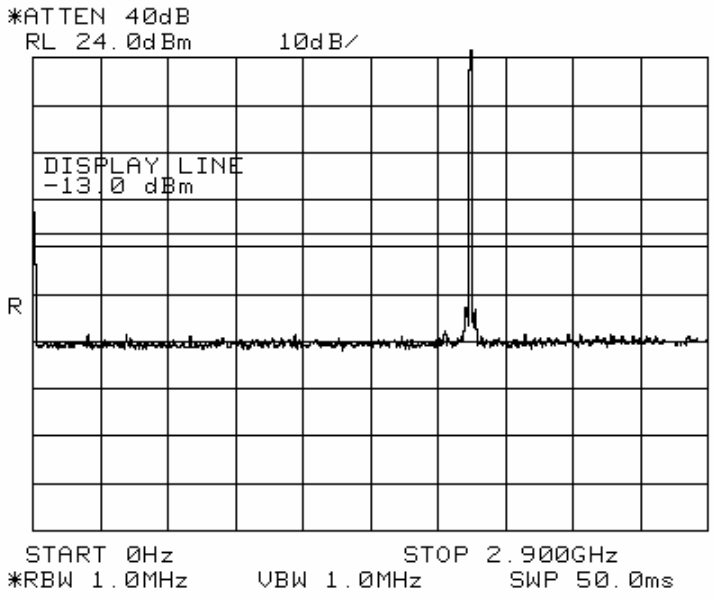
Exhibit 10 – Conducted Emission Test Results (Harmonics) and Spurious Emissions
FCC Part 2 and 24, Paragraph 2.1051, 24.238



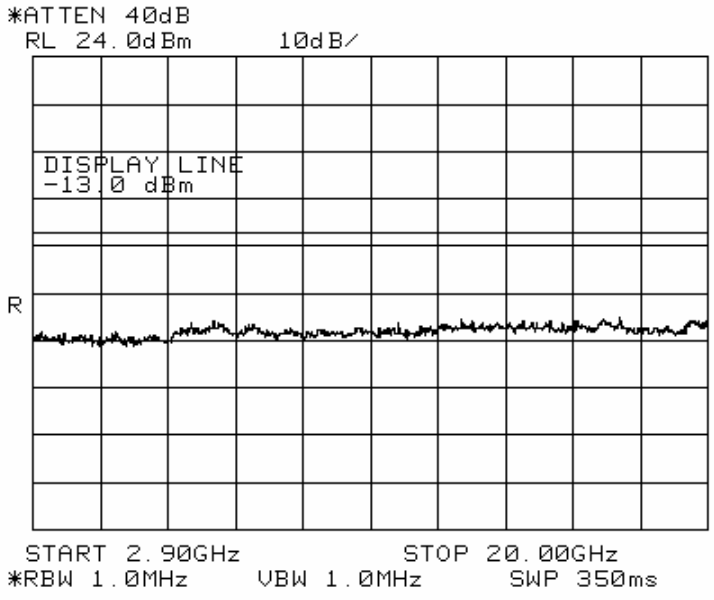
PCS Channel 25 TX Max Power



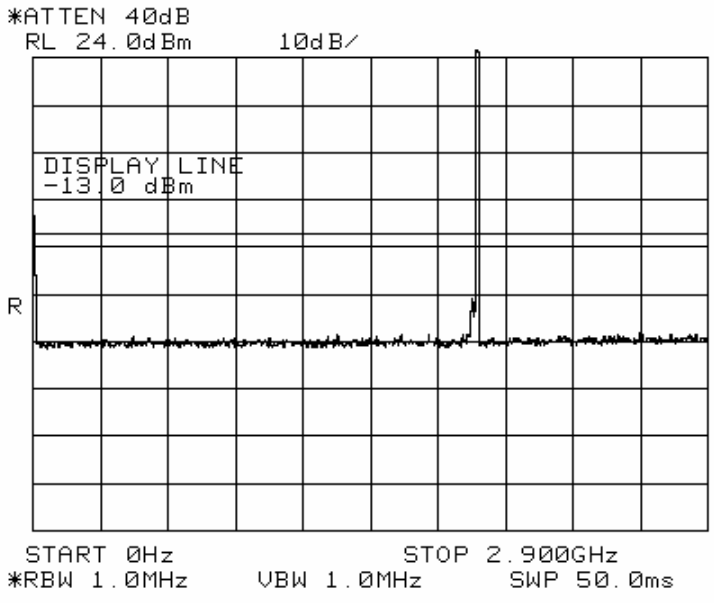
PCS Channel 25 TX Max Power



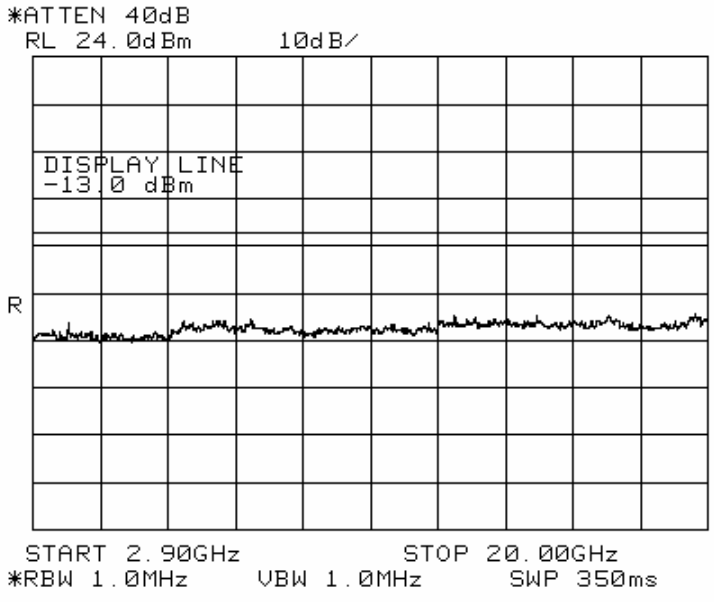
PCS Channel 600 TX Max Power



PCS Channel 600 TX Max Power



PCS Channel 1175 TX Max Power



PCS Channel 1175 TX Max Power

Exhibit 11 – Transmitter RF Carrier Frequency Stability - FCC part 2.1055

Transmitter RF Carrier Frequency Stability - FCC part 2, Paragraph 2.995
Phone transmitting in CDMA 800 mode, but with no modulation on the carrier

Measured with a HP 8564E Spectrum Analyzer

Carrier Frequency Reference at 25 Degrees C: 836489957 Hz

	variation from carrier frequency reference (Hz)							specification	
temp (C)	3.4V	3.5V	3.7V	3.8V	3.9V	4.1V	4.2V	lower limit	upper limit
-30	106	94	71	89	80	73	61	-2091	2091
-20	-122	-122	-119	-117	-109	-93	-72	-2091	2091
-10	-329	-324	-321	-314	-308	-295	-249	-2091	2091
0	-431	-425	-431	-433	-441	-447	-451	-2091	2091
10	-108	-125	-152	-131	-154	-190	-224	-2091	2091
20	27	27	23	22	21	14	-9	-2091	2091
30	62	61	56	57	53	45	33	-2091	2091
40	26	27	17	10	1	-17	-43	-2091	2091
50	159	162	165	164	166	160	149	-2091	2091
60	534	536	529	527	521	511	459	-2091	2091

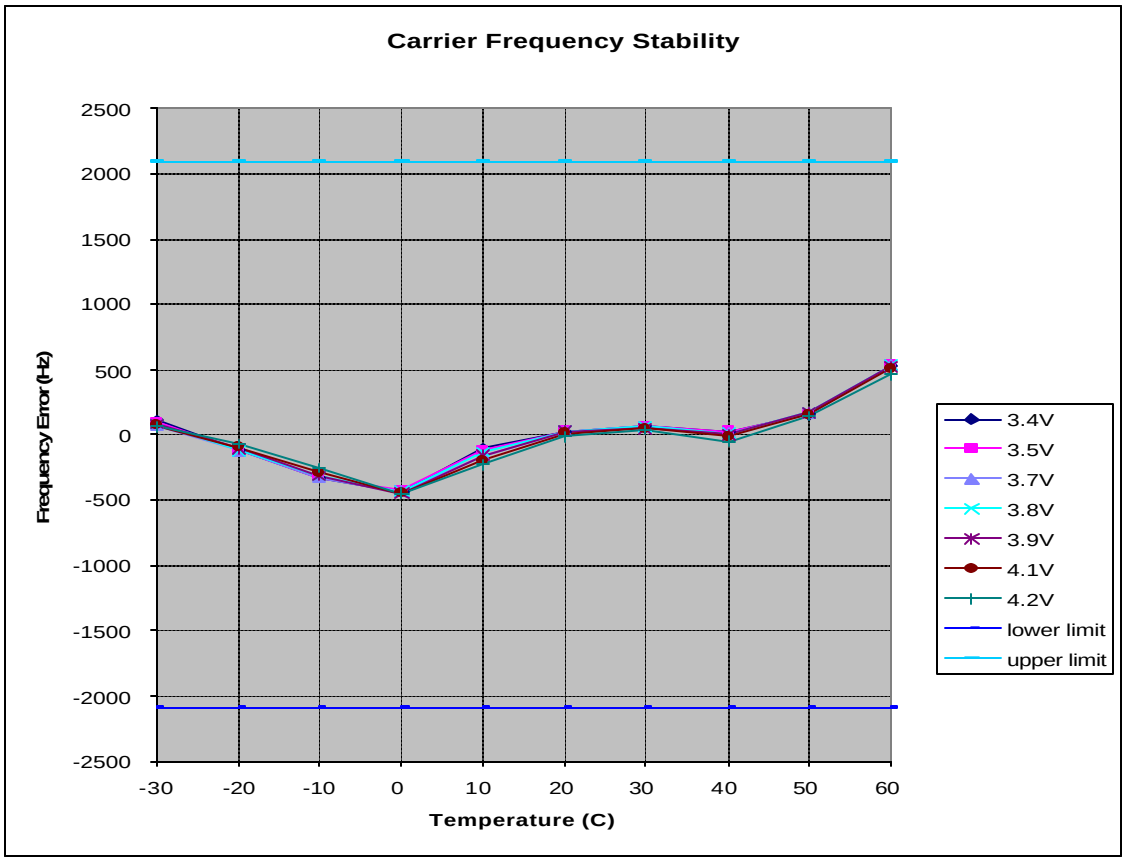

Carrier Frequency Stability
Frequency Error (Hz)
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-30
-20
-10
0
10
20
30
40
50
60
Temperature (C)
3.4V
3.5V
3.7V
3.8V
3.9V
4.1V
4.2V
lower limit
upper limit

Exhibit 12 – Transmitter RF Carrier Frequency Stability - FCC part 2.1055, 24.235

Transmitter RF Carrier Frequency Stability - FCC part 2, Paragraph 2.995
Phone transmitting in CDMA PCS mode, but with no modulation on the carrier

Measured with a HP 8564E Spectrum Analyzer

Carrier Frequency at Reference 25 Degrees C: 1880000267 Hz

	Variation from carrier frequency reference (Hz)							specification	
temp. (C)	3.4V	3.5V	3.7V	3.8V	3.9V	4.1V	4.2V	lower limit	upper limit
-30	393	371	308	161	-110	-497	-810	-4700	4700
-20	-328	-335	-325	-317	-302	-285	-215	-4700	4700
-10	-713	-683	-666	-638	-623	-593	-515	-4700	4700
0	-765	-791	-796	-823	-846	-891	-908	-4700	4700
10	-53	-48	-68	-101	-124	-180	-300	-4700	4700
20	321	301	293	266	278	253	214	-4700	4700
30	428	414	403	401	384	356	329	-4700	4700
40	634	621	618	604	578	553	486	-4700	4700
50	776	771	773	771	751	723	688	-4700	4700
60	693	678	660	655	635	608	596	-4700	4700

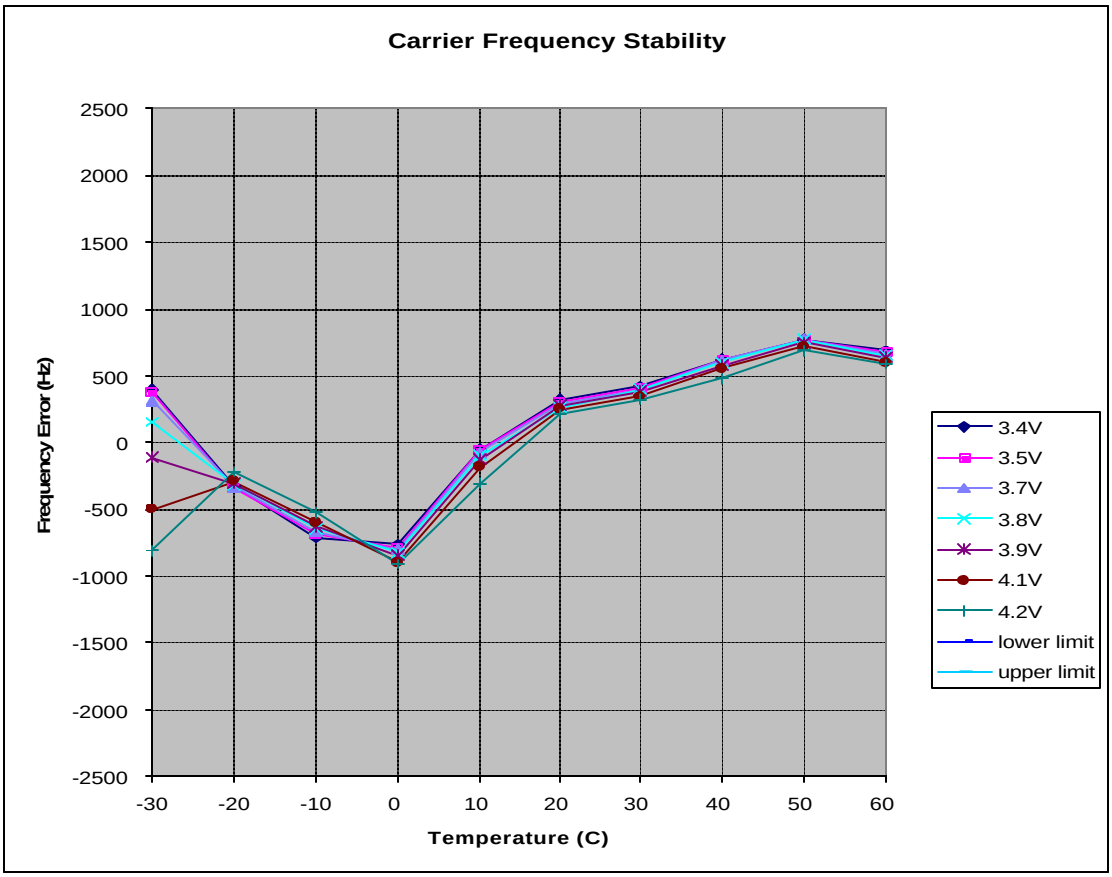

Carrier Frequency Stability
Frequency Error (Hz)
2500
2000
1500
1000
500
0
-500
-1000
-1500
-2000
-2500
-30
-20
-10
0
10
20
30
40
50
60
Temperature (C)
3.4V
3.5V
3.7V
3.8V
3.9V
4.1V
4.2V
lower limit
upper limit

Exhibit 13 – Measurement Procedures and Techniques

List of Equipment

Computer with Qualcomm FTM software

Spectrum Analyzers:

HP8594E, S/N 3746A05330, CAL DUE 02/04/04
HP8564, S/N 3821A01265, CAL DUE 10/27/03
Agilent E4443A, S/N US41420175, CAL DUE 12/09/03

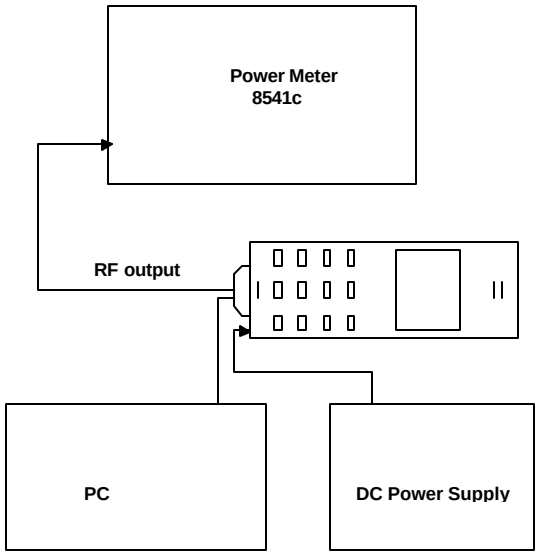
DC Power Supply

Power Meter

Gigatronics 8542C, S/N 291834580, CAL DUE 10/17/03
Gigatronics 8542C, S/N 311834580, CAL DUE 08/25/04

Measurement Procedures

RF Output Power

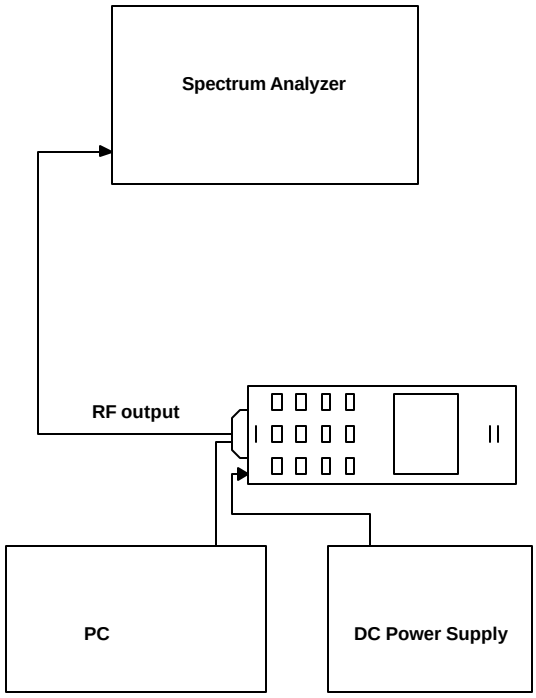


Definition - The output power rating of the transmitter is the power available at the output terminal of the transmitter when the terminal is connected to the normal load.

Method of Measurement - Measure the transmitter output carrier power without modulation using a power meter.

Minimum Standard - The transmitter output power shall be maintained within +2 / -4 dB.

Occupied Bandwidth (In Cellular Band)



Definition - The occupied bandwidth is defined as the spectrum noise produced at discrete frequency separations from the carrier due to all sources of unwanted noise within the transmitter in a modulated condition.

Method of Measurement – Connect a spectrum analyzer to the cellular phone's antenna connector. Set the cellular phone to transmit at the maximum RF output level and at full rate. Set the resolution bandwidth of the spectrum analyzer to 30 kHz. The value of the occupied bandwidth is calculated by an external or internal computer by summing all samples stored as "total power". This measurement is accomplished by the CDMA personality that is built into the spectrum analyzer.

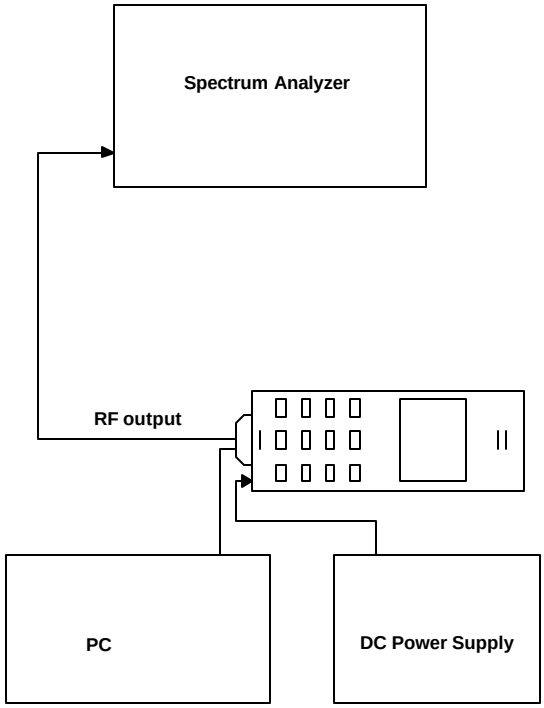
Minimum Standard – The occupied bandwidth shall not exceed 1.48 MHz.

In addition, in a 30 kHz bandwidth centered anywhere between 869 and 894 MHz, the mean power of emissions from the transmitter with modulated carrier shall not exceed -80 dBm.

Occupied Bandwidth – (In PCS Band)

The procedure has been stated in Exhibit 9

Conducted Spurious and Harmonic Emissions at Antenna Terminal



Definition - The conducted harmonic and spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside the authorized bandwidth of the transmitter.

Method of Measurement - Connect a spectrum analyzer to the cellular phone's antenna connector. Set the cellular phone to transmit at the maximum RF output level and at full rate. Set the resolution bandwidth and video bandwidths of the spectrum analyzer to the appropriate values. Measure the desire frequency bands.

Minimum Standard - Conducted harmonic and spurious emissions shall be attenuated below the level of emissions of the carrier frequency by at least 43 + 10 log (mean output power in Watts) dB.

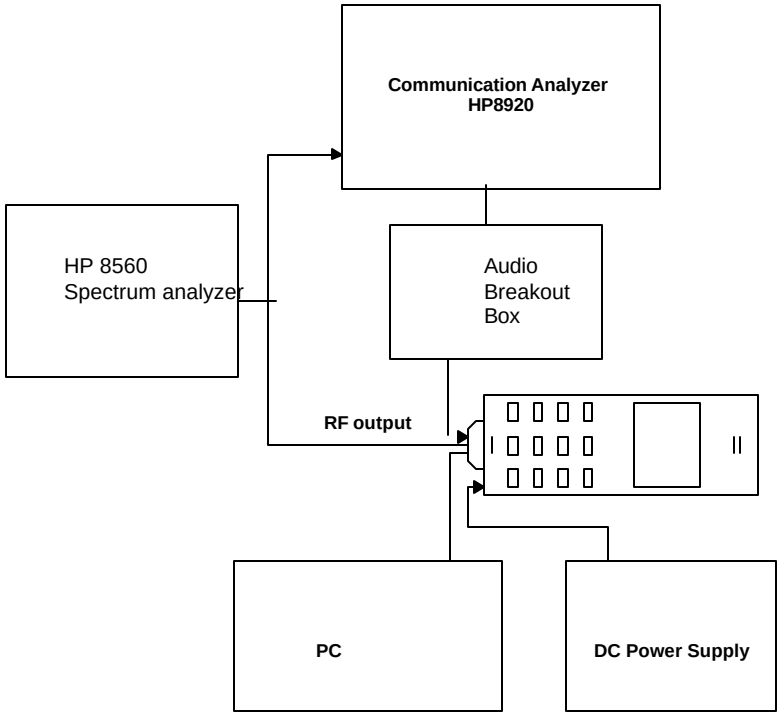
Radiated Spurious and Harmonic Radiation

Definition - The radiated spurious emissions are emissions from the subscriber unit with the attached antenna fully extended. The radiated spurious emissions include those emissions radiated from the attached antenna as well as the equipment cabinet and attached cables.

Method of Measurement - The measurement shall be conducted at standard radiation test site with a search antenna which is movable vertically and is rotatable 90 degrees for vertically and horizontally polarized signals.

Minimum Standard - Radiated spurious emissions shall be attenuated below the maximum level of emission of the carrier frequency by at least 43 + 10 log (mean output power in Watts) dB.

Frequency Stability



Definition - The frequency stability is the ability of the transmitter to maintain an assigned carrier frequency.

Method of Measurement - Use the communication tester to sample the transmitter RF output signal and measure its frequency. Very the ambient temperature from -30 to +60 °C, and also vary the DC supply voltage to the equipment from 3.2 to 4.2 V at each temperature.

Minimum Standard - The transmitter carrier frequency shall be maintained within ± 2.5 ppm.

Exhibit 14 – Product Overview and Circuit Diagrams

Technical Description

The Dual Band Phone consists of Code Division Multiple Access (CDMA) mode in the cellular band and CDMA mode in the PCS band. The Portable Phone is designed to meet the requirements of TIA/EIA/IS-98-B standards for Dual-Mode Wideband Spread Spectrum Cellular Mobile Stations, and ANSI J-STD_018 standard for 1.8GHz to 2.0GHz Code Division Multiple Access (CDMA) Personal Stations.

Frequency Range of operation: 824 - 849 MHz transmitter and 869 - 894 receiver for cellular band, 1850 – 1910MHz transmitter and 1930 – 1990 receiver for PCS band. Max RF power output is: 0.318W for CDMA in cellular band and 0.335W for CDMA in PCS band.

Power Supply requirements: 4.2V DC Li-Ion battery.

Modulation:

The audio input is sampled, digitally limited, and then filtered to amplitude and frequency limit the signal applied to the modulator. The device has an operating temperature range of -30 to +60 C. The functions include Compandor, PLL lock detect for received data, audio signal filtering for signals.

Power limiting:

Transmitted power is monitored by a RF detector diode which is coupled from the Power Amplifier (PA) output. The detected DC voltage is fed into a microprocessor which uses a calibration table along with an offset correction and temperature correction table to control power limits. When the RF power exceeds a predetermined limit the gain of the stage preceding the PA is reduced.

Block and Circuit Diagrams

Block and circuit diagrams are included in separate attachments.