Cover Letter

Federal Communications Commission
Authorization and Evaluation Division

Re: Application for PCS Transceiver Type Acceptance

Kyocera Wireless Corporation (KWC) herein submits the Application for Equipment Authorization (FCC Form 731) and Exhibits for Type Acceptance of a PCS Transceiver, FCC ID: OVFKWC-2119.

Applicant: Kyocera Wireless Corporation
10290 Campus Point Drive
San Diego, CA 92121-1522

Manufacture: Kyocera Wireless Corporation
10290 Campus Point Drive
San Diego, California 92121

The equipment, KWC model # 2119, is for mobile station cellular and PCS system use. The 2119 is in full compliance with all parts of ANSI J-STD-018, Recommended Minimum Performance Requirements for 1.8 to 2 GHz Code Division Multiple Access (CDMA) Personal Stations, issue July 1996.

Information concerning how the ESN protection requirements are met is provided in Exhibit 3.

Kyocera Wireless Corporation

Robert J Scodellaro
EMC Engineer, Staff/Manager

Request of Confidentiality

Federal Communications Commission
Authorization and Evaluation Division

Re: Request of Confidentiality

Pursuant to Sections 0.457 and 0.459 of the Commission's Rules, the Applicant hereby requests confidential treatment of information accompanying this Application as outlined below:

Schematics/block diagrams
Parts lists for the above schematics and block diagrams

The above materials contain trade secrets and proprietary information not customarily released to the public. The public disclosure of these matters might be harmful to the Applicant and provide unjustified benefits to its competitors.

The Applicant understands that pursuant to Rule 0.457, disclosure of this Application and all accompanying documentation will not be made before the date of the Grant for this Application.

Kyocera Wireless Corporation

Robert J Scodellaro
EMC Engineer, Staff/Manager

List of Exhibits

Exhibit	Description	FCC Reference
1	Certification of Test Data	2.911
2	General Information	2.1033(c), 2.1061,
3	ESN Protection	22.919
4	RF Output Power Measured Data - PCS	2.1046, 24.232
5	Occupied Bandwidth and Spurious Emission Measured Data - PCS	2.1049, 24.238
6	Conducted Harmonics Emissions Measured Data - PCS	2.1051, 24.238
7	Frequency Stability vs. Temperature and Voltage Measured Data - PCS	2.1055, 24.235
8	Measurement Procedures and Techniques	

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: 2119

Dates of Test: August 1-10, 2001

Test Performed by:

EMC Engineer, Staff/Manager:
Robert J Scodellaro

Exhibit 2

General Information

1. Production Plans

Quantity Production Planned

2. Technical Description - Section 2.1033 (c)

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

Applicant: Kyocera Wireless Corporation
10290 Campus Point Drive
San Diego, CA 92121

Manufacture: Kyocera Wireless Corporation
10290 Campus Point Drive
San Diego, CA92121

(2) FCC Identifier

FCC ID: OVFKWC-2119

(3) User's Manual

Sent separate

(4) Types of Emission

1M25F9W

(5) Frequency range

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.

(5) Operating power levels
(6)

The equipment supports 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 ANSI J-STD-018 Specification.

(7) Maximum output power

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 PCS band, the power consumption of the high power amplifier is about 27.4dBm.

(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.

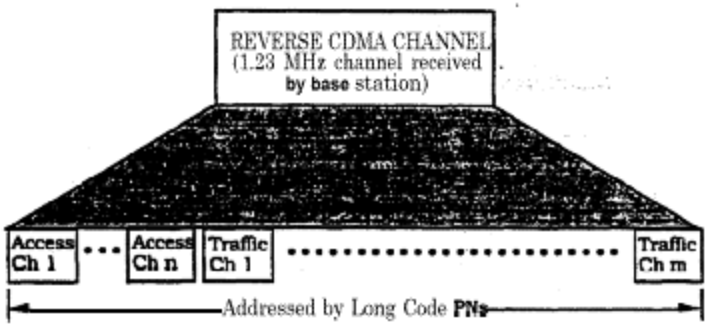


Figure 6.1.3.1-1. Example of Logical Reverse CDMA Channels Received at a Base Station

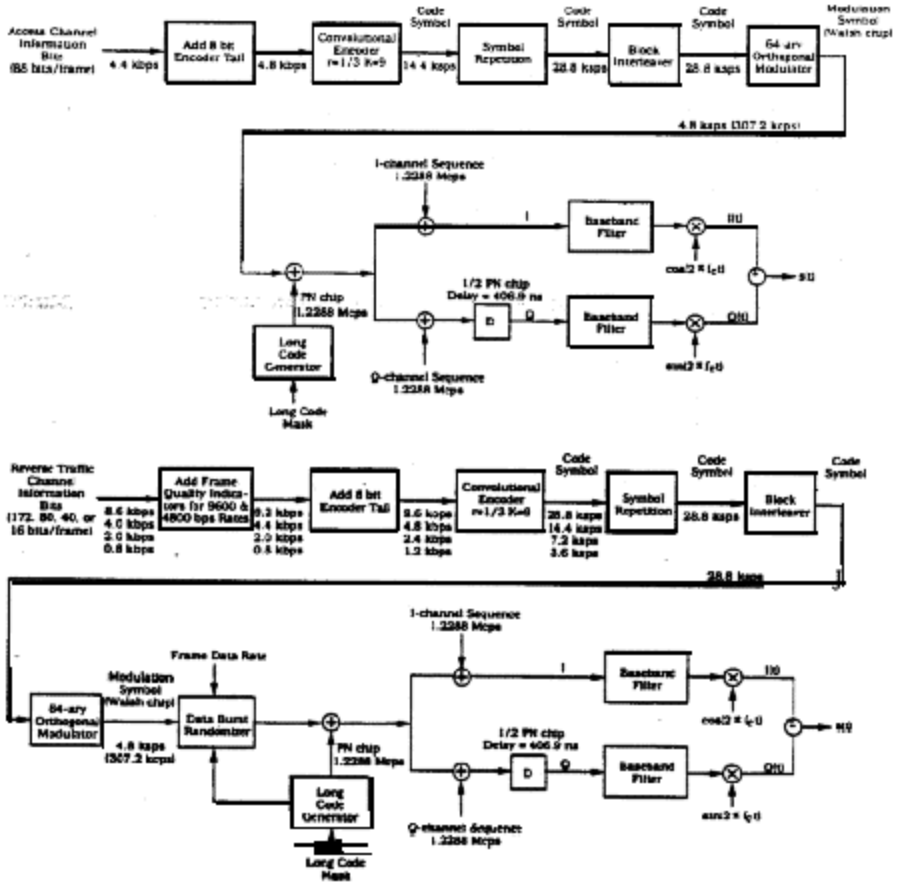


Figure 6.1.3.1-2. Reverse CDMA Channel Structure

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-l.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

Sent separate

(12) Photograph to reveal equipment construction and layout

Sent separate

Exhibit 3

ELECTRONIC SERIAL NUMBERS (ESN) Protection

The 2119 PCS Phone, FCC ID: OVFKWC-2119 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

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)

8/01/2001

Conducted power --
The RF output power was measured using a Gigatronics 8541C Power Meter.

		RF output power (W) - PCS
carrier frequency (MHz)	channel	CDMA
		measured
1851.25	25	0.156
1880	600	0.157
1908.75	1175	0.163

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)

8/01/2001

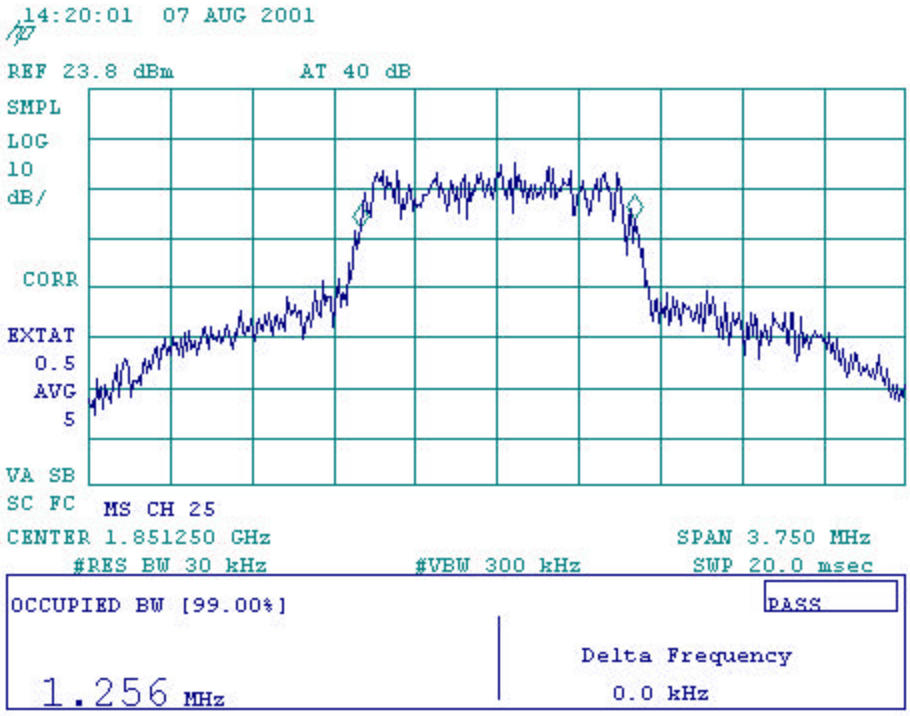
Radiated power --
The RF output power,**EIRP** was measured in an antenna range anechoic chamber.

		RF output power (W) - PCS
carrier frequency (MHz)	channel	CDMA
		measured
1851.25	25	0.300
1880	600	0.350
1908.75	1175	0.416

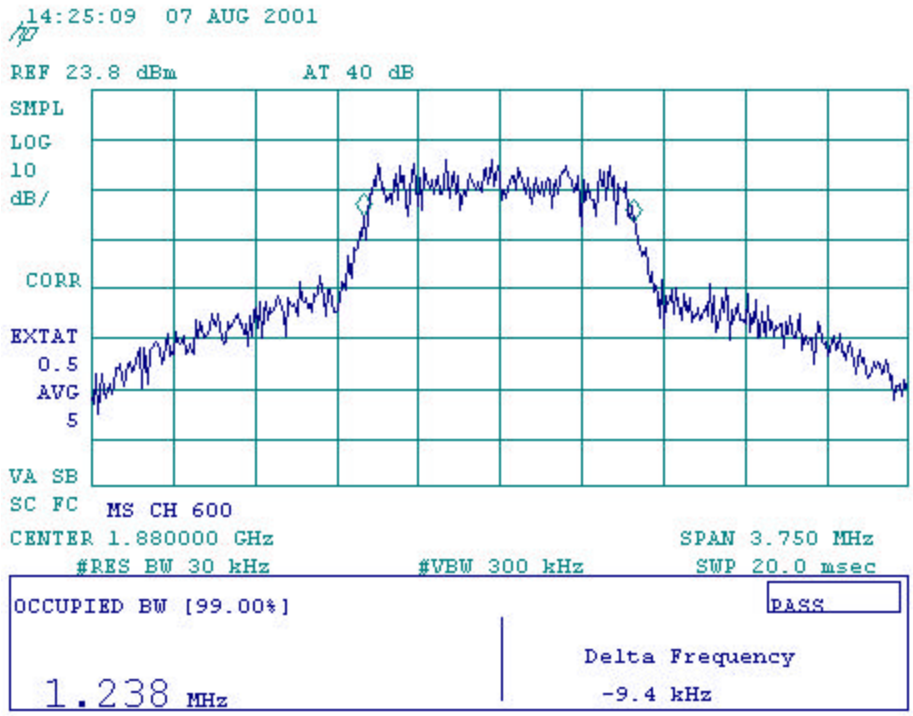
Exhibit 5

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

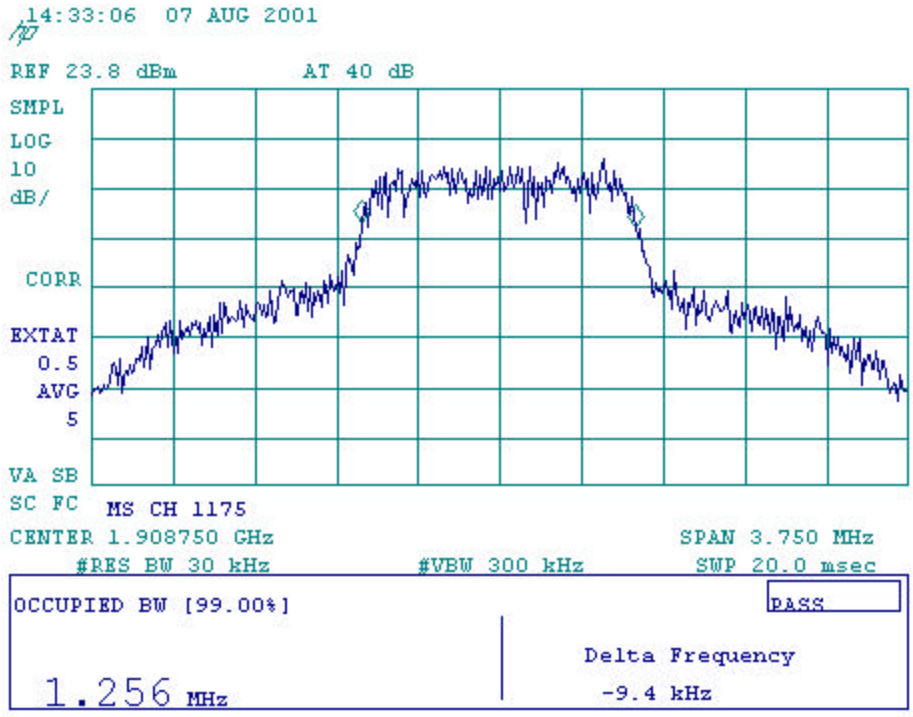
1. Occupied Bandwidth


14:20:01 07 AUG 2001
REF 23.8 dBm
AT 40 dB
SMPL
LOG
10
dB/
CORR
EXTAT
0.5
AVG
5
VA SB
SC FC
MS CH 25
CENTER 1.851250 GHz
SPAN 3.750 MHz
#RES BW 30 kHz
#VBW 300 kHz
SWP 20.0 msec
OCCUPIED BW [99.00%]
PASS
1.256 MHz
Delta Frequency
0.0 kHz

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

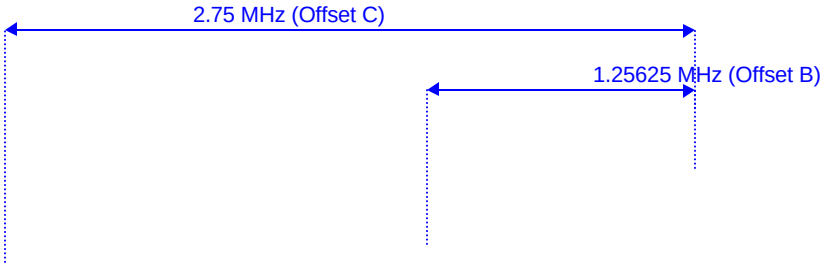
The ACPR (Adjacent Channel Power Ratio) is the power contained in a specified frequency-channel bandwidth relative to the total carrier power. It can measure up to three pairs of offset channels and relates them to the carrier power. ACPR measurement uses an integration bandwidth method (IBW) to measure 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.

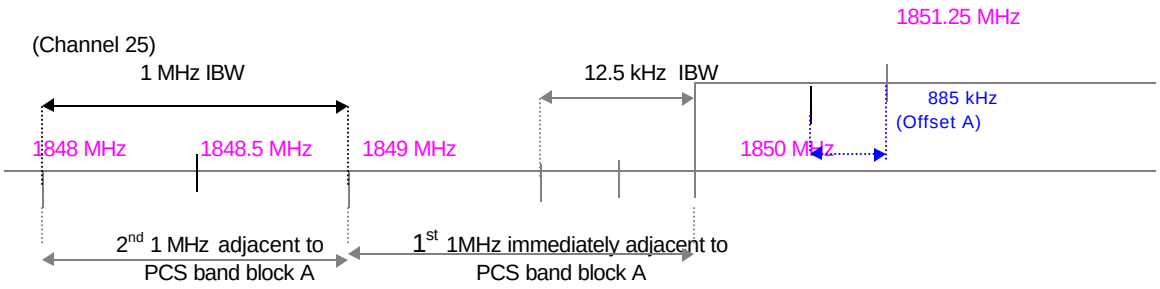
The following settings were used in the ACPR integration bandwidth method to complete the above measurements (a) and (b). An example to explain the settings is given.

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.





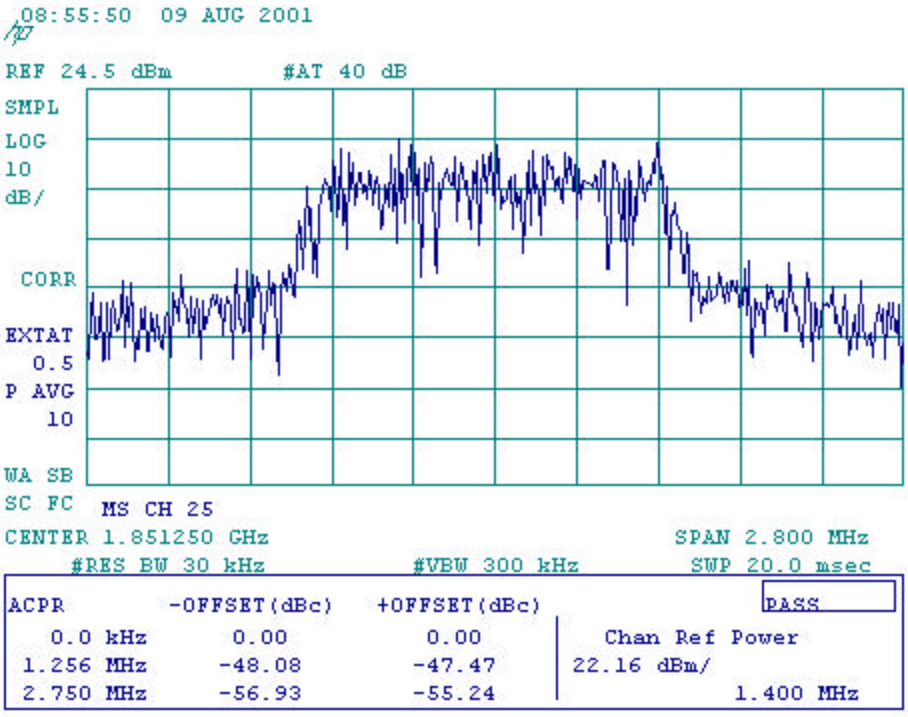
Note: The above drawing is not in scale.

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

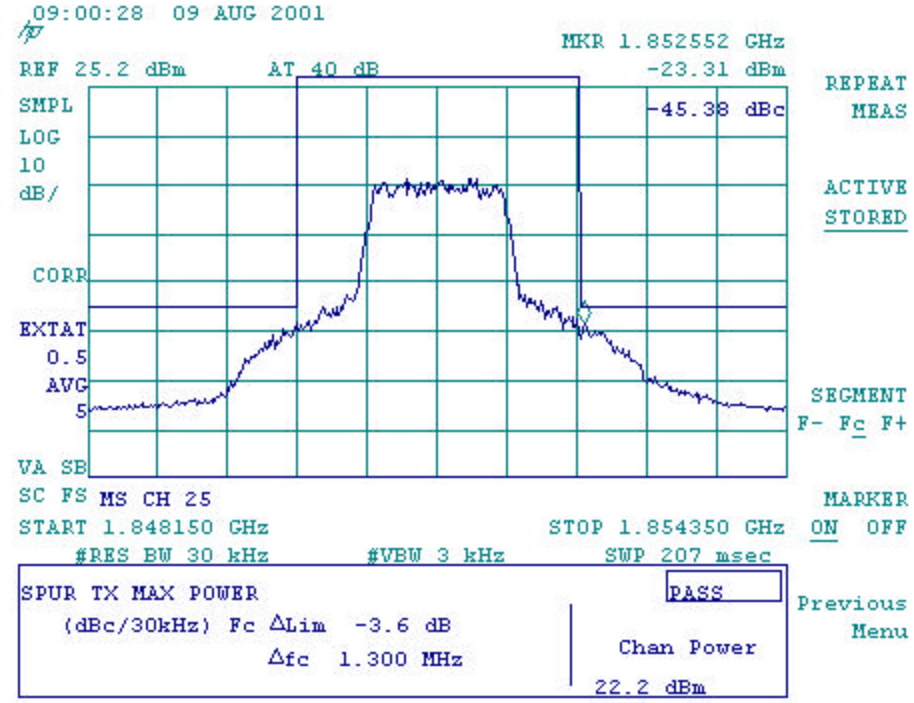
The harmonic and spurious emissions from 0 Hz to 22 GHz were measured using a RBW of 1 MHz and a VBW of 1 MHz on the spectral analyzer.

Test Results

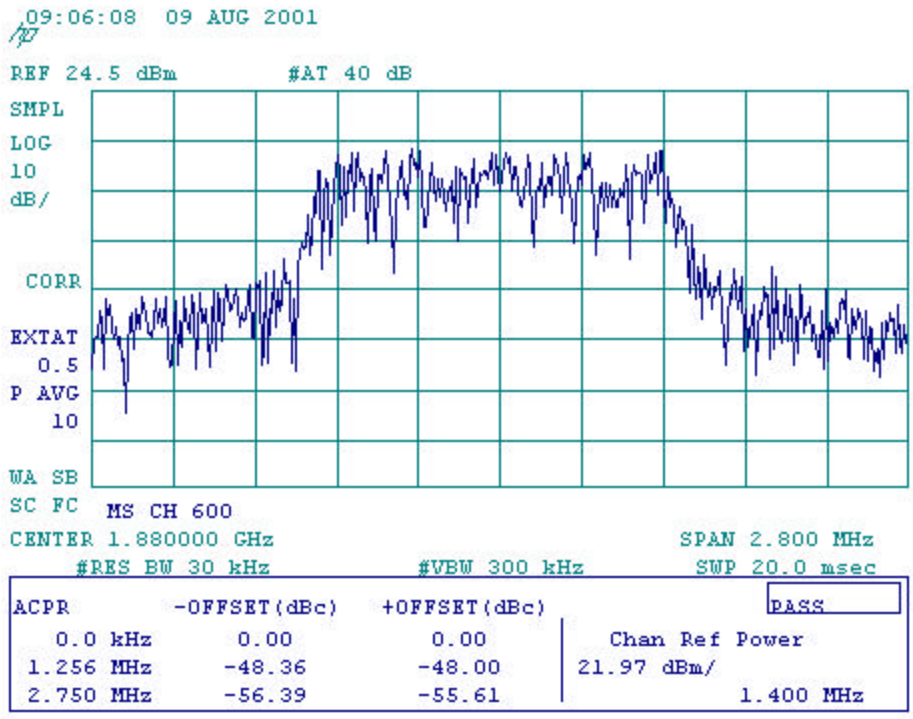
ACPR measurement (1st and 2nd 1MHz adjacent to PCS)



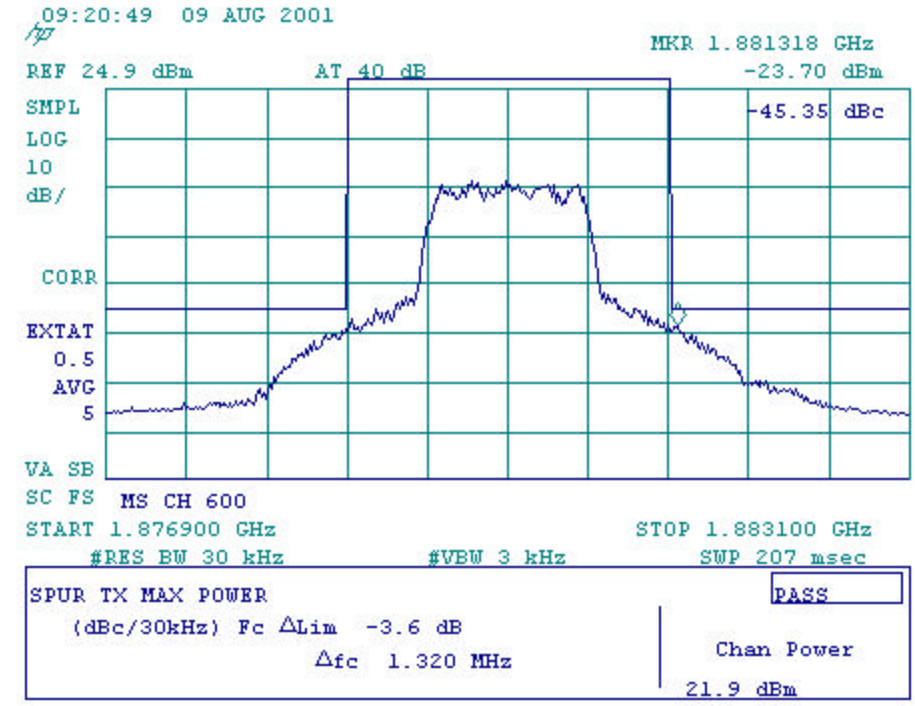
Channel 25



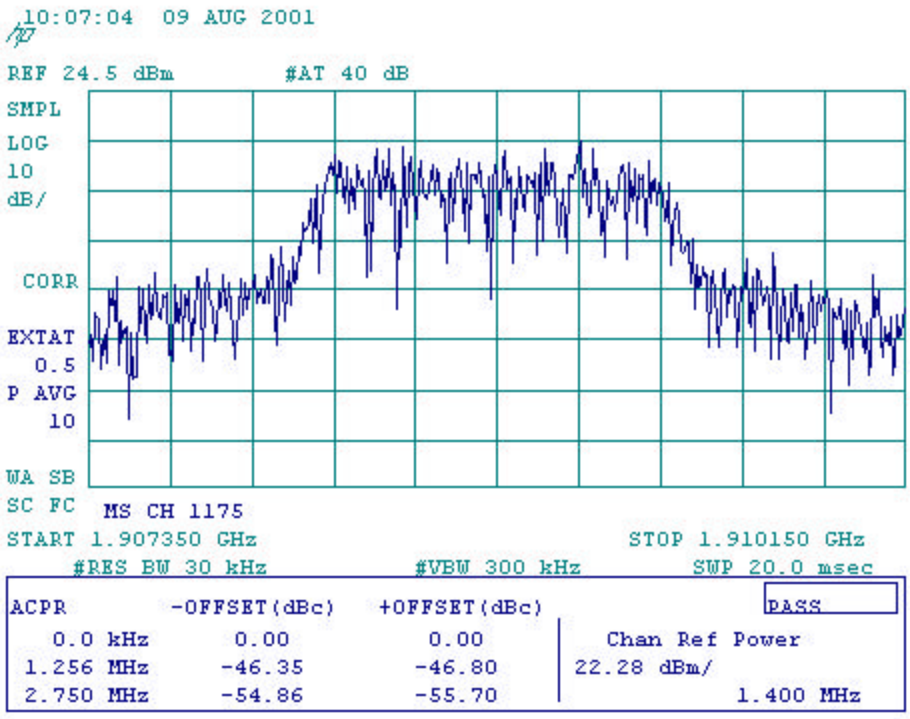
Channel 25



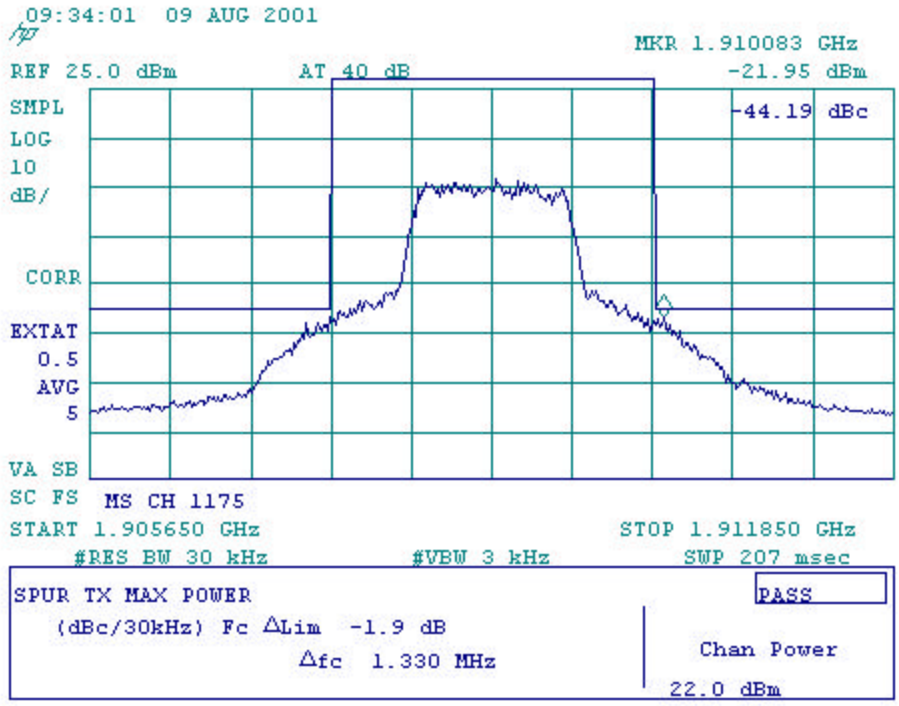
Channel 600



Channel 600

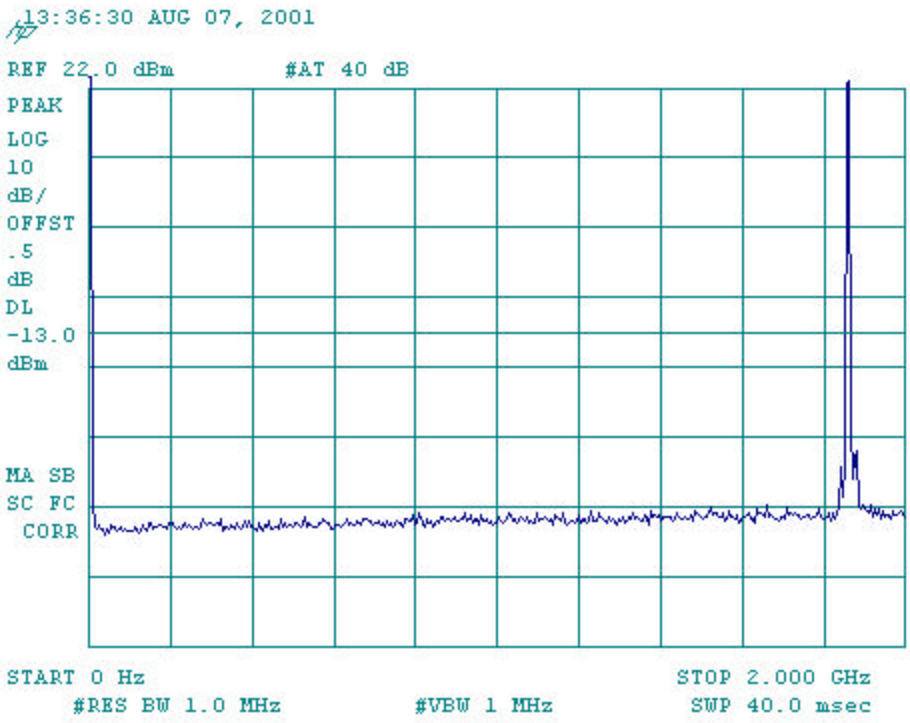


Channel 1175

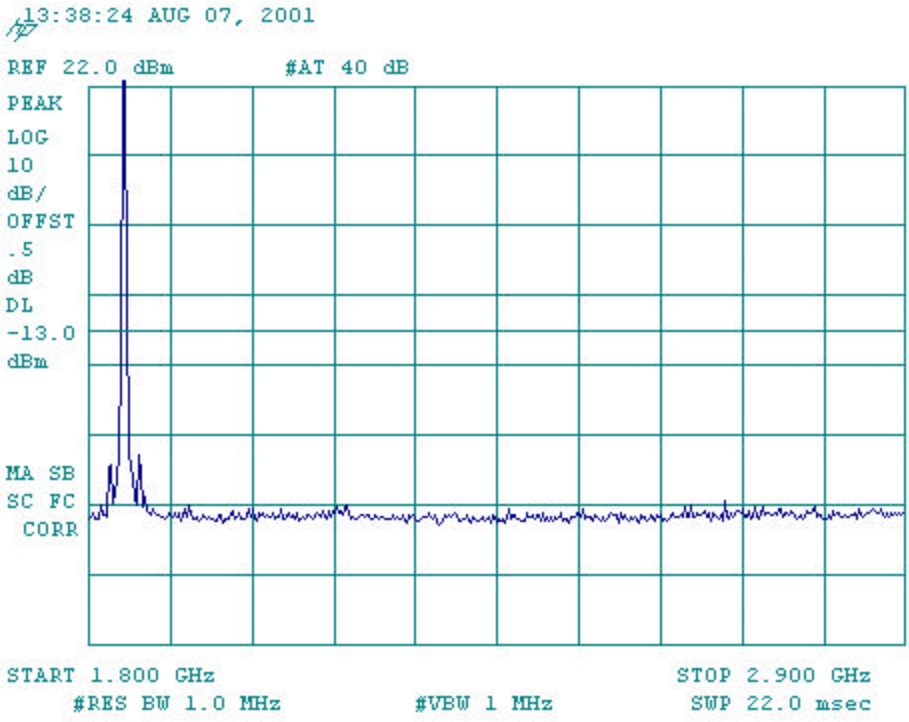


Channel1175

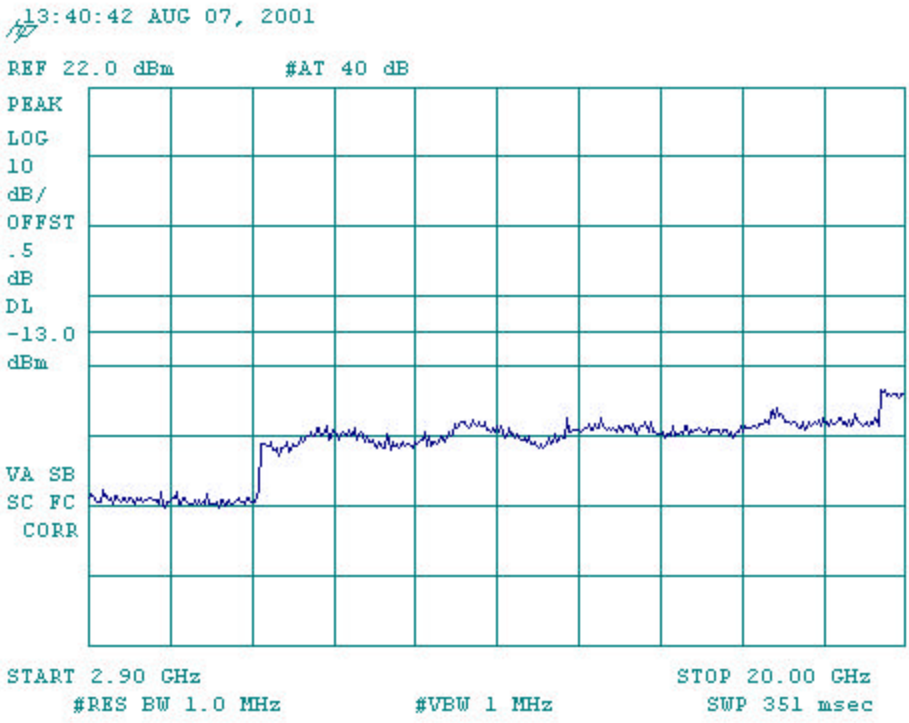
Spurious Emission Up to 10th harmonics



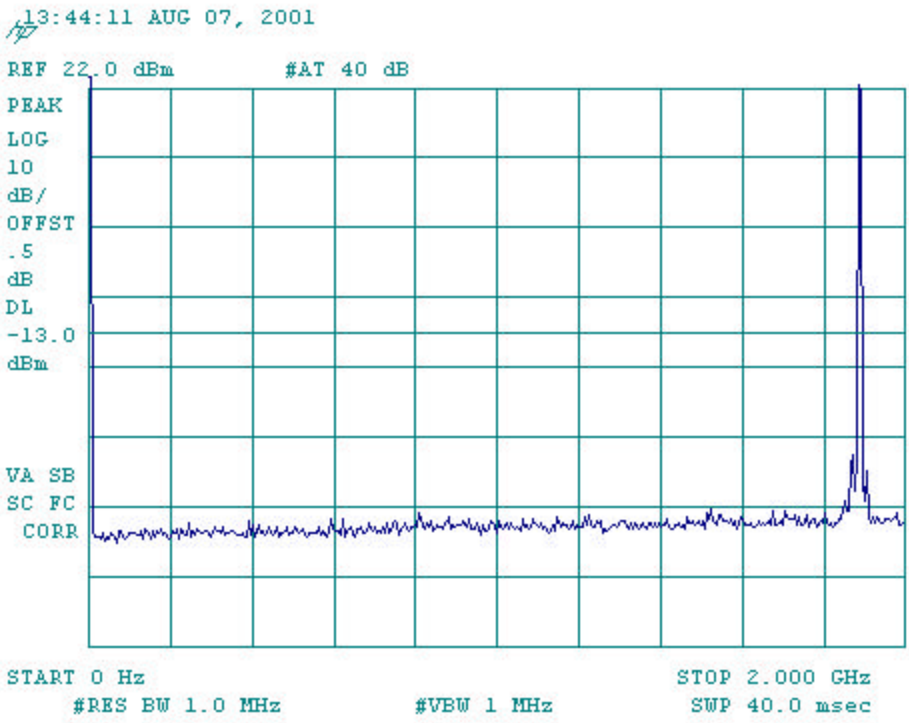
Channel 25



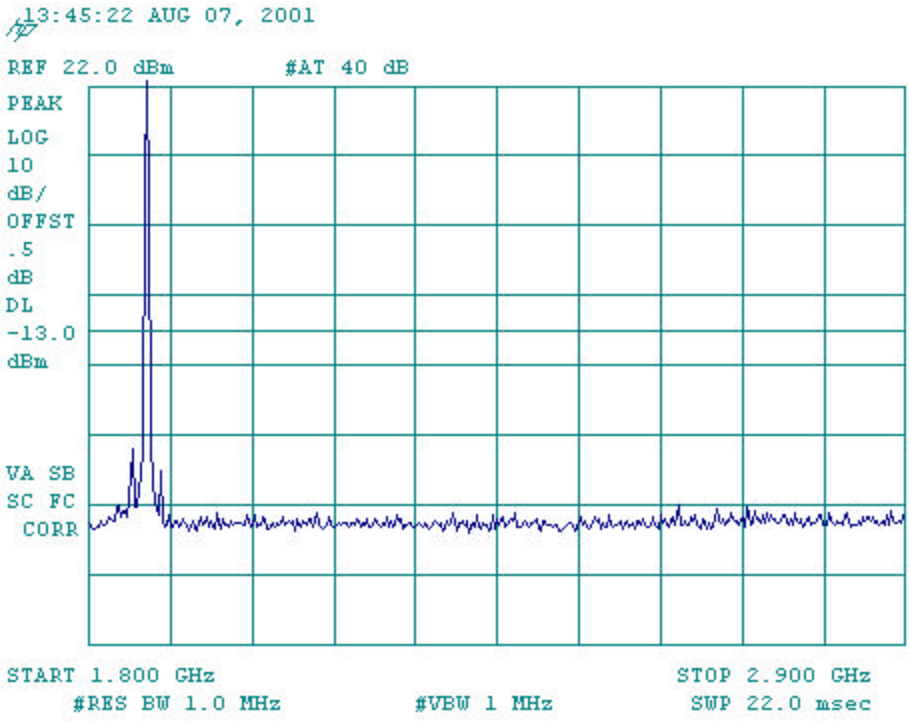
Channel 25


13:40:42 AUG 07, 2001
REF 22.0 dBm
#AT 40 dB
PEAK
LOG
10
dB/
OFFST
.5
dB
DL
-13.0
dBm
VA SB
SC FC
CORR
START 2.90 GHz
STOP 20.00 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
SWP 351 msec

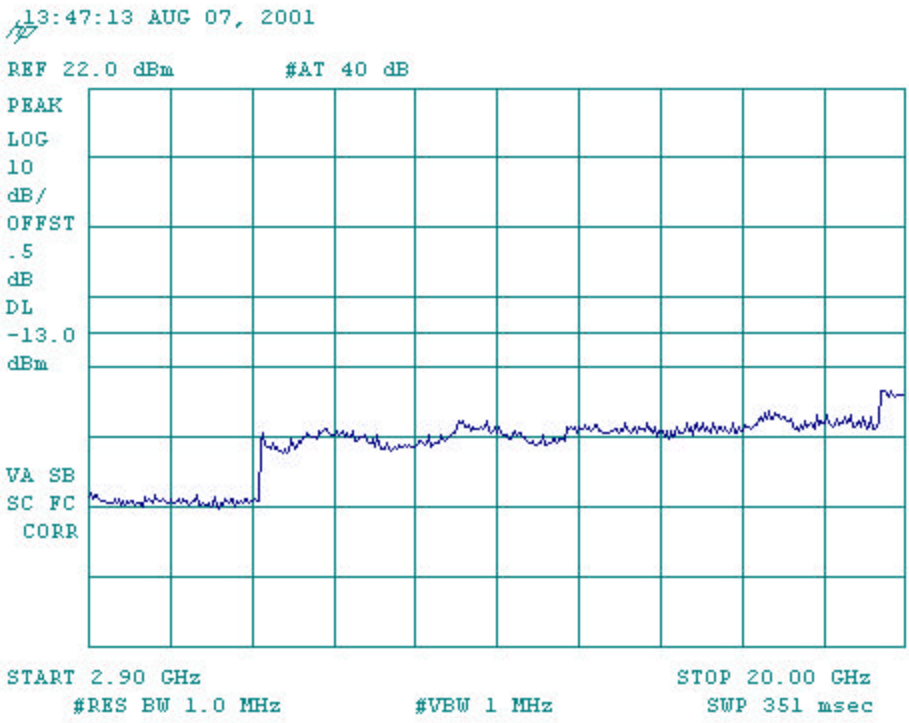
Channel 25



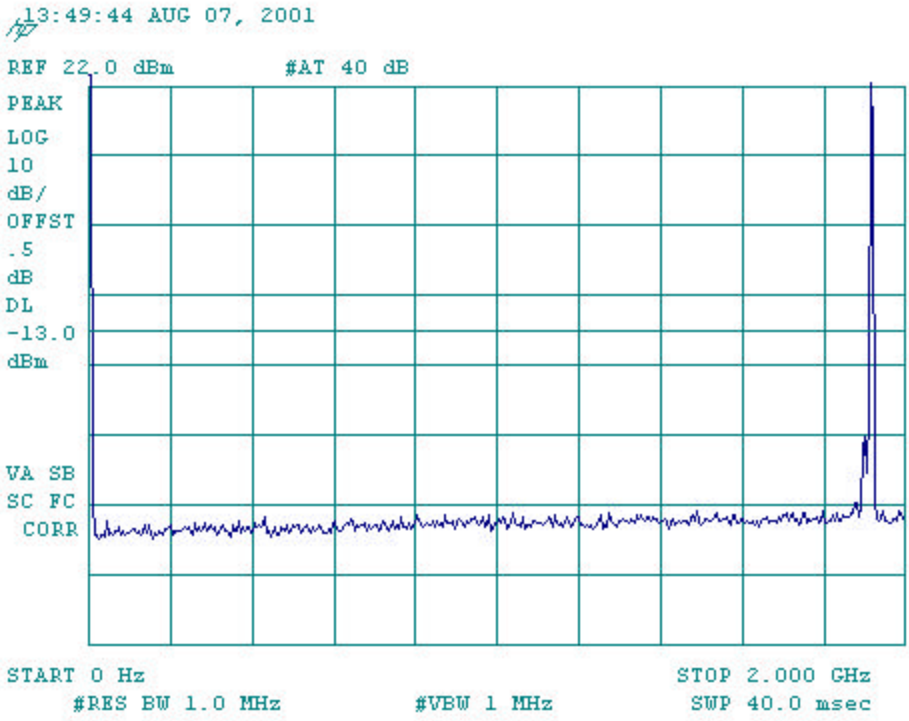
Channel 600



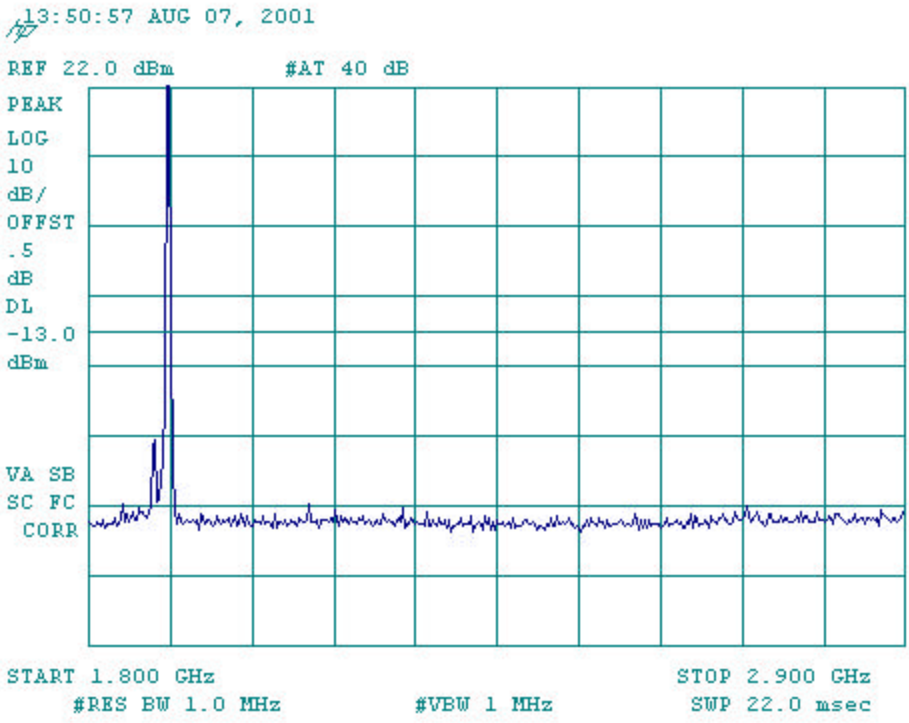
Channel 600


13:47:13 AUG 07, 2001
REF 22.0 dBm
#AT 40 dB
PEAK
LOG
10
dB/
OFFST
.5
dB
DL
-13.0
dBm
VA SB
SC FC
CORR
START 2.90 GHz
STOP 20.00 GHz
#RES BW 1.0 MHz
#VBW 1 MHz
SWP 351 msec

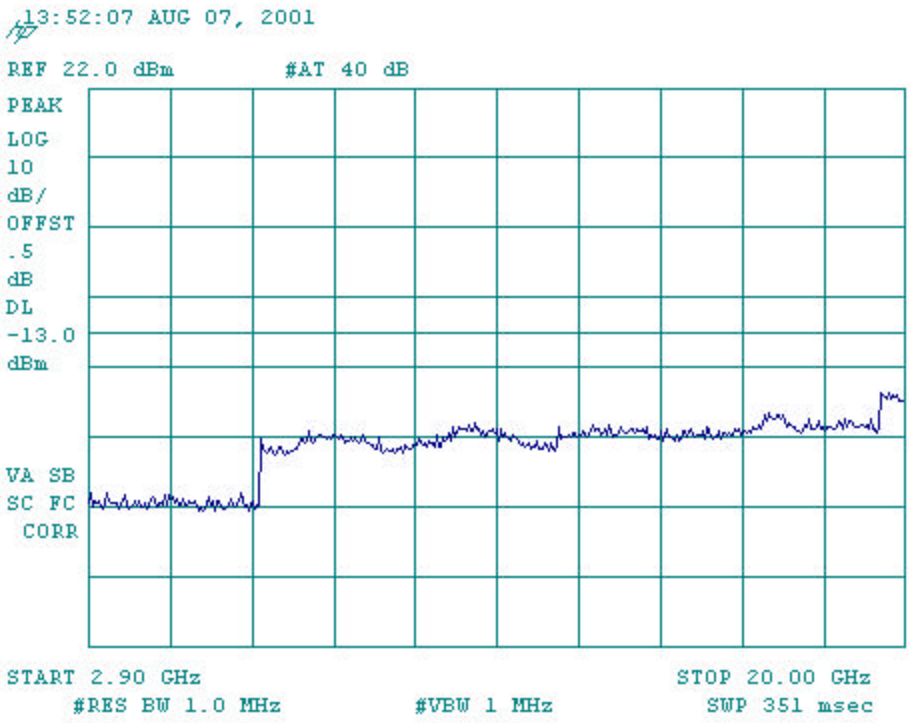
Channel 600



Channel 1175



Channel 1175



Channel 1175

Exhibit 6

Conducted Emission Test Results (Harmonics) - FCC Part 2 and 24, Paragraph 2.1051,

24.238

8/7/01

PCS CDMA High Power

low band – channel 25

	Frequency (MHz)	Measured Level (dBm)	specification limit (dBm)
1	1851.25		-
	2114.85	-79.80	-13
2	3702.5	-72.99	-13
3	5553.75	-77.61	-13
4	7405	-69.12	-13
5	9256.25	-90.46	-13
6	11107.5	-87.06	-13
7	12958.75	-85.81	-13
8	14810	-84.53	-13
9	16661.25	-84.64	-13
10	18512.5	-85.81	-13

mid band – channel 600

	Frequency (MHz)	Measured Level (dBm)	specification limit (dBm)
1	1880		-
	2143.60	-87.75	-13
2	3760	-74.55	-13
3	5640	-85.45	-13
4	7520	-74.48	-13
5	9400	-88.35	-13
6	11280	-87.68	-13
7	13160	-84.93	-13
8	15040	-86.17	-13
9	16920	-84.74	-13
10	18800	-84.19	-13

high band – channel 1175

	Frequency (MHz)	Measured Level (dBm)	specification limit (dBm)
1	1908.75		-
	2172.35	-87.05	-13
2	3817.5	-76.29	-13
3	5726.25	-87.68	-13
4	7635	-61.26	-13
5	9543.75	-79.13	-13

6	11452.5	-77.21	-13
7	13361.25	-84.99	-13
8	15270	-86.57	-13
9	17178.75	-82.89	-13
10	19087.5	-84.60	-13

Exhibit 7

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 PCS mode, but with no modulation on the carrier

Measured with HP8920 RF communication analyzer and HP 8560A Spectrum Analyzer

Carrier Frequency 1880 MHz PCS

	transmitter carrier frequency (MHz)							specification	
temperature (C)	3.4V	3.5V	3.6V	3.8V	4.0V	4.1V	4.2V	lower limit	upper limit
-30	-1075	-1034	-1009	-984	-950	-917	-884	-4700	4700
-20	26	26	26	46	66	66	66	-4700	4700
-10	403	403	403	422	422	422	422	-4700	4700
0	-34	174	233	266	299	341	359	-4700	4700
10	566	566	566	558	558	558	558	-4700	4700
20	458	441	433	416	383	366	350	-4700	4700
30	8	8	8	0	0	-9	-9	-4700	4700
40	243	246	246	246	246	254	257	-4700	4700
50	277	283	276	276	276	276	276	-4700	4700
60	573	577	574	574	566	566	566	-4700	4700

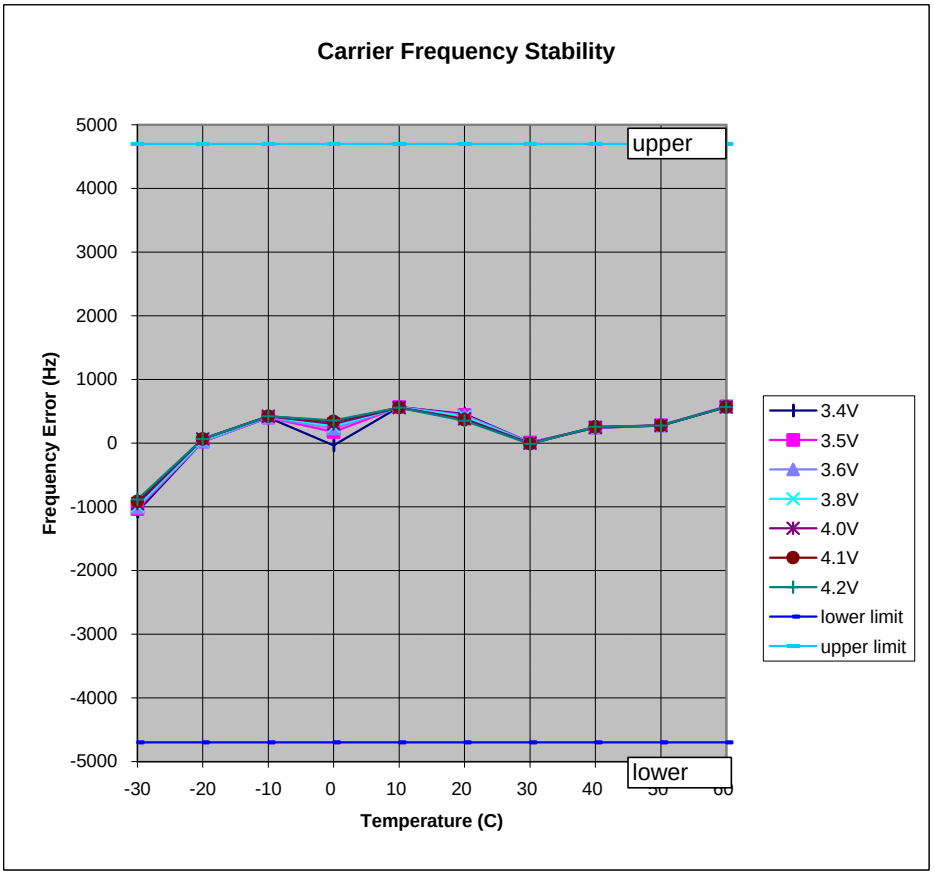


Exhibit 8

Measurement Procedures and Techniques

List of Equipment

Computer with Phone_T software

Spectrum Analyzers

HP8594E, S/N 3710A04900, CAL DUE 1/17/2002
HP8593EM, S/N 3501A01547, CAL DUE 3/5/2002

Communication Test Set

HP8920B, S/N US35320824, CAL DUE 11/22/2002

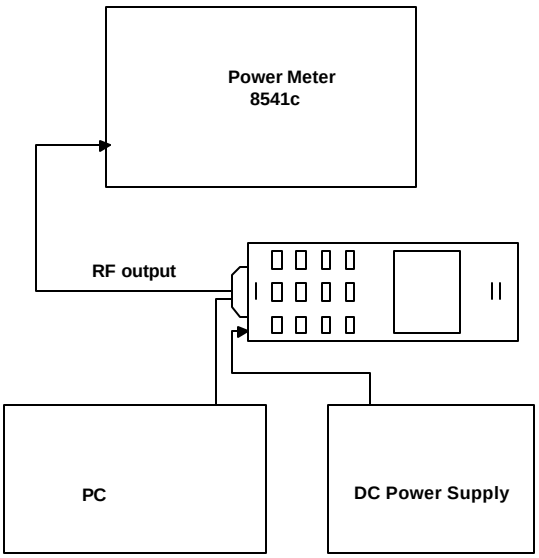
DC Power Supply

Power Meter

Gigatronics 8541C, S/N 1832893, CAL DUE 1/25/2002

Measurement Procedures

RF Output Power

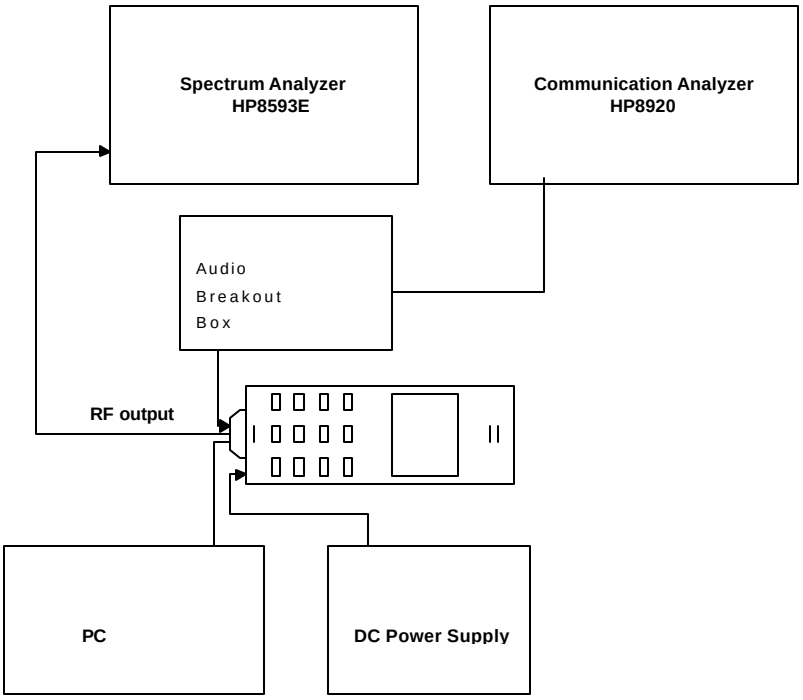


Definition - The output power rating of the transmitter is the power available at the output terminal of the transmitter when the terminal is connected to the normal load.

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.

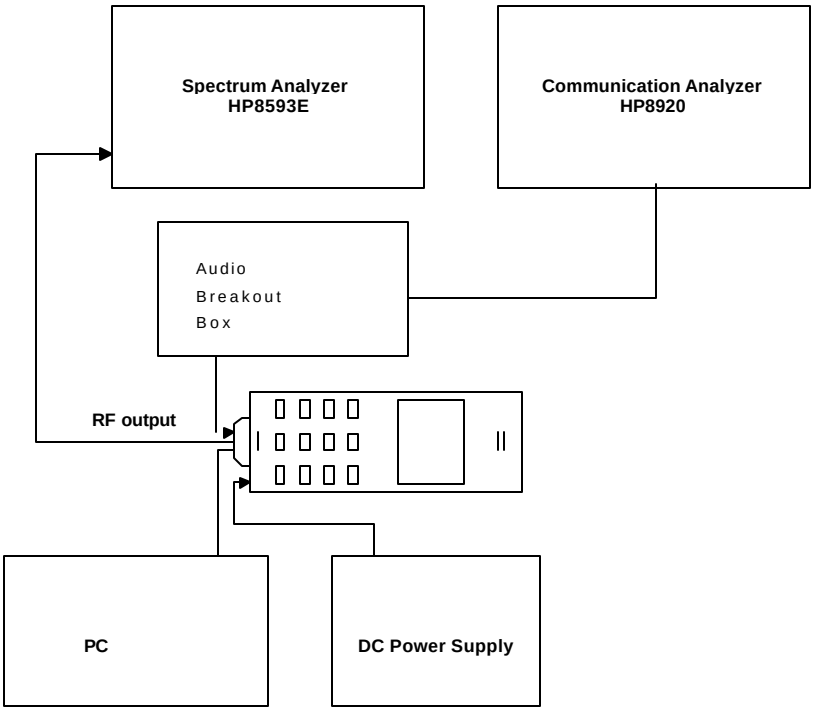
Occupied Bandwidth



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.

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.

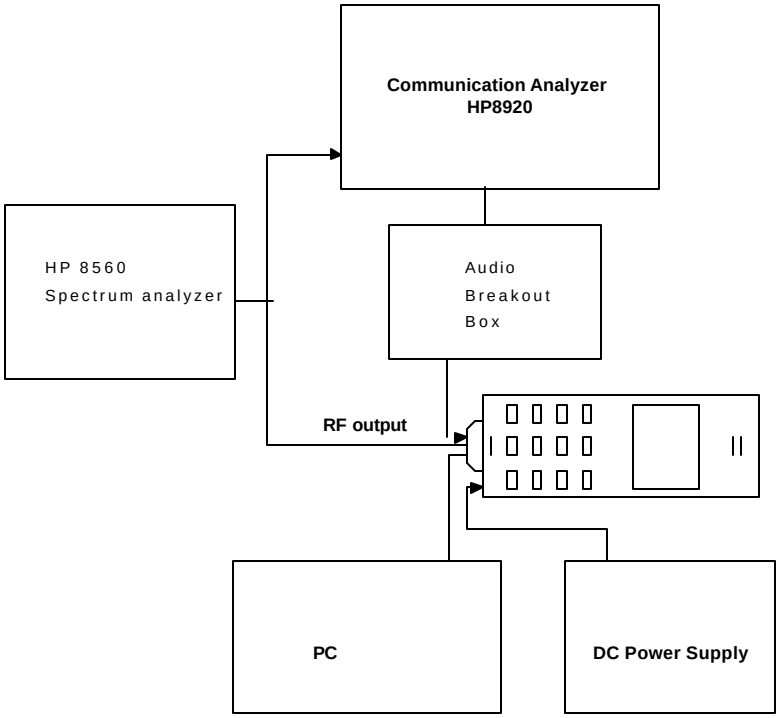
Radiated Spurious and Harmonic Radiation

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.