

10 Measurement Procedures and Techniques 2.1051

10.1 List of Equipment

Computer with Phone_T software

Spectrum Analyzers

HP8560E, S/N 3643A0680, CAL DUE 9/2000

HP8594E, S/N 3710A04900, CAL DUE 12/17/00

HP8593E, S/N 3501A01547, CAL DUE 2/23/01

Audio Spectrum Analyzer

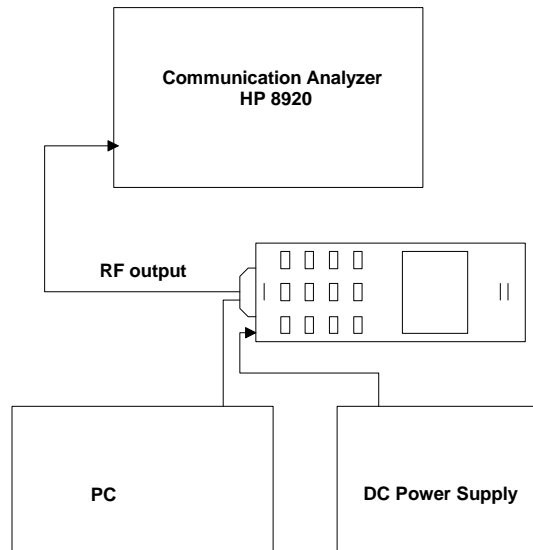
HP3588A, S/N 3005A00111, CAL DUE 2/28/01

Communication Test Set

HP8920B, S/N US35320824, CAL DUE 7/00

10.2 Measurement Procedures

10.2.1 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.

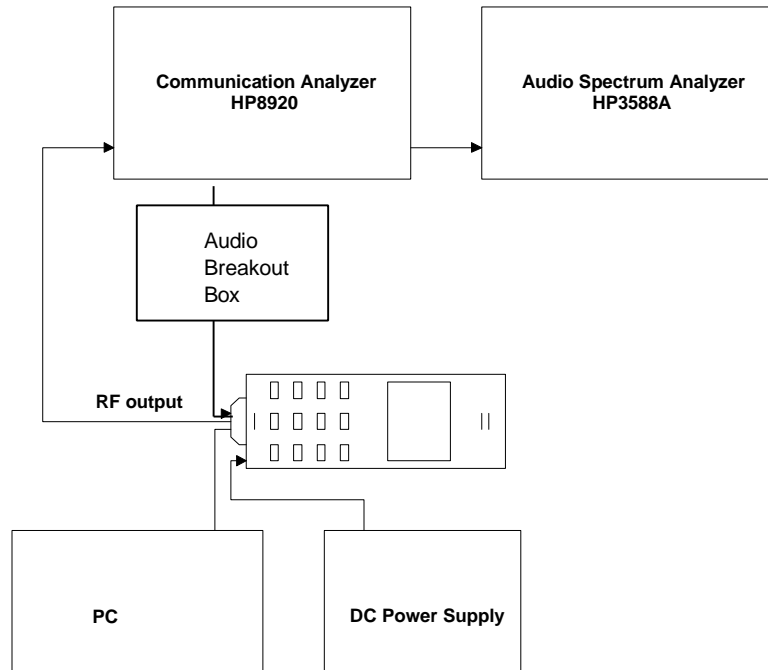
Method of Measurement - Measure the transmitter output carrier power without modulation using a communication test set for FM which has an RF wattmeter. An HP 8594E spectrum analyzer with the CDMA personality was used to measure CDMA mode.

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

Applicant: QUALCOMM INC.

FCC ID: J9CQSEC800

10.2.2 Modulation Audio Response



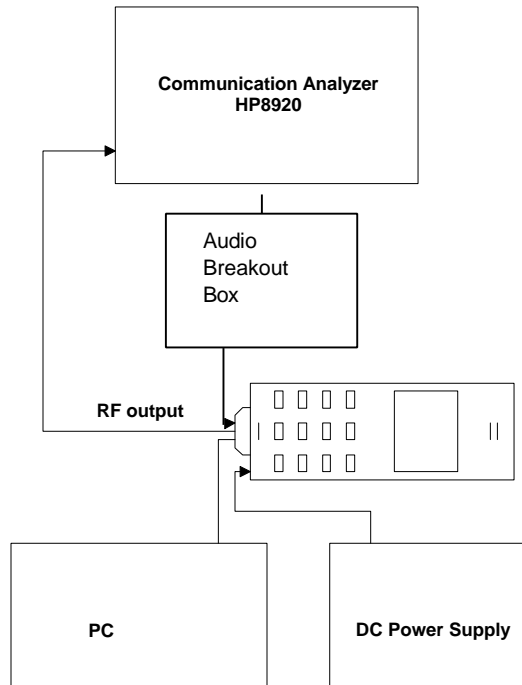
Definition - The transmitter audio frequency response is defined in terms of the degree of closeness with which the frequency deviation of the transmitter follows the prescribed 6 dB/octave pre-emphasis characteristic over a specified continuous audio frequency range while conforming to the required band-limiting conditions outside of that range.

Method of Measurement - Operate the transmitter with the compressor disabled, and monitor the output with HP8920 test receiver without de-emphasis. Apply a sine wave audio input to the transmitter external audio input port, vary the modulating frequency from 100 to 5000 Hz, and observe the input levels necessary to maintain a constant ± 2.9 kHz system deviation. Record the results. Adjust the audio input level to 20 dB greater than that required to produce ± 8 kHz deviation with 1 kHz tone. Vary the modulation frequency from 3 kHz to 30 kHz and observe the deviation while maintaining a constant audio input level. Use the audio spectrum analyzer to measure the output deviation at the same frequency as the input signal.

Minimum Standard - From 300 to 3000 Hz, the audio frequency response shall not vary more than +1 to -3 dB from a true 6 dB/octave pre-emphasis characteristic as referred to the 1000 Hz level (with the exception of a permissible 6 dB/octave roll-off from 2500 to 3000 Hz). Between 3 kHz to 30 kHz, the response shall not exceed that defined by the following table:

Frequency Range (f in kHz)	Attenuation Relative to 3 kHz (dB)
$3 \text{ kHz} \leq f \leq 5.9 \text{ kHz}$	$40 \log (f/3)$
$5.9 \text{ kHz} \leq f \leq 6.1 \text{ kHz}$	35
$6.1 \text{ kHz} \leq f \leq 15 \text{ kHz}$	$40 \log (f/3)$
$15 \text{ kHz} \leq f \leq 30 \text{ kHz}$	28

10.2.3 Modulation Limiting

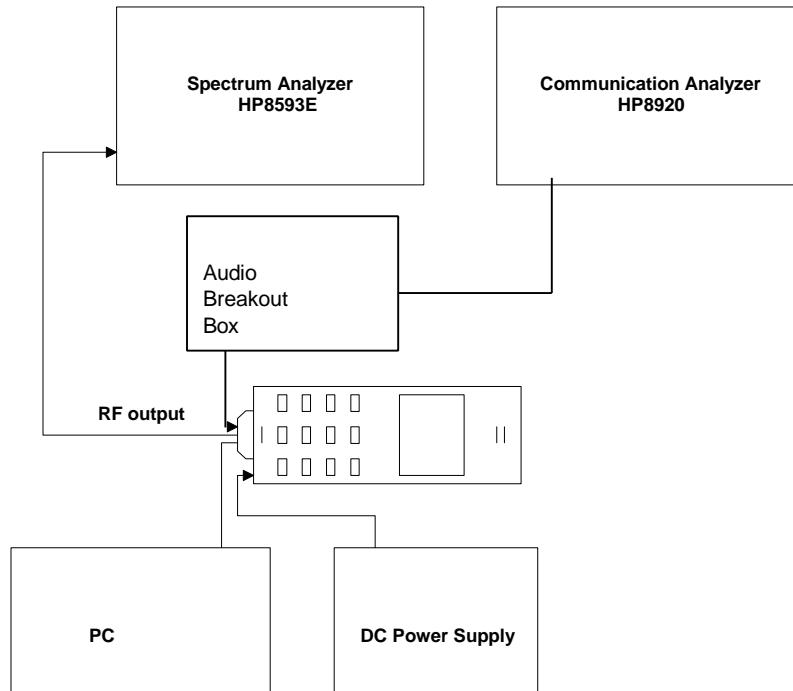


Definition - Modulation limiting refers to the ability of the transmitter circuits to prevent the transmitter from producing deviation in excess of rated system deviation.

Method of Measurement - With the compressor enabled and the SAT disabled, adjust the audio input for ± 8 kHz peak deviation at 1000 Hz. Increase the audio input level by 20 dB. With the input level held constant at the 20 dB, and observe the deviation for 400 Hz, 1000 Hz, and 2.7 kHz.

Minimum Standard - The peak deviation shall not exceed the rated system peak frequency deviation of ± 12 kHz at any time.

10.2.4 Occupied Bandwidth



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 - Use the spectrum analyzer and measure the following 8 modulating conditions: (1) For combined voice and SAT, disable the compressor, modulate with a 2500 Hz sine wave 13.5 dB greater than that required to produce ± 8 kHz peak deviation at 1000 Hz and a 6000 Hz SAT with ± 2.0 kHz peak deviation. (2) For combined Signaling Tone and SAT, modulate with a 10 kHz ST with ± 8 kHz peak deviation and a 6000 Hz SAT with ± 2.0 kHz peak deviation. (3) For wideband data, modulate with a quasi-random 10 kbps data pattern with ± 8 kHz peak deviation. (4) For CDMA, modulate with full rate. (5) For voice only, disable the compressor, modulate with a 2500 Hz sine wave 13.5 dB greater than that required to produce ± 8 kHz peak deviation at 1000 Hz. (6) For SAT only, modulate with a 6000 Hz SAT with ± 2.0 kHz peak deviation. (7) For ST only, modulate with a 10 kHz ST with ± 8 kHz peak deviation. (8) For combined SAT and DTMF, modulate with a 6000 Hz SAT with ± 2.0 kHz peak deviation and one of the DTMF tones.

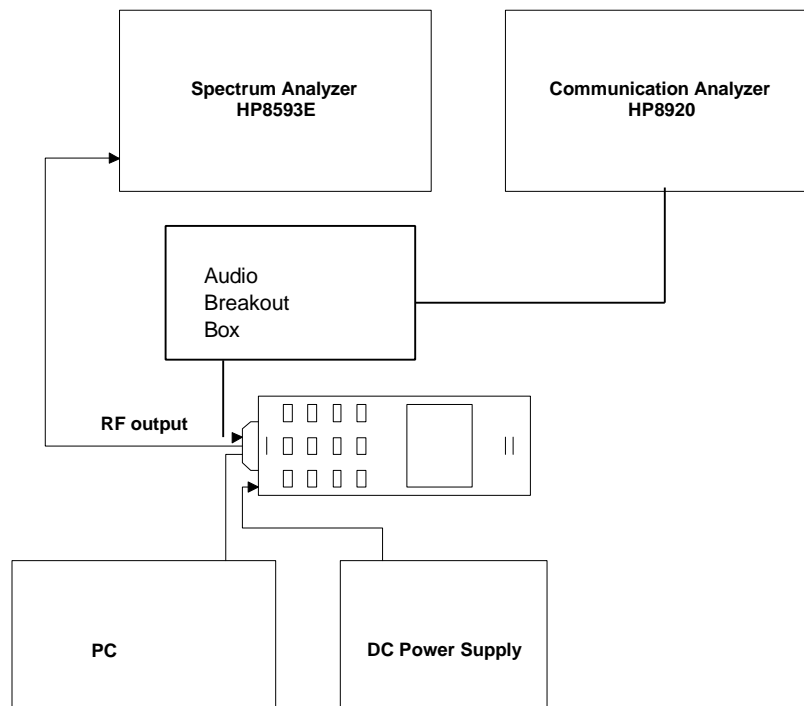
Minimum Standard - The mean power of emissions from the transmitter with modulated carrier shall be attenuated below the mean power of the unmodulated carrier in accordance with the following.

- (1) For all modulation: In a 300 Hz bandwidth centered on any frequency removed from the carrier by greater than 20 kHz up to and including 45 kHz, at least 26 dB.
- (2) For modulation by combined voice and SAT: In a 300 Hz bandwidth centered on any frequency removed from the carrier frequency by greater than 45 kHz, at least $63 + 10 \log$ (mean output power in Watts) dB. Since the equipment is rated 0.6 W, the limit is 61 dB.

- (3) For modulation by wideband data and combined ST and SAT: In a 300 Hz bandwidth centered on any frequency:
- (a) More than 45 kHz up to and including 60 kHz, at least 45 dB.
 - (b) More than 60 kHz up to and including 90 kHz, at least 65 dB.
 - (c) More than 90 kHz up to the first multiple of the carrier frequency, at least $63 + 10 \log$ (mean power in Watts) dB.

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.

10.2.5 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 - The transmitter shall be alternately modulated with combined voice and SAT and with wideband data. For combined voice and SAT measurements, disable the compressor, modulate with a 2500 Hz sine wave 13.5 dB greater than that required to produce ± 8 kHz peak deviation at 1000 Hz and a 6000 SAT with ± 2.0 kHz peak deviation. For wideband data measurements, the transmitter shall be modulated with a quasi-random 10 kbps data pattern with ± 8 kHz peak deviation. The measurement shall be made with a spectrum analyzer from the lowest radio frequency generated in the equipment to the 10th harmonic of the carrier except for that region within 75 kHz of the carrier frequency.

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.

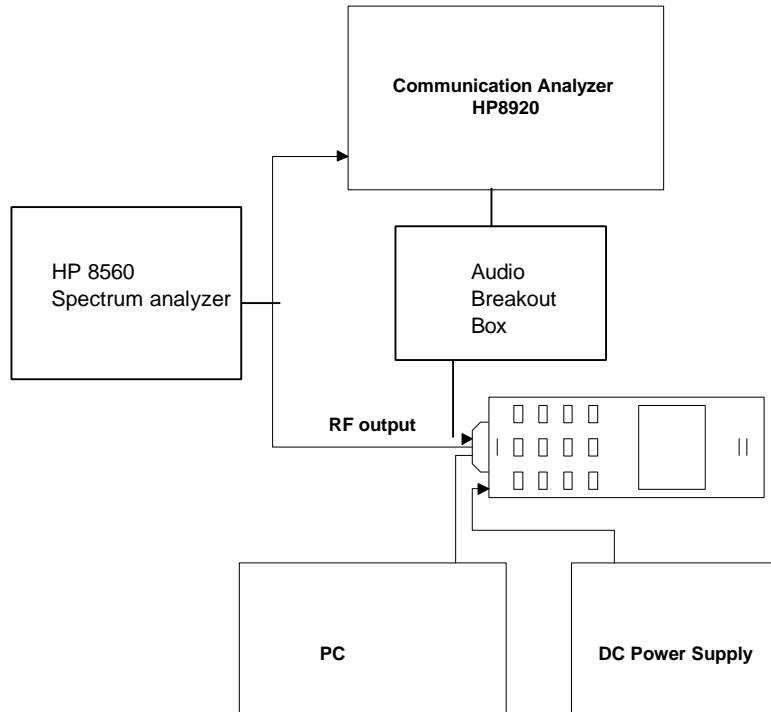
10.2.6 Radiated Spurious and Harmonic Radiation

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.

10.2.7 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. Vary the ambient temperature from -30 to +60 °C, and vary the DC supply voltage to the equipment from 3.5 to 4.1 V at each temperature.

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