

Processing Gain Test for WDC-9000

Test Setup Description:

The processing gain was measured using the CW jamming margin method described by FCC recommended test procedure, as described FCC-97-114. The specific test diagram is illustrated below.

All test equipment and the EUT were allowed to warm up for one hour prior to start of test to minimize drift over time. All test equipment had valid calibration. Calibration of carrier and interferer levels was performed several times during testing with no observed changes.

The measurements were performed at the mid center channel at 2440.8 MHz, over a range of 2441.8-2439.8 MHz. The measurements made across the center (+/-) 1 MHz should be used for calculation of Gp since that bandwidth represents the receiver passband. The computer set signal was (+/-) 1 MHz to handset and receive the signal from base.

A signal level 20 dB above threshold was chosen so that thermal noise would not effect the processing gain measurements. The measured threshold of the radio was -92 dBm at $BER = 1 \times 10^6$, therefore the signal was -72 dBm. The measured signal level at the output of the 6 dB splitter was -42 dBm (PSA), used for calculating Gp.

For the jammer signal, -44 dBm at the generator corresponds to -70 dBm (Pj) at the input of base phone. This figure was also used for calculating Gp.

Test Equipment:

HP Signal Generator, Model No. 8672A
HP Spectrum Analyzer, Model No.: 8566B

Explanation of Results:

The following notations are used on the spreadsheet data:

- Pg: Power at Generator in dBm (as indicated by generator display)
Pj: Power of interferer
Ps: Power of carrier at power meter test report (initial calibration)
J/S: Jammer to Signal ratio, Pj-Ps (dB) (calculated in spreadsheet)
Gp: Processing Gain = $S/N_o + L_{sys} + J/S$
Where $L_{sys} = 1$ dB (system loss);
(S/N)_o = 14.0 dB for GMSK at BT = 0.5;
Gp = 11.0 + 1 + J/S = 12 + J/S

All measurements inside the (+/-)1 MHz passband of the receiver give Gp results that exceed the minimum required value of 10 dB. Elimination of the worst 20% measurements was therefore not needed in order to meet the requirements (see spreadsheet and plotted results).

ITS Intertek Testing Services

Company: TT system LLC
Project #: J99030602
Model: IBM-2.4GIG
Engineer: Xi-Ming Yang
Date of test: December 29, 1999

Processing Gain

Frequency MHz	Pg dBm	Pj dBm	Psa(handset) dBm	Ps(handset) dBm	J/S dB	Gp dB
2441.80	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.75	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.70	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.65	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.60	-36.5	-62.5	-40.2	-70.2	7.7	19.7
2441.55	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2441.50	-41.5	-67.5	-40.2	-70.2	2.7	14.7
2441.45	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2441.40	-41.5	-67.5	-40.2	-70.2	2.7	14.7
2441.35	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2441.30	-44.5	-70.5	-40.2	-70.2	-0.3	11.7
2441.25	-45.5	-71.5	-40.2	-70.2	-1.3	10.7
2441.20	-45.0	-71.0	-40.2	-70.2	-0.8	11.2
2441.15	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2441.10	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2441.05	-42.8	-68.8	-40.2	-70.2	1.4	13.4
2441.00	-38.0	-64.0	-40.2	-70.2	6.2	18.2



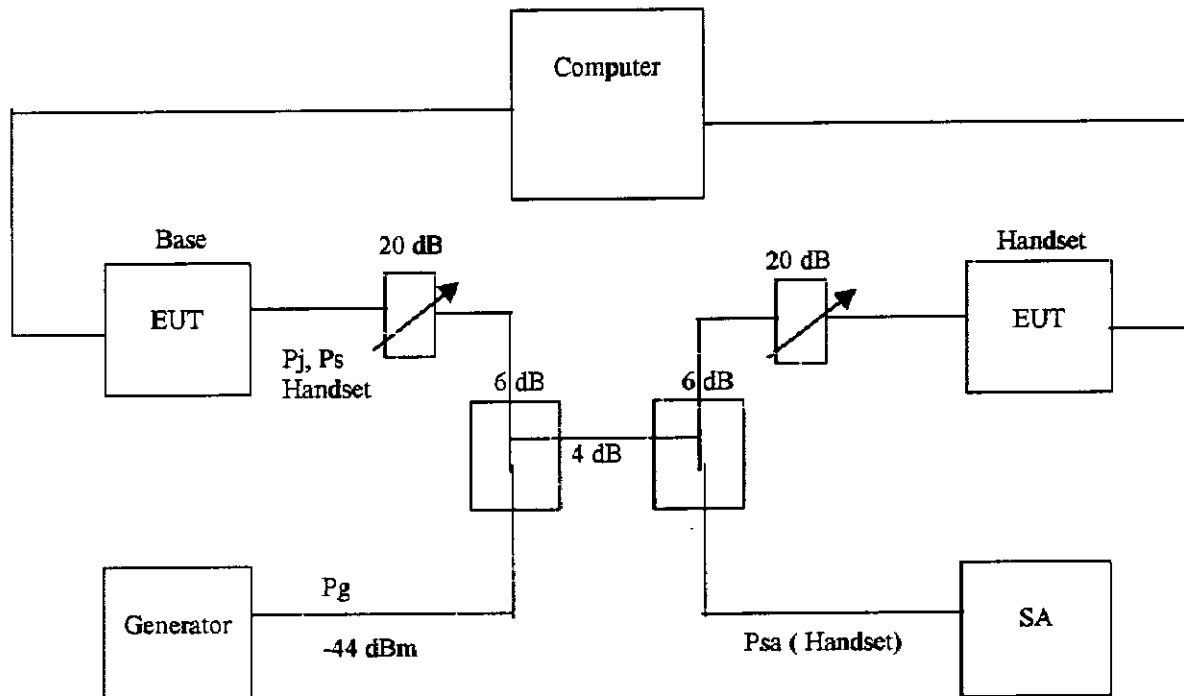
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Frequency MHz	Pg dBm	Pj dBm	Psa(handset) dBm	Ps(handset) dBm	J/S dB	Gp dB
2440.95	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.90	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2440.85	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2440.80	-39.0	-65.0	-40.2	-70.2	5.2	17.2
2440.75	-38.0	-64.0	-40.2	-70.2	6.2	18.2
2440.70	-42.5	-68.5	-40.2	-70.2	1.7	13.7
2440.65	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.60	-38.5	-64.5	-40.2	-70.2	5.7	17.7
2440.55	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.50	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.45	-43.0	-69.0	-40.2	-70.2	1.2	13.2
2440.40	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.35	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2440.30	-43.5	-69.5	-40.2	-70.2	0.7	12.7
2440.25	-40.5	-66.5	-40.2	-70.2	3.7	15.7
2440.20	-39.5	-65.5	-40.2	-70.2	4.7	16.7
2440.15	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2440.10	-42.0	-68.0	-40.2	-70.2	2.2	14.2
2440.05	-41.0	-67.0	-40.2	-70.2	3.2	15.2
2440.00	-38.0	-64.0	-40.2	-70.2	6.2	18.2
2439.95	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.90	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.85	-37.0	-63.0	-40.2	-70.2	7.2	19.2
2439.80	-37.0	-63.0	-40.2	-70.2	7.2	19.2

Test Setup Diagram



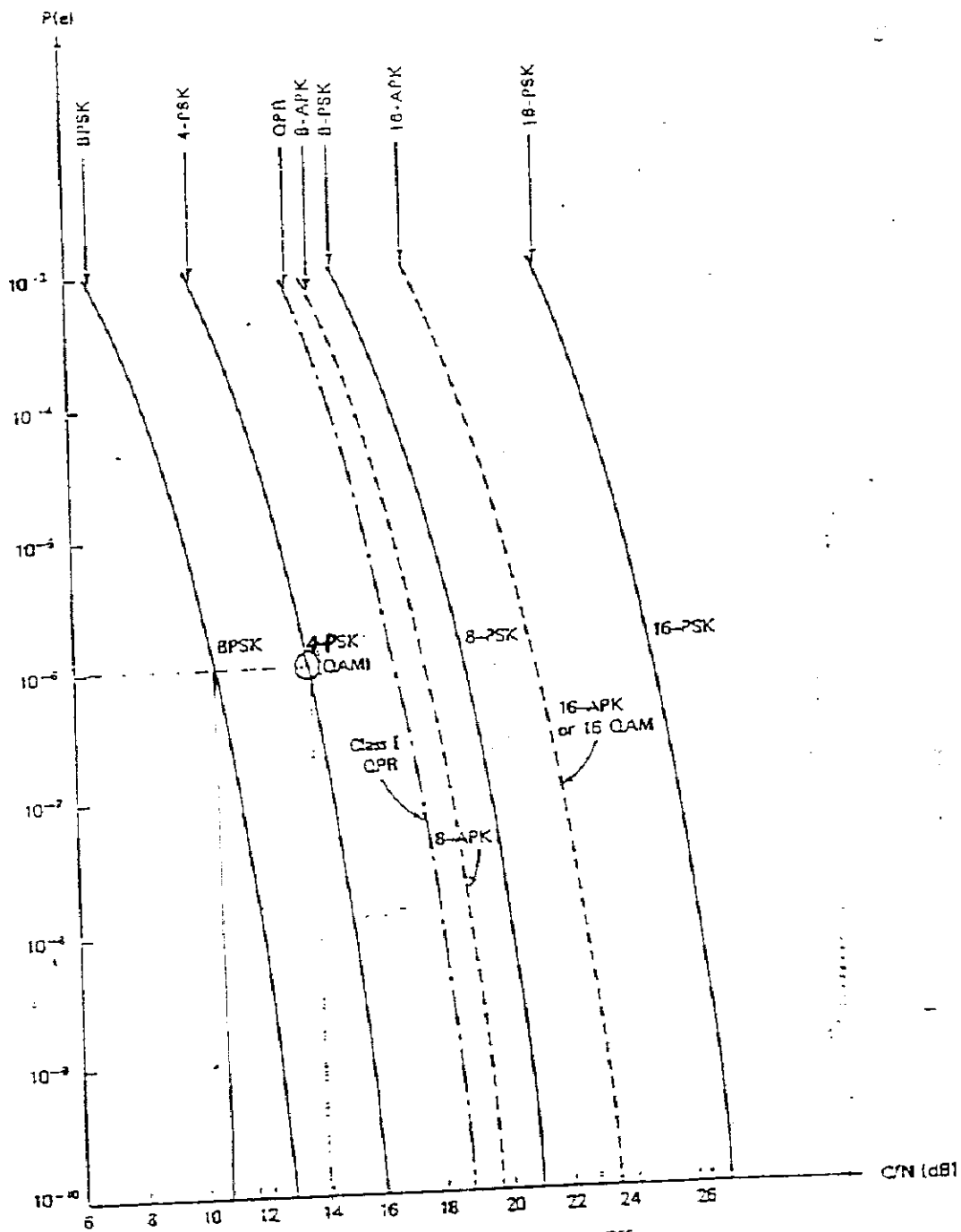


Fig. 3.11. $P(e)$ performance of M -ary PSK, QAM, QPR, and M -ary APK coherent systems. The rms C/N is specified in the double-sided Nyquist bandwidth.

Figure showing offset for QPSK (4-PSK) modulation C/N offset (14 dB).
 (Obtained from DIGITAL COMMUNICATIONS: Microwave Applications, by
 Kamilo Feher, Prentice-Hall Inc., 1981)