

Compliance with 15.247(e)1

The processing gain method complies with the exact words of 15.247 (e) 1: “The processing gain shall be determined from the ratio in dB of the signal to noise ratio with the system spreading code turned off to the signal to noise ratio with the system spreading code turned on, as measured at the demodulated output of the receiver.

The CCSK receiver consists of 16 parallel correlators and power detectors, which produce 16 demodulated outputs of the receiver. The noise output values from each of the 16 are different from the others at each output time, but they have identical long-term noise power averages. Furthermore, these noise power averages are independent of any presence of an input signal, and more particularly, are independent of whether the system spreading code is turned off, or whether the system spreading code is turned on.

Thus, the signal to noise ratio at the demodulated output of the receiver varies only with the signal output from the demodulated output of the receiver. The ratio in dB of the signal to noise ratio with the system spreading code turned off to the signal to noise ratio with the system spreading turned on, as measured at the demodulated output of the receiver, is exactly the ratio in dB of the signal output with the system spreading code turned off the signal output with the system spreading code turned on.

The unspread CCSK modulated signal is identical to a CW signal. Since the one-of-sixteen data words selects a particular time phasing of the spreading modulation, the signal with spreading code turned off is just a CW signal, and happens to be the same CW signal for all sixteen data words. The 16 parallel receiver correlators produce 16 different received signal waveforms from doing 16 different “despreadings” of this CW waveform, but the signal power values of the 16 are equal, at the demodulated output of the receiver. The input modulation is any-one-of-sixteen, and the demodulated output is any-one-of-sixteen.

The reported processing gain measurements, of the increase of signal power output with the system spreading code turned on, over the signal power output with the system spreading code turned off, measured at the demodulated output of the receiver, are an accurate determination of the processing gain.