Fairplay's Theoretical Processing Gain Calculation:

The input data stream at a data rate, R_b, is used to form two-bit QPSK (base-band domain) symbols at a symbol rate of R_s. There are four possible symbols: {00,01,10,11}. The relationship between the symbol rate and the data rate is as follows:

$$R_s = \frac{R_b}{2}$$

The spread-spectrum modulator uses M-ary orthogonal keying to transmit a unique pseudorandom sequence associated with each of the QPSK symbols. The length of each sequence is 32 chips. The chipping rate is related to the symbol rate as follows:

$$R_c = 32R_s$$

The processing gain is defined as the ratio of the chipping rate to the data rate:

$$G_p = \frac{R_c}{R_b} = \frac{32R_s}{2R_s} = 16$$

The processing gain in dB is greater than 10 dB and therefore is theoretically compliant with 15.247(e).

$$G_p = 10\log_{10}(16) = 12.04\ dB > 10\ dB$$