AM-FM παρουσία προσθετικού θορύβου $N(t) = n_c(t)\cos\omega_c t - n_s(t)\sin\omega_c t$

Φασματική πυκνότητα λευκού θορύβου $S_N(f)= N_0/2$

Ισχύς Θορύβου = $\int S_N(f)df$

$K.A._{AM\text{-}SSB\text{-}SC} = SNR_o/SNR_i = 1$

$K.A._{AM\text{-}DSB\text{-}SC} = SNR_o/SNR_i = 2$

$K.A._{AM\text{-}DSB} = SNR_o/SNR_i \le 2$

Αν έχομε μεγάλο SNR_i, τότε $K.A._{AM\text{-}DSB} = SNR_o / SNR_i = 2m^2S/(1+ m^2S)$ όπου:
$S_i= (A^2/2)(1 + m_{AM}^2S)$ και $N_i= 2N_0W$ (W Hz το εύρος ζώνης πληροφορικού σήματος)
$S_o = A^2m^2S$ και $N_{out}= 2N_oW$ (στην έξοδο κορυφοφωρατή, χωρίς LPF φίλτρο).

$f_{FM}(t)=A\cos(\omega_c t+K_{FM}\int s(t)dt) = A\sum_{n=-\infty}^{\infty} J_n(\beta)\cos(\omega_c + n\omega_s)t$ (ω_s μέγιστη συχνότητα s(t))

$\omega_i(t) = \omega_c + K_{FM}\, s(t) \rightarrow f_i(t) = f_c + (K_{FM}/(2\pi))s(t)$

$\Delta\omega = K_{FM}\,|s(t)|_{max} = \text{constant}$

$B = 2(\Delta\omega + \omega_s) = 2(\beta+1)\,\omega_s$

$\beta = \Delta\omega / \omega_s$

$f_{PM}(t)=A\cos(\omega_c t+K_{PM}\, s(t))$ $\omega_i(t) = \omega_c + K_{PM}\, d(s(t))/dt$

$s(t) = a\cos\omega_s t$

$f_{FM}(t) = A\cos[\omega_c t + (aK_{FM}/\omega_s)\sin\omega_s t]$ $\Delta\omega=aK_{FM}$

$f_{PM}(t) = A\cos(\omega_c t+K_{PM}\, a\cos\omega_s t)$ $\Delta\omega=aK_{PM}\,\omega_s$ (ανάλογο ω_s) $B=2(\Delta\omega+\omega_s)=2(aK_{PM}\,\omega_s+\omega_s)$

$S_i = A^2/2$

$N_i = N_0 B = N_0\, 2(\beta+1)W$

$S_o = K_{FM}^2S = \Delta\omega^2S$ (Αν $\Delta\omega = K_{FM}$)

$N_{out} = N_0\, \omega_s^3/(3\pi A^2)$

$K.A._{FM} = 6\, K_{FM}^2\, S\, \Delta\omega / \omega_s^3 = 6\beta^2(\beta+1)S$

$s(t) = \cos\omega_s t$

$K.A._{FM} \approx 3\beta^3$

$SNR \rightarrow 10\log_{10}SNR$ (dB)
