

“Influence of linear and non-linear distortions in SAW/FBAR duplexers for 3rd generation mobile phone systems”, pp.120-127

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Abstract – This paper describes the influence of linear and nonlinear distortions in surface acoustic wave (SAW) and film bulk acoustic wave resonator (FBAR) duplexers on 3rd generation mobile phone systems, based on system simulations including the duplexer characteristics. For the linear distortion, the error vector magnitude (EVM) of the WCDMA transmitter is evaluated using a FBAR duplexer and it is clarified that 1dB deviation of the insertion loss in one signal channel deteriorates the EVM by 1.8 %. For the non-linear distortions, the cross modulation in the CDMA2000 system and the intermodulation distortion (IMD) in the WCDMA system are investigated by using two types of non-linear duplexer models. Firstly, the relationship between the acoustic power in a SAW duplexer and the noise power caused by the cross modulation in the CDMA2000 is clarified. Secondly, the required IMD for a duplexer in the WCDMA system is evaluated, connected with the duplexer’s attenuation and isolation. The obtained results enable the designer to predict the influence of distortions on the system performance during the design process of the duplexer.