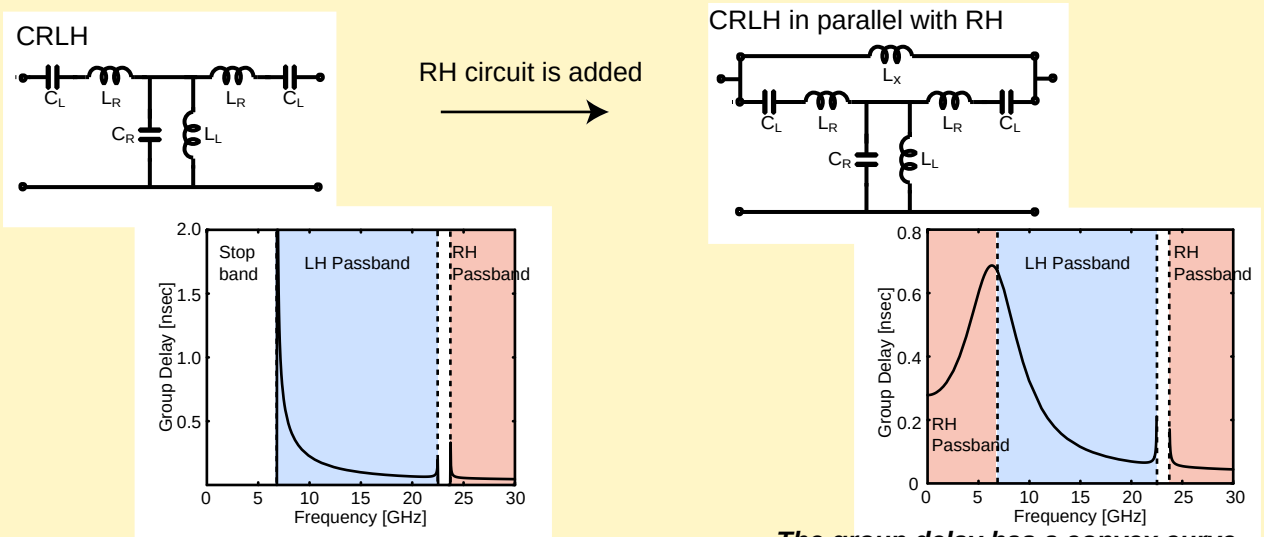
Group Delay Compensation Technique for UWB MMIC Using Composite Right/Left-Handed Circuit

Abstract - A group delay equalizer consisting of a composite right/left handed (CRLH) circuit in parallel with a right handed (RH) circuit is proposed for UWB RF components. Dispersion characteristics and group delay characteristics for the proposed circuit are described. A group delay compensation circuit was designed for the developed InGaP/GaAs HBT MMIC amplifier with an active balun. It is demonstrated that the measured group delay variation is reduced.

CRLH in parallel with RH

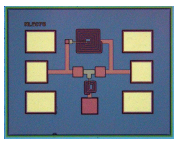


The group delay has a convex curve.

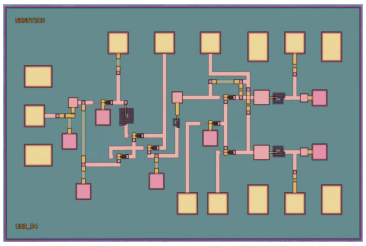
Usually UWB RF devices have a concave group delay. Therefore this circuit can equalize it.

Group delay compensation

Photographs

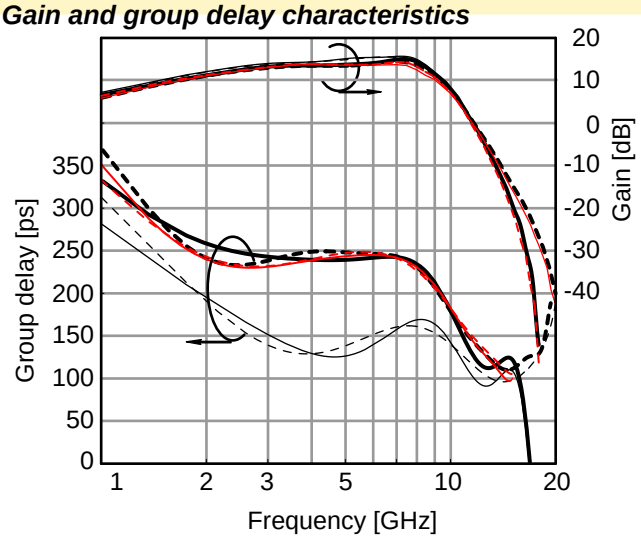


Fabricated GD compensation circuit



Fabricated broadband amplifier with an active balun

Gain and group delay characteristics



measured MMIC
MMIC with the simulated group delay equalizer
MMIC with the measured group delay equalizer

The group delay variation is reduced.