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On-chip grounded CPW line model with anomalous skin effect in THz band

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Abstract

This paper proposed and analyzed a new grounded coplanar waveguide (CPW) line model with anomalous skin effect for THz integrated circuits. The proposed CPW line model employs a donut-style multilayer conductor structure. The electromagnetic (EM) simulation of the proposed 50-Ω CPW line model results in the proportion to the frequency to powers of 0.5, 0.6, and 0.67 at 0.1–0.6 THz, 0.7–1.3 THz, and 1.4–2.0 THz, respectively. These results indicate the proposed CPW line model provides more accurate characteristics caused by anomalous skin effect on EM simulation.

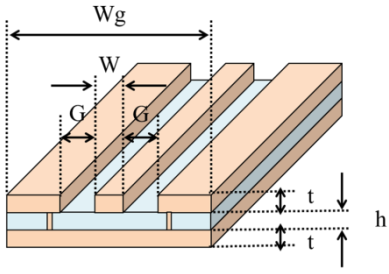
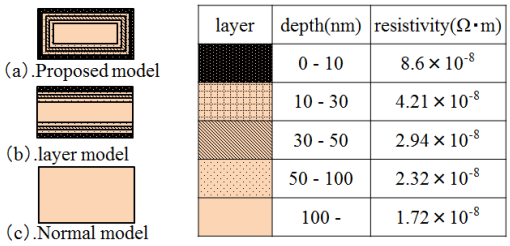


Fig1. EM simulation model of on-chip coplanar waveguide (W=2μm, G=1μm, Wg=60μm, t=1μm, h=1μm)



layer	depth(nm)	resistivity(Ω·m)
	0 - 10	8.6×10^{-8}
	10 - 30	4.21×10^{-8}
	30 - 50	2.94×10^{-8}
	50 - 100	2.32×10^{-8}
	100 -	1.72×10^{-8}

Fig2. Conductor model

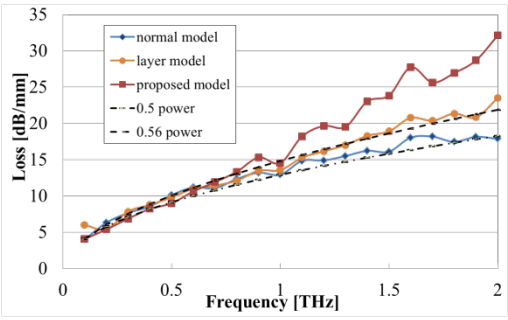


Fig3. Losses of CPW models

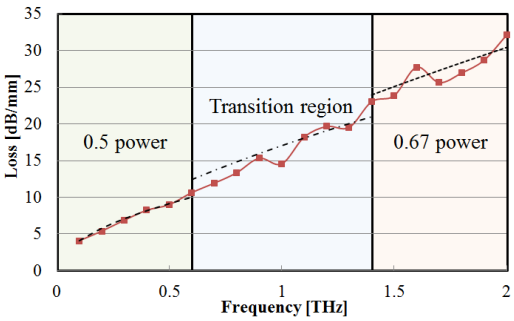


Fig4. Losses of proposed CPW conductor model

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