半导体学报
Journal of Semiconductors
Welcome to www.cjs.ac.cn

双极场引晶体管:III.短沟道电化电流理论（双MOS栅纯基）

The Bipolar Field-Effect Transistor:III.Short Channel Electrochemical Current Theory(Two-MOS-Gates on Pure-Base)

摘要点击：517　全文下载：4130

查看全文　查看/发表评论　下载PDF阅读器

所在位置：2008,29(1):1-11

中文关键词：双极场引晶体管理论　MOS场引晶体管　同时并存空穴电子表面沟道和体积沟道　表面势　短沟道理论　双栅纯基

英文关键词：bipolar field-effect transistor theory　MOS field-effect transistor　simultaneous electron and hole surface and volume channels　surface potential　short channel theory　double-gate pure-base

基金项目：

PACC代码：

EEACC代码：

作者	单位
揭斌斌	北京大学，北京 100871
薛支唐	北京大学，北京 100871；佛罗里达大学，美国佛罗里达州,Gainesville FL32605，美国；中国科学院外籍院士，北京 100871

中文摘要：

本文描述双极场引晶体管(BiFET)短沟道理论．晶体管分成两个区域，源区和漏区．每区在特定外加端电压下既可为电子或空穴发射区又可为电子或空穴收集区．把两维无缺陷Shockley方程分离为两个以表面势为参变量的一维方程，并运用源区和漏区界面处电子电流和空穴电流连续性，得到在源区和漏区内解析方程．典型BiFET包括薄纯基上两个等同金属氧化物硅（MOS）栅．用图形提供实用硅基和氧化层厚度范围内,随直流电压变化,输出和转移电流和电导总量，电子沟道与空穴沟道分量，和两区电学长度.报道前没考虑沟道缩短的偏差。

英文摘要：

This paper describes the short channel theory of the bipolar field-effect transistor (BiFET) by partitioning the transistor into two sections,the source and drain sections,each can operate as the electron or hole emitter or collector under specific combinations of applied terminal voltages. Analytical solution is obtained in the source and drain sections by separating the two-dimensional trap-free Shockley Equations into two one-dimensional equations parametrically coupled via the surface-electric-potential and by using electron current continuity and hole current continuity at the boundary between the emitter and collector sections. Total and electron-hole-channel components of the output and transfer currents and conductances, and the electrical lengths of the two sections are computed and presented in graphs as a function of the D.C.terminal voltages for the model transistor with two identical and connected metal-oxide-silicon-gates (MOS-gates) on a thin pure-silicon base over practical ranges of thicknesses of the silicon base and gate oxide. Deviations of the long physical channel currents and conductances from those of the short electrical channels are reported.

您是第672374位访问者

主办单位：中国电子学会，中国科学院半导体研究所　　单位地址：北京市海淀区清华东路甲35号

Service Tel：010-82304277，82304311　　Fax：010-82305052　　邮编：100083　　Email：cjs@semi.ac.cn

本系统由勤云电子有限公司设计,技术支持电话：010-81928386,Email:et_yehu@yahoo.com.cn,网址：http://www.e-tiller.com