MATHEMATICAL MODELS OF THE COMMON-SOURCE AND
COMMON-GATE AMPLIFIERS USING A METAL-FERROELECTRIC-
SEMICONDUCTOR FIELD EFFECT TRANSISTOR

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Mathematical models of the common-source and common-gate amplifiers using metal-
ferroelectric-semiconductor field effect transistors (MFSFETs) are developed in this paper. The
models are compared against data collected with MFSFETs of varying channel lengths and
widths, and circuit parameters such as biasing conditions are varied as well. Considerations are
made for the capacitance formed by the ferroelectric layer present between the gate and substrate
of the transistors. Comparisons between the modeled and measured data are presented in depth
as well as differences and advantages as compared to the performance of each circuit using a
MOSFET.

Keywords: mathematical model; MFSFET; MFFET; metal-ferroelectric-semiconductor field
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