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Abstract

An alternative methodology to the modified Norde's model is presented to determine both series and shunt parasitic resistance, ideality factor and the resistance-mediated "turn-on" voltage of diodes by measuring derivatives of I-V characteristics. Experimental results follow to support the theoretical investigation and demonstrate a self-consistency check.

Keywords: Diode model; Norde plot; ideality factor; parasitic resistance; turn-on voltage

1. INTRODUCTION

p-n junction diodes or Schottky diodes are known for their rectifying characteristics. Current-voltage and capacitance-voltage measurements are important tools used to characterize diodes[1], [2]. Norde[3] in 1979 and many others[4]–[6] since then have used modified I-V plots to determine the ideality factor and barrier height of Schottky diodes even if associated with high series resistance. On the other hand, the forward diode current increases sharply above the so-called "turn-on" or "knee" voltage, generally estimated by the tangent intercept approach or simply defined at which a certain current is reached. In this work, we expand on Norde's model and present a methodology based on derivatives of