

CHAPTER

5

FIELD EFFECT TRANSISTOR

5.1 Introduction

This chapter will discuss 'Junction Field Effect Transistor' (JFET) in detail including the structure, characteristics and biasing techniques, while the small signal model for this transistor will be discussed in Chapter 7. However, MOSFET will not be discussed in detail in this book.

The operation of this device depends on current caused by electrical field. There are two types of transistors in this field effect category:

- a) Junction Field Effect Transistor (JFET).
- b) Metal Oxide Semiconductor Field Effect Transistor (MOSFET).

5.2 Structure of JFET

Figure 5.1 shows the structure of a JFET of type n channel. Ohmic contacts exist at both ends of n type semiconductor bar. Current flows along the bar which is also called the channel when voltage source is connected to the two terminals of the bar. The current is carried by electrons which are the majority charge carriers in the n type channel. The two sides of the bar are doped with p type impurities to form p type regions called the Gate.

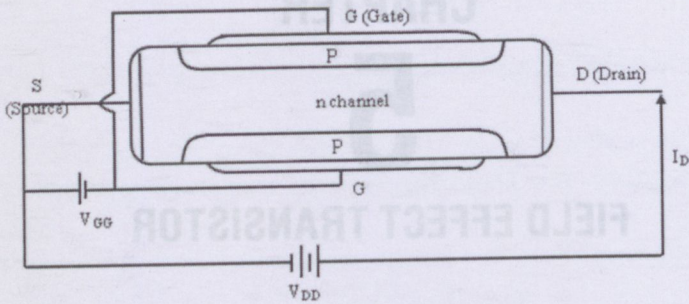


Figure 5.1: Structure of n Type Junction Field Effect Transistor (JFET).

Referring to Figure 5.1, the terminals for JFET may be defined as follows:

Source, S: Terminal where majority charge carriers (e.g electrons for n channel) enter the bar.

Drain, D: Terminal where majority charge carriers leave the bar.

Gate, G: The two sides of the bar which have been doped with impurities such that they become p type. The gates are connected to the negative terminals of V_{GG} such that there exist p-n junctions at the two sides of the bar which is always reverse biased.

Channel: The n type region between the two gates where channel current flows from source to drain.

Figure 5.2 shows the circuit symbols for JFET which are to be used in this chapter.