LECTURE 3

Diode Characteristic Curve

Analog Electronics

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Outline and Aim

As you learned in the last lecture, a diode is a semiconductive device made with a single *pn* junction. A diode conducts current when it is forward-biased when the bias voltage exceeds the barrier potential. A diode prevents current when it is reverse-biased at less than the breakdown voltage.

After completing this lecture, you should be able to

- Describe the essential diode characteristics
- Explain the diode V-I characteristic curve

Diode Characteristic Curve

Fig. 1 is a graph of diode voltage versus current, known as a **V-I characteristic curve**.

- **The upper right quadrant of the graph represents** the forward-biased condition. As you can see, there is a tiny forward current (I_F) for forward voltages V_F below the barrier potential.
- **Once the forward voltage reaches the barrier potential**, the current increases drastically and must be limited by a series resistor.
- The voltage across the forward-biased diode remains approximately equal to the barrier potential.

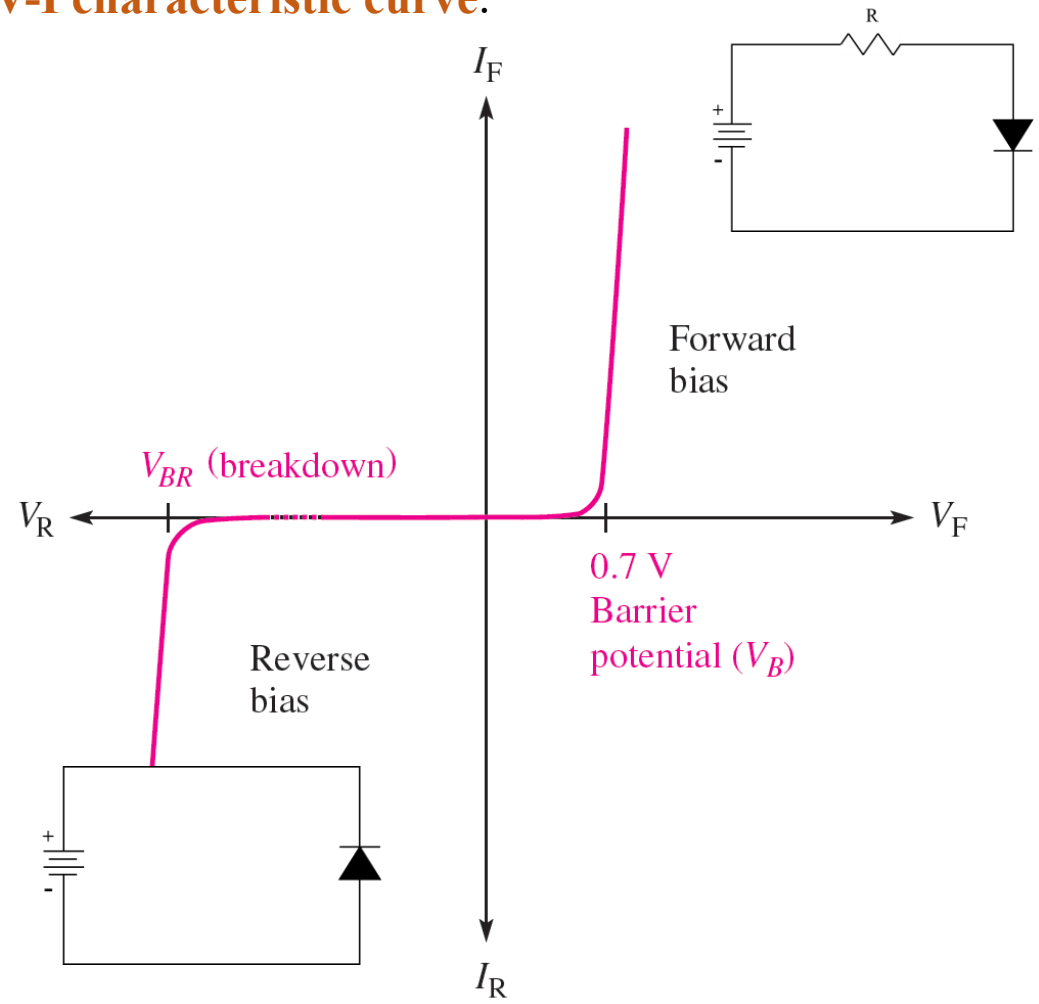

Fig. 1: General diode V-I characteristic curve.

Diode Characteristic Curve

Fig. 1 is a graph of diode voltage versus current, known as a **V-I characteristic curve**.

- **The lower left quadrant of the graph represents** the reverse-biased condition. As the reverse voltage (V_R) increases to the left, the current remains near zero until the breakdown voltage (V_{BR}) is reached.
- When a breakdown occurs, there is a **large reverse current which, if not limited, can destroy the diode**. Typically, the breakdown voltage is greater than 50 V for most rectifier diodes. Remember that most diodes should not be operated in the reverse breakdown.

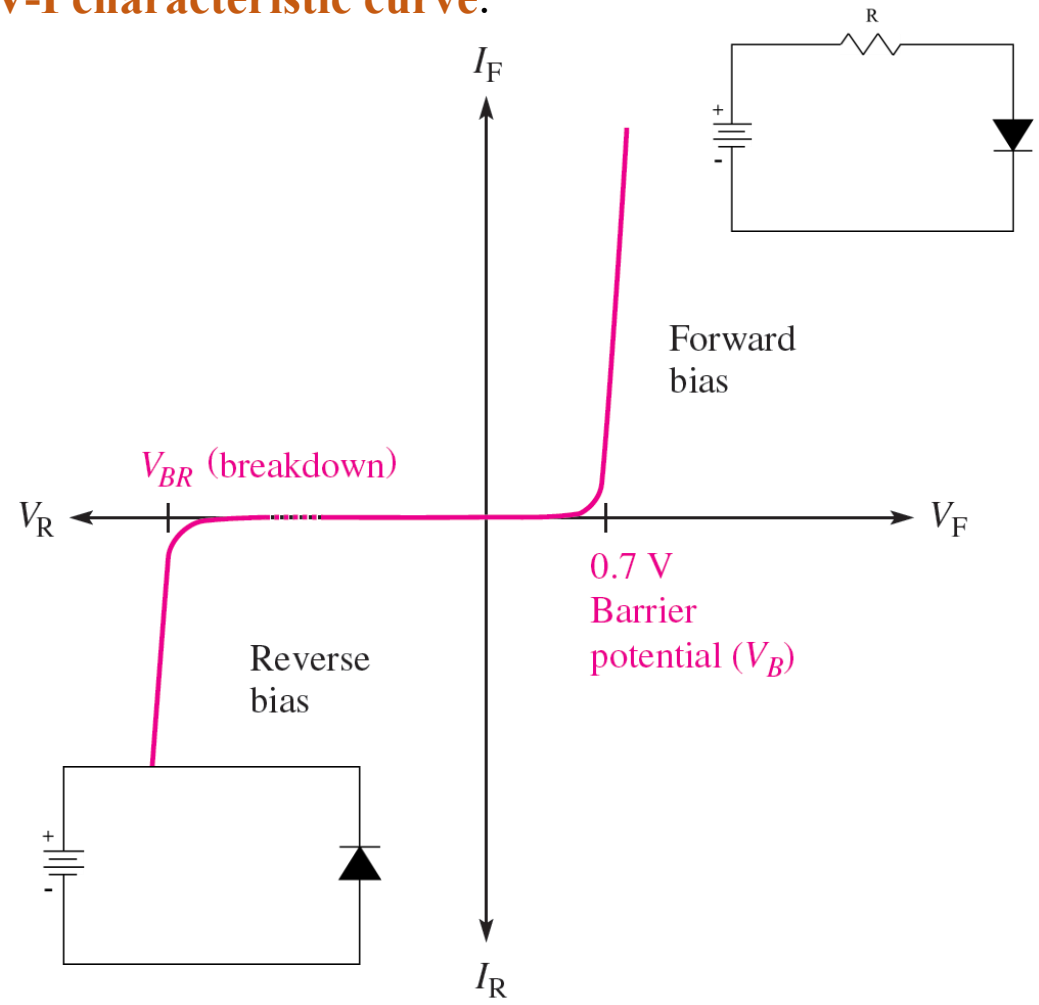

Fig. 1: General diode V-I characteristic curve.