

Basic Concepts

Q: What is a transistor? A: A transistor is a semiconductor device used to amplify or switch electronic signals and electrical power.

Q: Name the terminals of a transistor. A: Emitter, Base, and Collector.

Q: What are the two main types of transistors? A: Bipolar Junction Transistor (BJT) and Field Effect Transistor (FET).

Q: What is a BJT? A: A BJT is a transistor that uses both electron and hole charge carriers.

Q: What is a FET? A: A FET is a transistor that uses only one type of charge carrier (either electrons or holes).

Q: What is meant by transistor action? A: Transistor action refers to the ability of a transistor to amplify current.

Q: What are transistor symbols used for? A: Transistor symbols represent the type and terminals of transistors in circuit diagrams.

Q: What is the common base connection? A: A configuration where the base terminal is common to both input and output circuits.

Q: What is the common emitter connection? A: A configuration where the emitter terminal is common to both input and output circuits.

Q: What is the common collector connection? A: A configuration where the collector terminal is common to both input and output circuits.

Transistor as an Amplifier

Q: How does a transistor work as an amplifier? A: A small input current at the base produces a larger output current at the collector.

Q: Which transistor configuration is commonly used as an amplifier? A: Common emitter (CE) configuration.

Q: What is the input and output in CE configuration? A: Input is at the base-emitter junction, output is at the collector-emitter junction.

Q: What is transistor load line analysis? A: It is a graphical method to study transistor operation and determine operating point.

Q: What is the operating point (Q-point)? A: The Q-point is the steady-state voltage and current in a transistor when no input signal is applied.

Q: What is the cutoff point of a transistor? A: The point where the transistor is fully OFF and no current flows.

Q: What is the saturation point of a transistor? A: The point where the transistor is fully ON and maximum current flows.

Q: Why is the CE configuration popular? A: It provides good voltage, current, and power gain.

Q: What is the practical way of drawing a CE circuit? A: By showing supply voltage, resistors, and transistor with proper polarities.

Q: How is output obtained from a transistor amplifier? A: The output is taken across the collector resistor in CE configuration.

Transistor Characteristics

Q: What are the characteristics of a common base connection? A: Low input resistance, high output resistance, and current gain less than 1.

Q: What are the characteristics of a common emitter connection? A: High current gain, moderate input resistance, and phase reversal between input and output.

Q: What are the characteristics of a common collector connection? A: High input resistance, low output resistance, and voltage gain less than 1.

Q: What is leakage current in a transistor? A: The small current that flows through a transistor even when it is supposed to be OFF.

Q: What factors affect transistor performance? A: Biasing, temperature, load resistance, and transistor type.

Q: What is transistor cutoff? A: Condition where both junctions are reverse biased, and transistor conducts no current.

Q: What is transistor saturation? A: Condition where both junctions are forward biased, and transistor conducts maximum current.

Q: What is power rating of a transistor? A: The maximum power a transistor can safely dissipate without damage.

Q: How is a transistor configured in common base mode? A: Base is common, input is applied to the emitter, output is taken from the collector.

Q: How is a transistor configured in common collector mode? A: Collector is common, input is applied to the base, output is taken from the emitter.

Transistor Connections & Configurations

Q: What is the comparison between transistor connections? A: CE: high gain, CB: low input resistance, CC: unity voltage gain, high input resistance.

Q: Which configuration has current gain less than 1? A: Common base (CB).

Q: Which configuration is used as a voltage buffer? A: Common collector (CC) configuration.

Q: Which configuration is preferred for amplification? A: Common emitter (CE) configuration.

Q: What is the significance of common emitter in audio amplifiers? A: Provides good voltage and power gain suitable for audio signals.

Q: What is a transistor testing method? A: Using an ohmmeter, multimeter, or transistor tester to check junctions.

Q: How is a transistor identified? A: By its type (NPN/PNP), part number, and datasheet specifications.

Q: What is the importance of semiconductor devices numbering system? A: Helps identify transistor type and electrical characteristics.

Q: What is transistor lead identification? A: Determining which pin is emitter, base, and collector.

Q: How does transistor lead arrangement affect performance? A: Wrong connections can prevent amplification or damage the transistor.

Applications

Q: What are applications of common base amplifiers? A: High-frequency applications due to low input resistance.

Q: What are applications of common emitter amplifiers? A: Audio, radio, and power amplification.

Q: What are applications of common collector amplifiers? A: Impedance matching and voltage buffering.

Q: How do transistors compare to vacuum tubes? A: Smaller, more efficient, durable, and require less power.

Q: Why are transistors preferred over vacuum tubes? A: Longer life, lower heat, and portable applications.

Q: Can a transistor be used as a switch? A: Yes, by operating in cutoff and saturation regions.

Q: What is a transistor amplifier load line? A: Graph showing voltage and current limits to determine Q-point.

Q: How is output waveform affected by Q-point? A: Proper Q-point ensures linear amplification without distortion.

Q: What is meant by transistor configuration? A: The way terminals are connected to input and output circuits.

Q: What is the difference between CE, CB, and CC? A: CE: high gain, phase reversal; CB: low input, high output; CC: unity voltage gain.

Advanced Topics

Q: How to determine transistor configuration? A: By identifying input/output terminals and connection type.

Q: What is practical method for transistor amplifier design? A: Biasing transistor properly, choosing resistors, and determining Q-point.

Q: What is transistor cut-off frequency? A: The frequency at which transistor gain drops to 70.7% of its low-frequency value.

Q: How to measure leakage current? A: By measuring collector current with base open using a sensitive ammeter.

Q: What is transistor power dissipation? A: Product of collector-emitter voltage and collector current.

Q: How is transistor performance evaluated? A: By measuring gain, input/output resistance, and linearity.

Q: What is the difference between voltage gain and current gain? A: Voltage gain = output voltage/input voltage; Current gain = output current/input current.

Q: What is the importance of input/output characteristics? A: Helps design and analyze transistor circuits.

Q: How to prevent transistor overheating? A: Using heat sinks or limiting power dissipation.

Q: What is the effect of temperature on transistor? A: Leakage current increases and may lead to thermal runaway.