

Active and Passive Devices

Aspect	Active Components	Passive Components
Function	Amplify, switch, modulate signals.	Affect characteristics of signals.
Energy Requirement	Require an external energy source to function.	Do not require an external energy source.
Signal Processing	Actively manipulate signals.	Modify signals without active manipulation.
Current Control	Control the flow of current.	Do not control current flow actively.
Power Gain	Can provide power gain (amplification).	Do not provide power gain.
Voltage Gain	Can provide voltage gain.	Do not provide voltage gain.
Complexity	Can be complex, containing multiple elements.	Generally simpler in construction.
Energy Conversion	Can convert energy (e.g., transistor switching).	Do not convert energy in the same way.
Examples in Circuits	Used in signal amplification, signal processing, control.	Used in filtering, impedance matching.
Response to Signals	Respond to input signals and modify them.	Respond to signals by affecting them.
Primary Functionality	Active signal processing and control.	Signal conditioning and shaping.
Active Participation	Actively influence circuit behavior.	Passively affect circuit characteristics.
Role in System Design	Crucial for designing complex functions.	Essential for signal conditioning and control.
Energy Dependency	Dependent on an external power source.	Independent of an external power source.