

# Rarely Asked Questions

Strange stories from the call logs of Analog Devices

## Is Your Amplifier Disabled, or is it Merely Sleeping?

**Q:** What's the difference between, power-down, shutdown, standby, sleep mode or disable?

**A.** While all these functions may sound similar, they can have very different meanings depending on the specific amplifier and the manufacturer.

We use the terms *power-down* and *shutdown* to represent the state of an amplifier when the quiescent supply current is lowered from its *normal* operating level. The supply current is typically throttled back by reducing the current in the amplifier's internal bias circuitry. For example, an amplifier that draws milliamps of quiescent current in normal mode may draw only microamps or even nanoamps in power-down mode. The amplifier's output voltage is undefined in both power-down and shutdown modes.

We use the term *disable* to represent the state of an amplifier whose quiescent supply current is reduced from the normal *on* state of the amplifier, but with the additional feature that the output goes to a high-impedance state when the device is put into disable mode. This extremely useful condition provides high input-to-output isolation, and enables outputs to be multiplexed by wire or'ing them together.

Read the data sheet carefully. For a simple power-down function, the specification table may contain a couple of lines that discuss the power parameters, or there may be a plot of normal vs. power-down supply current. There may



also be a plot of the power-down current over temperature. For a disable function (high-impedance state), you can expect the same specification table references, but you may also find an output impedance vs. frequency plot—as the high output impedance is not constant over frequency—or a circuit example featuring the high-impedance capability of the device in a multiplexed application. Also be careful to note the *power-down* threshold voltages. Op amps do not have ground pins, so most power-down circuits are internally referenced to one of the supply rails. The switching levels may not be compatible with conventional logic signals and may thus require some type of level translation.

Not all manufacturers use the same naming convention; what one manufacturer calls disable another may call shutdown, so you should consult the manufacturer's data sheet for their definition of power-down, shutdown, or disable.

**To Learn More About  
Power-Down Functions**

<http://dn.hotims.com/27751-101>



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