

# PURE SINE WAVE VS. SIMULATED SINE WAVE

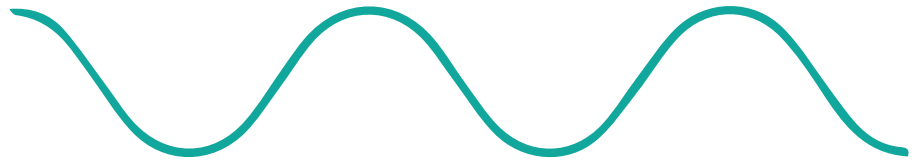
When it comes to output waveform, there are two types of UPS battery backup—the kind that produce a pure sine wave and the kind that produce a simulated or modified sine wave, also known as a pulse-width modulated (PWM) sine wave, when on battery power.

When a UPS system receives power and frequency from the AC line that is within an acceptable range, it will not do anything to correct it. The incoming utility power is typically a pure sine wave and this is what connected equipment expect. However, if the UPS system detects a power disturbance such as a blackout, over- or under-voltage condition, or frequency change, it will use its battery to correct the condition and restore clean power. It is only when on battery power that the sine wave becomes a consideration.

The main difference between pure sine wave and simulated sine wave UPS systems is that a pure sine wave system in battery backup mode is guaranteed to produce a cleaner output for any piece of equipment connected to it, whether it's a desktop computer, lab equipment or a server in a data center. The same cannot be said of a modified system, which produces a stepped approximation to a sine wave when on battery. Its output is choppier and provides equipment with a less stable output waveform.

Note: A stepped sine wave and a square sine wave are the same thing.

## PURE SINE WAVE



**PRO:** Smoother and cleaner output for sensitive equipment, Improves equipment performance and efficiency

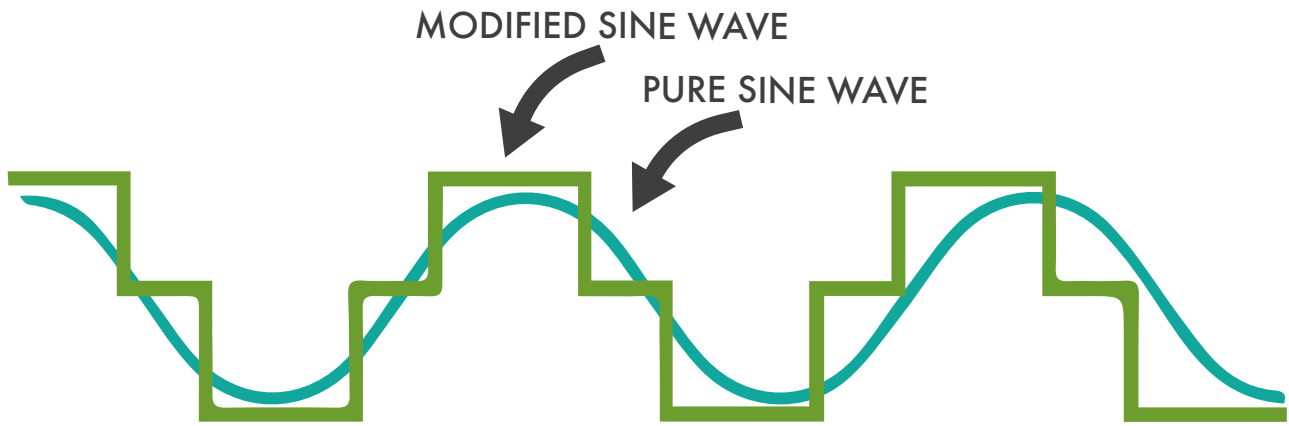
**CON:** Approximately two times the cost of a comparable modified sine wave UPS system

## MODIFIED SINE WAVE



**PRO:** Approximately half the cost of a pure sine wave UPS system

**CON:** Less smooth and stable output, Decreased equipment performance and efficiency



It's important to understand that both types of UPS system produce true sine wave output more than 99% of the time. It is only during a power failure, when the UPS is producing power from its battery reserves, the output waveform is a concern. Also keep in mind that typical applications for pure sine wave UPS systems involve the protection of critical server, network, medical and telecommunications equipment or electronic equipment that is particularly sensitive to input power, such as lab test equipment. Modified sine wave UPS systems typically protect PCs, home entertainment systems, A/V components and media centers.