



### Online Double Conversion vs Econo-Mode (Line Interactive)

When comparing UPS efficiencies it's important to ensure you're comparing apples to apples. A lot of UPS manufactures are touting UPS efficiencies as high as 99% with their new econo-mode products. UPSs that operate in econo-mode is always in bypass mode and relies heavily on sensing and reacting to power events, whereas a double conversion UPS is always on line and keeps supplying conditioned power regardless of input power events.

As with any engineered solution, there is a trade-off. In the case of double conversion vs line-interactive you trade power quality and reliability for slightly lower operating costs. The table below highlights some of the key differences.

Power Event	Double Conversion (Toshiba G9000)	Econo-Mode (Line-Interactive)
Power Failure	Backup load power immediately online	Backup load must switch from static to bypass inverter
Surge Sag Overvoltage Undervoltage	Load voltage regulated +/- 1%	Load experiences voltage surges, sags, overvoltages, and undervoltages until the power event exceeds preset USP limit.
Switching Transients Line Noise	Load isolated from transients and line noise	Load experiences voltage transients and line noise until preset limit is exceeded
Frequency Variation Harmonic Distortion Voltage Unbalance	Load isolated from transients and line noise	Line frequency variations, harmonic distortions, and voltage unbalance are passed on through the load

UPS Parameter	Toshiba G9000	Competitors (Econo-Mode)
Efficiency	96.5%	95% to 99%
Voltage Regulation	+/- 0.5% to 1.0%	Dependent on UPS settings. Typically +/- 5%
THD	2% Linear Load 5% Non-linear load	No limitation or power conditioning

What does all this mean for the user? When selecting an Uninterruptible Power System, you must consider more than efficiency ratings and consider your power quality requirements and reliability. If you're operating a critical power system where failure is not an option, a double conversion UPS is going to offer the most reliability and the highest power quality. And when it comes to efficiency in a double conversion UPS, [Toshiba's G9000](#), with IGBT technology and transformer-less design are the leader in online double conversion UPS efficiency.

