

Uninterruptible Power Supply (UPS) Selection Criteria - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the selection and deployment of uninterruptible power supply (UPS) systems within carrier-grade, enterprise, and industrial telecommunications infrastructures. As network densification and edge computing drive power consumption upwards, the UPS has evolved from a simple backup battery to a mission-critical active power conditioning and energy storage subsystem. This datasheet outlines the essential selection criteria, architectural considerations, and performance benchmarks required to ensure system-level reliability, high availability, and optimal total cost of ownership (TCO). The following parameters are critical for ensuring that the UPS solution matches the specific load profile, redundancy requirements, and environmental constraints of the target deployment.



ARCHITECTURE & CHASSIS DESIGN

The foundational selection criterion begins with the UPS topology. Three primary architectures dominate the telecom landscape: Standby (Offline), Line-Interactive, and Double-Conversion (Online). For mission-critical infrastructure where zero transfer time is non-negotiable, the Double-Conversion topology is mandated. In this configuration, the rectifier continuously charges the battery bank while the inverter supplies pure sine wave AC power to the load, isolating sensitive networking equipment from all grid anomalies including sags, surges, and frequency variations. Chassis design directly impacts serviceability; hot-swappable power modules, battery trays, and intelligent bypass switches are essential for mean time to repair (MTTR) targets. The physical footprint must accommodate high-density 19-inch rack mounting, with depth considerations varying from 600mm for shallow edge

deployments to 1000mm for high-capacity core data centers. Front-to-back or bottom-to-top cooling airflow must align with the data center hot-aisle/cold-aisle containment strategy to prevent thermal recirculation and reduce cooling overhead.

HARDWARE FEATURES

A comprehensive UPS selection process must evaluate the rectifier and inverter efficiency across the entire load spectrum, not merely at full load. Modern IGBT-based designs with DSP control achieve efficiencies exceeding 96% in online mode and 99% in eco-mode. However, for sensitive telecom loads, eco-mode bypass may be disabled to maintain harmonic distortion levels below 3% Total Harmonic Distortion (THD). Battery management is the single largest variable impacting lifespan. Temperature-compensated charging, advanced equalization, and predictive battery health monitoring via internal impedance measurement are mandatory features. The UPS must support multiple battery chemistries including Valve-Regulated Lead-Acid (VRLA), Lithium-Ion (Li-Ion), and Nickel-Cadmium (NiCd) for extreme temperature environments. Scalability is defined by the ability to parallel up to 4-6 units for capacity (N+1) or redundancy (2N) configurations, facilitated by a centralized static bypass and load sharing bus. Communication capabilities are non-negotiable; the UPS must feature redundant Ethernet ports supporting

SNMPv3, Modbus TCP, and RESTful APIs for integration with DCIM and NMS platforms, alongside dry contacts for legacy alarm systems.

COMPLIANCE & STANDARDS

The UPS system must adhere to a rigorous suite of international standards to ensure safety, electromagnetic compatibility, and performance. Compliance with IEC 62040-1 (Safety), IEC 62040-2 (EMC), and IEC 62040-3 (Performance and test methods) is foundational. For telecom-specific installations, ETSI EN 300 386 and NEBS GR-63-CORE (Physical Protection) and GR-1089-CORE (EMC and Safety) are critical, ensuring the equipment withstands seismic activity, extreme temperatures, and transient voltage surges encountered in central offices. Efficiency certifications such as the EU Eco-Design Directive and ENERGY STAR for UPS systems are increasingly vital for procurement and carbon footprint reporting. The UPS must also support RoHS and REACH directives, guaranteeing the absence of hazardous substances. Documentation of these compliance levels provides the validation required for carrier network entrance (NE) approval processes.

TECHNICAL SPECIFICATIONS

The following table aggregates critical parametric data points essential for

evaluating and matching a UPS system to a specific equipment load. All metrics are specified under nominal operating conditions unless otherwise stated.

Parameter	Specification
Power Rating (kVA/kW)	10-50 kVA / 9-45 kW
Topology	True Double Conversion (VFI)
Input Voltage Range	140-276 VAC (3-Phase Wye)
Input Power Factor	>0.99
Output Voltage Regulation	±1% Static
Output Voltage THD	<3% (Linear Load)
Overload Capacity	110% for 10 min, 125% for 1 min
Efficiency (Online Mode)	Up to 96.5%
Parallel Redundancy	Up to 6 Units (N+X)
Battery Type	VRLA / Li-Ion (Field Replaceable)
Communication	Dual Ethernet (SNMPv3), RS-232, Dry Contact
Ambient Operating Temperature	0 °C to 40 °C (Derated above 30 °C)
Audible Noise	<55 dBA at 1m (Full Load)
Physical Form Factor	3RU-6RU Rackmount / Floor Standing

ORDERING OPTIONS

To streamline procurement and ensure system compatibility, the UPS platform is structured into modular ordering options. Base chassis configurations are available supporting 10kVA, 20kVA, and 50kVA internal battery trays. Expansion battery cabinets (EBC) are ordered as separate SKUs based on required autonomy (backup time) at specified load percentages. The communication options module includes the network management card (NMC) with SNMP and environmental sensors, as well as the dry contact interface. Installation services, including startup and commissioning as well as one-year on-site warranty extensions, are offered as structured service bundles. Factory integration testing ensures that complete assemblies arrive as fully tested systems, minimizing on-site assembly time and reducing the risk of field failures. Specific SKUs for remote monitoring software and capacity planning tools are available for enterprise-wide management.

