



System Solution Guide - Preview

Telecom Base Stations



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The diagram illustrates the system architecture for the 48V DC power supply. It shows the flow from AC Input to the final -48V DC Output. Key components include:

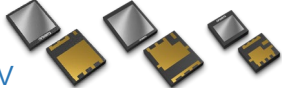
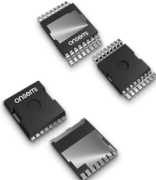
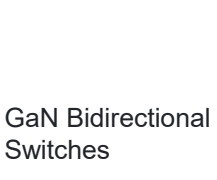
- AC Input:** The starting point of the power supply.
- Rectifier:** Converts AC to DC. It is marked as **optional*.
- Power Conversion:** A dashed box containing:
 - PFC (Power Factor Correction):** Improves the power factor.
 - LLC (Load Resonant Converter):** A type of DC-DC converter.
 - Transformer:** Used for isolation and voltage transformation.
 - SR Rectification (Synchronous Rectification):** Improves efficiency by using active diodes.
- Signal Conditioning:** A dashed box containing:
 - Current Sensing:** Monitors the current in the system.
 - Comparator:** Compares the sensed current with a reference.
- Control Unit:** A dashed box containing:
 - Interface:** Connects the control unit to the rest of the system.
 - Logic & Memory:** The main processing and storage unit.
 - Bluetooth LE:** For wireless communication.
 - Temp. Sensor:** Monitors the temperature of the system.
- Auxiliary Power:** A dashed box containing:
 - Rectifier & Protection:** Provides a safe auxiliary power source.
 - PWM Controller:** Generates Pulse Width Modulation signals for the power conversion stage.
 - Regulator:** Regulates the auxiliary power.
- Gate Driver:** Controls the switching of the power MOSFETs in the power conversion stage.
- ORing Si/GaN:** A diode or MOSFET-based component used for output protection and efficiency.
- Antenna:** Receives the -48V DC Output signal.



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onsemi GaNEXUS™ portfolio brings advanced GaN power technology to enable next-generation telecom base station designs with higher efficiency, power density, and simplified system integration. GaNEXUS GaN FETs provide optimized solutions for high-frequency power conversion in both AC-DC front-end and DC-DC stages. Integrated GaN devices that combine the power switch, gate driver, and protection functions help reduce design complexity, accelerate time-to-market, and lower BOM costs, while high-frequency switching enables smaller magnetics and higher power density. In base stations, GaNEXUS solutions are particularly well suited for compact AC-DC power supplies, intermediate bus converters (IBCs), and auxiliary power modules, helping designers improve efficiency, simplify thermal management, and scale power delivery in increasingly power-dense systems.

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LV/MV • 40 - 200 V  HV • 650 V 	• GaN Smart (FET+Protection) • GaN Drive (FET+Driver) 	GaN Bidirectional Switches 

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Silicon LV/MV MOSFETs

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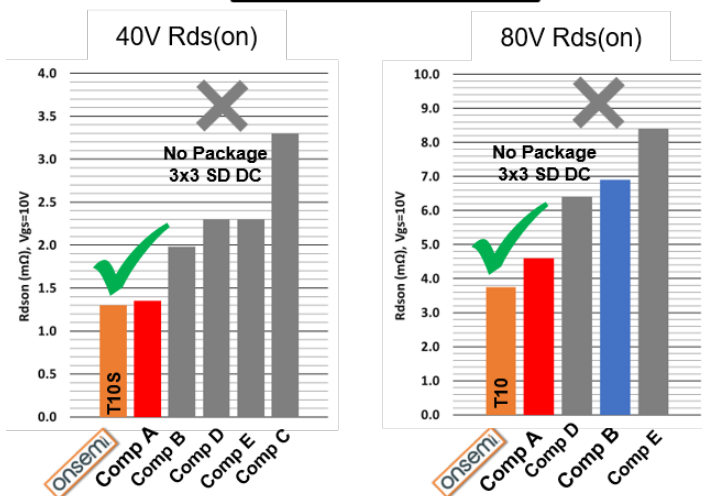
Low/Medium Voltage MOSFETs

onsemi PowerTrench® Silicon MOSFETs deliver best-in-class $R_{ds(on)} \times Q_g$ FOM and over 98% peak efficiency across LLC, HSC (Hybrid-Switched Capacitor), and synchronous rectification topologies essential for 5G base station and cloud power supplies. Advanced 3x3 and 5x6 Dual Cool packages provide up to 8% lower thermal resistance than competitors, enabling higher power density and reliable full-load operation in space-constrained telecom designs. Explore more about [LV/MV MOSFET families](#).

Table 4: Advanced MOSFET families with different packages

Voltage Class	Family	Example	Typical Package Types	Package Images
150 V	T8	NTMTSC4D3N15MC NTMFSC012N15MC NTTFS034N15MC	8x8 Dual Cool 5x6 Dual-Cool 3x3 u8-FL	
100 V	PTNG LowQ _{SW}	NTMFS3D2N10MD NTMFS4D2N10MD NTTFS012N10MD	5x6 SO8-FL 3x3 u8-FL	
80 V	T10	NTMFSCH1D4N08X NTTFSSCH4D0N08XL	5x6 Dual-Cool 3x3 Source Down DC	
60 V	T6	NTMFSCHT1D0N06CS NTMFS5C604N	5x6 Dual-Cool 5x6 SO8-FL	
40 V	T10	NTMFSCHT0D5N04XL NTTFSSCH1D3N04XL NTMFS0D5N04XL	5x6 Dual-Cool 3x3 Source Down DC 5x6 SO8-FL	

Conduction Loss



Switching Loss

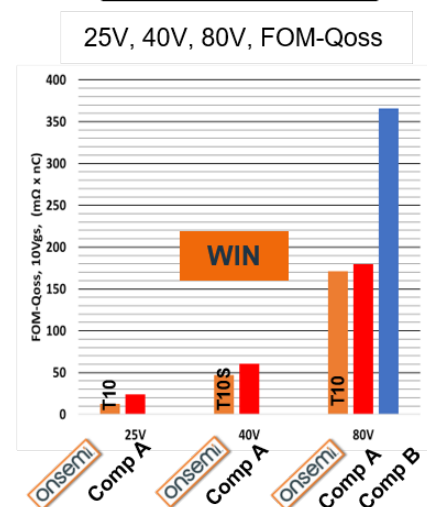


Figure 6: FOM Comparison of T10 3x3 Source Down DC MOSFETs in DC-DC Converter

Frequently Asked Questions (FAQ)

What are the key power architecture requirements in modern 5G telecom base stations?

1 Modern base stations require high-efficiency power conversion, high power density, reliable operation, and long service life. Most systems use a centralized -48 V DC power architecture with multiple AC-DC and DC-DC conversion stages supporting baseband processing, radio units, and auxiliary systems. As 5G-Advanced and future 6G networks increase power demands, designers increasingly focus on reducing losses, improving thermal performance, and enabling continuous operation in harsh outdoor environments.

Why is the -48 V DC architecture widely used in telecom infrastructure?

2 The -48 V DC architecture remains the industry standard because it simplifies battery backup integration, improves operational safety, reduces distribution losses, and supports high system reliability. It enables efficient power delivery across baseband units (BBUs), remote radio units (RRUs), and active antenna systems while supporting the redundancy required for carrier-grade networks. The architecture is particularly well suited for continuous service operation and long deployment lifecycles exceeding ten years.

How do SiC and GaN power semiconductors improve telecom base station efficiency?

3 Wide-bandgap (WBG) technologies such as SiC and GaN enable higher switching frequencies, lower switching losses, and greater power density than conventional silicon devices. SiC devices are commonly used in high-power AC-DC conversion and power factor correction stages, while GaN devices are well suited for high-frequency DC-DC conversion. Together they help reduce thermal challenges, shrink magnetic components, improve efficiency, and lower total operating costs in telecom power systems.

Why is power density becoming increasingly important in base stations?

4 As 5G and future wireless networks deploy more radio channels, beamforming functions, and advanced processing hardware, equipment manufacturers must fit greater functionality into limited space. Higher power density enables smaller power supplies, reduced cabinet size, and lower cooling requirements while supporting increasing power demands from BBUs, RRUs, and active antenna units. Efficient power conversion technologies help operators reduce footprint, operating costs, and overall infrastructure complexity.

Why are timing synchronization and monitoring critical in 5G base station design?

5 Advanced 5G technologies such as massive MIMO, beamforming, carrier aggregation, and Time Division Duplexing require extremely accurate timing and phase alignment across distributed network equipment. Standards such as IEEE 1588v2 PTP and SyncE help achieve sub-microsecond synchronization. Combined with accurate current sensing, voltage monitoring, and system diagnostics, precise timing improves spectral efficiency, network reliability, service quality, and support for latency-sensitive applications.

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