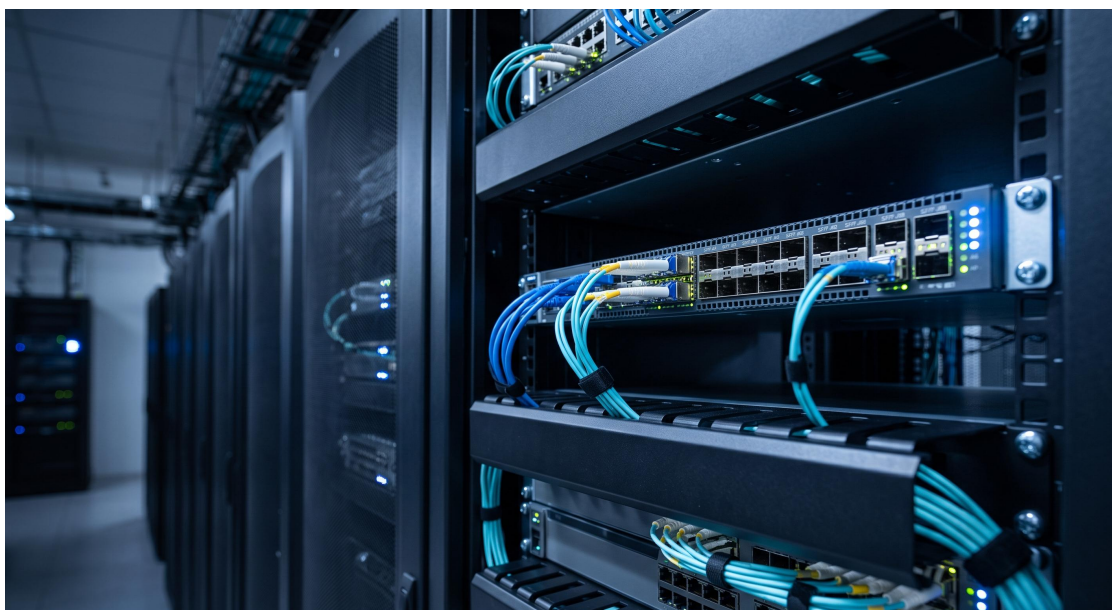


5G Fronthaul 25G SFP28 Selection Manual - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

This document serves as the definitive technical reference for the deployment and procurement of 25G SFP28 optical transceivers within 5G New Radio (NR) fronthaul architectures. As mobile network operators transition to centralized and cloud-based Radio Access Network (C-RAN) topologies, the selection of the appropriate fronthaul optics becomes critical for maintaining enhanced Common Public Radio Interface (eCPRI) performance, low latency, and high reliability. This manual provides a comprehensive breakdown of the hardware specifications, environmental tolerances, and interoperability matrices required for optimal 5G transport network integration.



ARCHITECTURE & CHASSIS DESIGN

The 25G SFP28 portfolio is engineered to address the stringent physical layer demands of 5G fronthaul, bridging the Distributed Unit (DU) and Remote Radio Unit (RRU). The form factor adheres to the Small Form-factor Pluggable (SFP28) Multi-Source Agreement (MSA), ensuring mechanical compatibility with existing high-density line cards. The design philosophy prioritizes thermal efficiency and signal integrity, utilizing a duplex LC connector interface for dual-fiber bidirectional communication or Simplex for BiDi variants. The chassis-level design supports hot-swappable insertion, allowing for field-replaceable unit (FRU) maintenance without service interruption, critical for maintaining the 99.999% carrier-grade availability required in mobile backhaul networks.

HARDWARE FEATURES

Our 25G SFP28 modules incorporate several advanced hardware features to ensure seamless operation in diverse outdoor and indoor environments. Key features include:

- ****Optical Interface****: 1310nm DFB laser for Extended Reach (ER) up to 40km, and 850nm VCSEL for Short Reach (SR) up to 100m, supporting both SMF and

MMF standards.

- **Digital Diagnostics Monitoring (DDM)**: Real-time monitoring of supply voltage, temperature, transmitter bias current, and received optical power, providing essential tools for network maintenance and fault isolation.
- **Forward Error Correction (FEC) Support**: Hardware-level support for RS-FEC (Reed-Solomon) algorithms (e.g., KP4), ensuring link integrity and bit-error-rate (BER) performance better than $1E-12$, which is essential for the high-noise environments typical of fronthaul segments.
- **Low-Latency Design**: Propagation delay optimized to less than 4ns, ensuring that round-trip time (RTT) remains within 3GPP boundaries for time-sensitive synchronization protocols (IEEE 1588v2 / SyncE).

COMPLIANCE & STANDARDS

The modules are rigorously tested and certified against leading international and industry-specific standards. Compliance includes: IEEE 802.3cc (25GBASE-SR/LR/ER), SFF-8472 and SFF-8636 for management interfaces, and RoHS-6/6 for environmental regulation. Additionally, the hardware meets the GR-468-CORE reliability standards for optical components, ensuring robust performance over a 10+ year operational lifespan.

TECHNICAL SPECIFICATIONS

The following section details the core physical and operational parameters for the available 25G SFP28 SKUs. All parameters are guaranteed over the specified operating temperature range.

Parameter	Specification
Form Factor	SFP28 (MSA Compliant)
Data Rate	25.78125 Gbps (NRZ) - 28Gbps Capable
Power Supply Voltage	3.3V $\pm$ 5%
Power Consumption	< 1.5W (SR) / < 2.0W (LR/ER)
Operating Temperature Range	Commercial (0 to 70 ° C) / Industrial (-40 to 85°C)
Fiber Channel Reach	100m (SR) / 10km (LR) / 40km (ER) / 20km (BiDi)

ORDERING OPTIONS

The modularity of the product line allows for tailored solutions based on link distance and fiber type. Standard ordering categories are defined as follows:

- **SFP28-SR**: 850nm VCSEL, 100m reach over OM3/OM4 MMF. Ideal for intra-data center and DU-to-RRU connections within the same campus.
- **SFP28-LR**: 1310nm DFB, 10km reach over SMF. Standardized for metropolitan area fronthaul.
- **SFP28-ER**: 1550nm DFB with APD receiver, 40km reach over SMF. Suited for rural and long-distance tower connectivity.
- **SFP28-BiDi**: 1270nm/1330nm WDM, 10km-20km reach over single-fiber SMF. Designed for scenarios where fiber pair availability is constrained, reducing physical cabling infrastructure.

