EML Selection Guide for Railway Communication Grade EPON Equipment

Overview

EMI Filters for Railway Signaling Systems | EN 50121-4 Design. This guide outlines what EMI filters do in railway signaling applications, which standards.

Key Takeaways

Selecting railway-grade EPON equipment requires compliance with EN 50155, robust EMI/EMC performance, environmental resilience, and proper network design for rolling stock and wayside applications.Key Standards and Compliance

EN 50155 is the primary standard for electronic equipment installed on rolling stock, ensuring devices can withstand vibration, temperature extremes, and power fluctuations typical of railway environments . For wayside equipment, EN 50121-4 applies, focusing on electromagnetic compatibility (EMC) in trackside installations . Compliance with these standards is critical for safety, reliability, and certification approval.

Environmental and Operational Considerations

Railway EPON devices must operate reliably under harsh conditions:

• Temperature: Typically -40°C to +70°C (Class OT3), with some onboard equipment requiring up to +85°C (Class OT4/TX), .

• Vibration and Shock: Devices must tolerate constant mechanical stress from wheels, bogies, and track irregularities .

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• Power Fluctuations: Voltage spikes from catenary systems or regenerative braking must be managed .

• Electromagnetic Interference (EMI): High-voltage contact lines, traction motors, and inverters generate EMI; EPON devices must maintain signal integrity under these conditions .

Network Design Considerations

When selecting EPON equipment for railway communication:

• Device Type: Determine whether the device is for rolling stock (EN 50155) or wayside (EN 50121-4) applications .

• Port Requirements: Assess the number of devices to connect, including future expansion, uplink/downlink ports, and bandwidth needs .

• Fiber Connectivity: Choose the appropriate fiber type (Single Mode, Multi Mode, or WDM), speed (Fast Ethernet or Gigabit Ethernet), and connector type (SC, ST, LC, SFP) based on distance and network topology .

• High-Speed Signal Integrity: Ensure impedance control and EMC design are maintained, especially for high-frequency EPON lines .

Integration with Railway Communication Systems

Railway EPON equipment often interfaces with advanced signalling and communication systems:

• GSM-R and FRMCS: EPON devices must support secure, low-latency communication for train control and passenger services .

• CBTC Systems: Continuous real-time communication between trains and trackside equipment requires reliable EPON links for signaling and control .

• EULYNX Interoperability: Standardized interfaces facilitate cross-border operations and reduce installation complexity .

Supplier and Manufacturing Considerations

• EMS Supplier Experience: Choose suppliers with proven experience in railway-grade electronics and long-term service support .

• Component Selection and Lifespan: Components should support 30-year operational lifespans with minimal maintenance .

• Certification Support: Suppliers should provide documentation and testing to demonstrate compliance with EN 50155/EN 50121-4 and SIL levels where applicable .

Summary

To select EML/EPON equipment for railway communication:

• Ensure EN 50155 compliance for rolling stock or EN 50121-4 for wayside.

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• Verify environmental resilience: temperature, vibration, shock, and EMI tolerance.

• Plan network topology: ports, fiber type, speed, and expansion needs.

• Confirm compatibility with railway communication systems (GSM-R, FRMCS, CBTC).

• Choose experienced suppliers capable of long-term support and certification documentation. Following these guidelines ensures reliable, safe, and future-proof EPON deployment in railway environments.

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