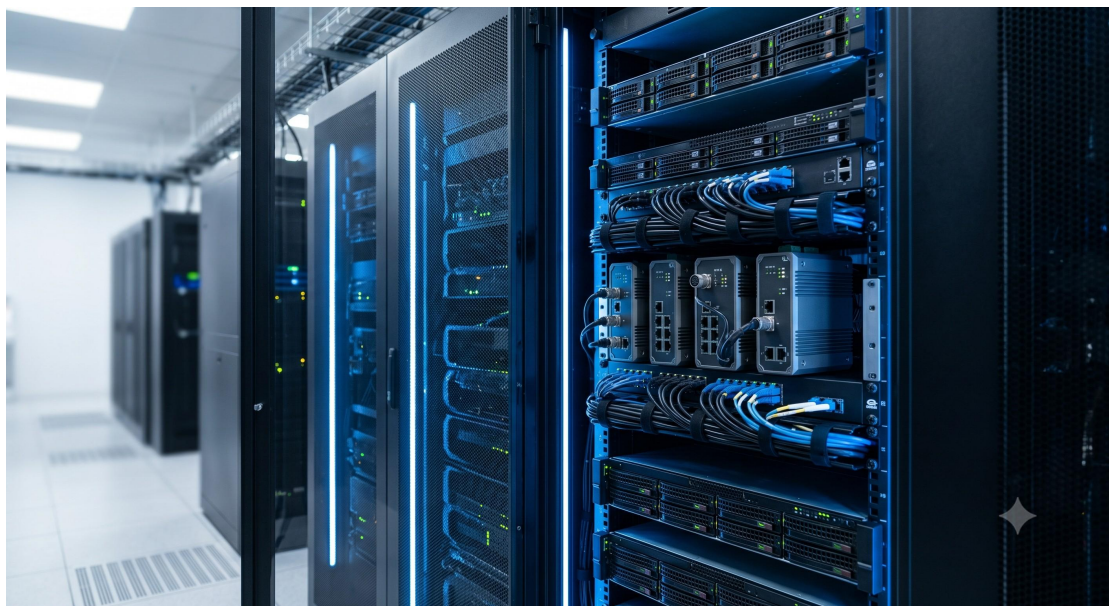


Ruggedized Telecom Infrastructure Application Note: Railway Rolling Stock

EN50155 Certified Switches

PRODUCT IDENTIFICATION & SCOPE

This document provides a comprehensive technical specification and operational overview of the Gen-7 EN50155 Certified Rolling Stock Ethernet Switch Series (hereinafter referred to as the 'Platform' or 'Switch Series'). Designed to address the stringent demands of onboard railway environments, the platform delivers deterministic low-latency Layer 2 switching and basic Layer 3 routing across the consist, enabling Passenger Information Systems (PIS), CCTV surveillance, and Train Control & Monitoring System (TCMS) data backbone.



SYSTEM HARDWARE TOPOLOGY

The Switch Series adopts a fanless, conduction-cooled chassis leveraging a monocrystalline aluminum-magnesium-silicon alloy heatsink. The system topology bifurcates into a fixed-port I/O panel and a rear-module expansion bay for M12 or M23 circular connector adapters. The internal backplane supports a 16 Gbps non-blocking shared memory switch fabric. Key hardware nodes include:

- Power Input Module (PIM): Dual isolated 24/36/48/72/110 VDC nominal inputs (16.8 VDC to 137.5 VDC range).
- CPU Module: ARM Cortex-A9 800 MHz with 256 MB DDR3 SDRAM and 64 MB NOR flash.
- PHY Layer: Automotive-grade BroadReach PHY with 2 kV magnetic isolation per port.

DATA & CONTROL PLANE CAPABILITIES

Forwarding paradigm: Store-and-forward with cut-through configurable on per-port basis. Control plane integrates an industrial protocol gateway (TRDP, MVB over Ethernet, PROFINET, Ethernet/IP). The platform supports VLAN (4k active), IGMP snooping v2/v3, Rapid Spanning Tree (RSTP/MSTP), and an onboard Dying Gasp interrupt for power-loss event capture.

COMPONENT BREAKDOWN – INTEGRATED SUBSYSTEMS

- Ethernet Ports: 8x 10/100/1000BASE-TX via M12 X-coded (IP67) OR 4x 100BASE-FX and 4x 10/100/1000BASE-T (M12 A-coded).
- SFP Slots: 2x Gigabit SFP (100/1000BASE-X) supporting -40 °C to +85 °C industrial SFPs.
- Console: 1x RS-232 via M12 A-coded, CLI accessible.
- Alarm Relay: 2x Dry contact Form-C relay (1A@30VDC) for system health monitoring.
- Storage: microSD slot up to 32 GB for event logging and firmware upgrade.

OPERATIONAL SPECS MATRIX

Parameter	Specification
Form Factor	IP40 rugged aluminum, wall/DIN rail mount (160mm x 150mm x 65mm)
Switching Capacity	12.8 Gbps (non-blocking, full duplex)
Power Supply	Dual isolated 16.8-137.5 VDC, 1+1 hot-standby, 12W max consumption
MTBF (Mean Time Between Failures)	856,000 hours (Telcordia SR-332, 40°C GB)
Ingress Protection	IP40 (unit), IP67 (cabled ports with

	M12 connectors)
Forwarding Rate	9.52 Mpps (64-byte frames)
MAC Table Size	8K entries
Jumbo Frame Support	9,216 bytes
Surge Protection	Common mode: ± 2 kV, Differential mode: ± 1 kV (per EN61000-4-5)

REGULATORY COMPLIANCE – EN50155 EXTENDED MANDATE

The Switch Series holds full conformance to the following railway standards:

- EN 50155 (2017) Class OT4 (-40°C to +85°C operating ambient), Tx (-40°C to +70°C with solar radiation).
- EN 50121-3-2 (EMC for rolling stock apparatus – immunity & emissions).
- EN 45545-2 (Fire safety – Hazard Level HL3).
- IEC 61373 Category 1 Class B (Shock & vibration – Body mounted).
- EN 50153 (Electrical safety protective provisions).

