XPONSHOP Unbranded Wi-Fi 7 Premium ONU RF Shielding and Thermal Dissipation Profile - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

Product Designation: XPONSHOP Unbranded Wi-Fi 7 Premium ONU (Optical Network Unit)

Model Series: XPO-W7PRO-SHIELD Series

Product Classification: Next-Generation Fiber-to-the-Home/Office (FTTH/FTTO) Customer Premises Equipment (CPE)

Core Technology: IEEE 802.11be (Wi-Fi 7) with Integrated GPON/XGS-PON Optical Transceiver

Distinguishing Feature: Advanced Hybrid Engineering of RF Shielding and High-Efficiency Thermal Dissipation within a Compact Form Factor.

This document serves as the definitive technical overview and hardware datasheet for the XPONSHOP Unbranded Wi-Fi 7 Premium ONU. It provides an in-depth analysis of the system's architectural design, focusing on the proprietary RF shielding methodology and the active/passive thermal management profile that ensures carrier-grade reliability and superior wireless performance in dense subscriber environments.



CORE INTERNAL TOPOLOGY

The internal architecture of the XPO-W7PRO-SHIELD is segmented into four distinct functional enclaves to mitigate cross-domain interference and thermal coupling.

1. Optical Front-End (OFE): Houses the Class B+ GPON/XGS-PON transceiver, featuring a hardened fiber optic receptacle. This domain is physically separated from the digital core via a metallic isolation barrier to contain electromagnetic interference (EMI) emanating from the high-speed optical-to-electrical conversion processes.

2. Wi-Fi 7 RF Subsystem (WFS): Central to the design is the Broadcom/MediaTek Wi-Fi 7 chipset, supporting 2.4 GHz, 5 GHz, and 6 GHz frequency bands

(Tri-Band). The 4x4 MIMO antenna array is connected via precision U.FL connectors.

3. RF Shielding Faraday Cage: A continuous, multi-compartment stamped metal cage encapsulates the Wi-Fi 7 RF Subsystem. This cage is engineered to provide > 75 dB of isolation at 6 GHz, preventing desensitization of the upstream optical receiver and ensuring that the ONU does not radiate spurious emissions that could affect adjacent CPEs. The shield is soldered directly to the ground plane to ensure a low-impedance return path.

4. Thermal Dissipation Engine (TDE): Comprising a dual-path thermal solution. Path A utilizes a direct-contact copper heat-pipe assembly that extracts heat from the Wi-Fi 7 Power Amplifiers (PAs) and routes it to a large-area aluminum finned heatsink. Path B utilizes an integrated, temperature-controlled variable-speed blower fan that actively pulls cool air from the bottom vents, across the heatsink, and exhausts it through the rear panel.

SWITCHING SUBSYSTEM CAPABILITIES

The switching and routing subsystem is powered by a high-performance multi-core network processor (NPU) integrated with the main SoC.

- Non-Blocking Switching: Guarantees wire-speed forwarding for all Ethernet ports and the Wi-Fi 7 interface simultaneously.
- Layer 2/3 Offload: Hardware-accelerated bridging, routing, and VLAN tagging to free up CPU resources for advanced QoS and security tasks.
- Queue Management: Supports Advanced QoS with 8 hardware queues per port, enabling strict priority, WFQ, and WRED for latency-sensitive traffic (gaming/VR).

OPERATIONAL ADVANTAGES

The fusion of superior RF shielding and advanced thermal dissipation provides distinct operational advantages for Service Providers (ISPs):

- Uncompromised Wi-Fi 7 Performance: The shielding ensures that the full 320 MHz channel bandwidth capability of Wi-Fi 7 is utilized without interference, delivering peak data rates > 10 Gbps (PHY rate) to high-end client devices.
- Signal Integrity Preservation: By isolating the optical receiver from the high-power Wi-Fi transmitters (EIRP up to 30 dBm per band), the ONU maintains a low BER (Bit Error Rate) on the PON interface, extending the upstream optical budget and allowing for longer fiber plant reach.
- Silent Operation & Longevity: The high-efficiency thermal profile prevents throttling. The intelligent fan speed control operates below 25 dBA under

normal load (< 40 °C ambient), ensuring a silent environment. Maintaining junction temperatures below 85 °C significantly extends the lifespan of the electrolytic capacitors and the Wi-Fi chipset, reducing field failure rates.

SPECIFICATION MATRIX

HARDWARE INTERFACES

- Optical Interface: 1 x SC/APC or SC/UPC GPON/XGS-PON Port (ITU-T G.984/G.987 compliant)
- Ethernet LAN: 1 x 10G/5G/2.5G/1G/100M Multi-Gigabit RJ45 Port, 3 x 1G/100M RJ45 Ports
- Wi-Fi 7 (Tri-Band): 4x4 MIMO (2.4 GHz: 4x4, 5 GHz: 4x4, 6 GHz: 4x4)
- External Button: WPS Pairing / Factory Reset combination button

RF SHIELDING PERFORMANCE

- Shielding Effectiveness (SE): > 65 dB from 100 MHz to 6 GHz (Per MIL-STD-285).
- Shielding Material: Tin-plated steel (SECC) with integrated EMI gaskets on all seams.

THERMAL DISSIPATION PROFILE

- Cooling Type: Passive (Heatsink/Heatpipe) + Active (Variable Speed Blower).

- Thermal Resistance (Junction-to-Ambient): < 2.5 °C/W.

- Operating Temperature Range: 0°C to 45°C.

- Storage Temperature Range: -40°C to 85°C.

- MTBF: > 300,000 Hours (Telcordia SR-332, Issue 4).

Parameter	**Specification**
Form Factor	Compact Desktop / Wall-Mount (175 x 110 x 30 mm)
Switching Capacity	30 Gbps (Full-Duplex Non-Blocking)
Power Supply	External 12V DC / 2.5A (30W Max) Universal AC Adapter
RF Shielding	Stamped Metal Faraday Cage (Tin-plated Steel)
Wi-Fi Standard	IEEE 802.11be (Wi-Fi 7) Tri-Band (2.4/5/6 GHz)
Cooling System	Copper Heatpipe + Aluminum Heatsink + Variable Speed Fan
Max Power Consumption	25W (Typical: 18W)

REGULATORY COMPLIANCE

The XPO-W7PRO-SHIELD is designed to meet the stringent global standards for telecommunications and wireless equipment:

- Safety: IEC 62368-1 (Audio/Video, Information and Communication Technology Equipment).
- EMC: FCC Part 15 Class B, EN 301 489-1/17 (EMC standards for Radio equipment).
- Radio Spectrum: FCC Part 15 (Unlicensed U-NII bands), EN 303 687 (Wi-Fi 7), EN 300 440 (SRD), and regional variations for CE, UKCA, and RCM.
- Telecom: ITU-T G.984/G.987 (GPON/XGS-PON), IEEE 802.3bz (Multi-Gigabit Ethernet), and IEEE 802.3ah (EPON interoperability for specific SKUs).
- Environmental: RoHS 3.0 and REACH compliant. Packaging meets WEEE directive requirements.

