High-Performance Chinese Alternative 10G SFP+ Transceiver Optical Power Register Reference - Official Technical Overview & Hardware Datasheet

PRODUCT IDENTIFICATION

Product Designation: High-Performance Chinese Alternative 10G SFP+ Transceiver Optical Power Register Reference (Model Series: OPR-10G-CN).

This document serves as the definitive technical datasheet and reference manual for the OPR-10G-CN series, a premium, cost-optimized optical transceiver solution engineered for seamless interoperability within existing 10G Ethernet infrastructures. Designed as a high-fidelity alternative to incumbent Tier-1 suppliers, this module integrates advanced Digital Diagnostic Monitoring (DDM) with a proprietary optical power register for enhanced link margin analysis and predictive failure detection.



CORE INTERNAL TOPOLOGY

The OPR-10G-CN series is architected around a 10Gbps InGaAs PIN photodiode and a 1310nm/1550nm DFB laser diode, coupled with a high-sensitivity Transimpedance Amplifier (TIA) and a Limiting Post-Amplifier. The critical innovation lies in the integrated Microcontroller Unit (MCU) which hosts a non-volatile optical power register. This register maintains a calibrated baseline of transmit (Tx) and receive (Rx) optical power, enabling real-time delta analysis against factory parameters. The module employs a high-frequency impedance-controlled ceramic substrate to minimize parasitic capacitance and ensure signal integrity up to 10.3125 Gbps.

SWITCHING SUBSYSTEM CAPABILITIES

This transceiver is fully compliant with the SFF-8431 and SFF-8472 Multi-Source Agreements (MSAs). While operating as a physical layer device, its integration with host systems supports key layer-1 and layer-2 network diagnostic protocols:

- SFP+ Electrical Interface: Compliant with SFI electrical specification for 10.3125 Gbps operation.

- Digital Diagnostic Monitoring (DDM): Real-time monitoring of Temperature, Supply Voltage, Bias Current, Tx Power, and Rx Power with 10-bit ADC

resolution.

- Optical Power Reference Register: Factory-calibrated offset and gain coefficients stored in EEPROM, allowing the host to compute absolute and relative optical power changes with an accuracy of +/- 2dB over industrial temperature ranges.

- Support for IEEE 802.3ae 10GBASE-SR/LR/ER standards depending on the specific SKU variant.

OPERATIONAL ADVANTAGES

- True Interoperability: Rigorously tested for zero-bit-error-rate performance with all major 10G switch and NIC vendors (Cisco, Juniper, Arista, Broadcom, Intel).

- Enhanced Diagnostic Insight: The proprietary optical power register provides maintenance teams with historical power degradation trends, enabling proactive link replacement before signal failure occurs.

- Cost-Effective Performance: Delivers Tier-1 optical performance and reliability at a significantly reduced total cost of ownership (TCO).

- Environmental Resilience: Hardened components support extended operating temperatures from 0°C to 70°C (Commercial) or -40°C to 85°C (Industrial variants).

SPECIFICATION MATRIX

Parameter	**Specification**
Form Factor	SFP+ (Small Form-factor Pluggable Plus)
Data Rate	10.3125 Gbps (9.95 Gbps to 10.3125 Gbps)
Optical Wavelength	1310nm (LR) / 1550nm (ER) / 850nm (SR)
Transmitter Type	DFB Laser Diode (1310/1550nm) / VCSEL (850nm)
Receiver Type	InGaAs PIN Photodiode
Reach (Distance)	300m (SR-Multimode), 10km (LR-SingleMode), 40km (ER-SingleMode)
Power Budget	SR: 7.0dB, LR: 9.0dB, ER: 15.0dB
Power Consumption	<1.0W (Maximum)
Operating Temperature	Commercial: 0°C to 70°C / Industrial: -40°C to 85°C
Digital Diagnostics	Temperature, Voltage, Bias, Tx/Rx Power (with OPR)
Optical Power Register	Factory-calibrated baseline with delta

	tracking accuracy of +/- 2dB
Connector	Duplex LC
MTBF	>1,000,000 Hours (Telcordia GR-468)

REGULATORY COMPLIANCE

The OPR-10G-CN series adheres to stringent international safety and environmental standards, ensuring risk-free deployment in global carrier and enterprise networks:

- Laser Safety: FDA 21 CFR 1040.10 and IEC 60825-1 Class 1 Laser Product compliance.

- EMC/EMI: FCC Part 15 Class B, CE Mark (EN 55032, EN 55024), and VCCI standards.

- Environmental: RoHS-3 (2015/863/EU) and REACH compliant.

- Telcordia Reliability: Designed to meet GR-468-CORE reliability qualification requirements.

