

ICS 33.180.10

CCS M33



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 28511.1-2024

**Integrated optical path devices based on planar lightwave
circuit - Part 1: Optical power splitter based on planar lightwave
circuit (PLC) technology**

平面光波导集成光路器件 第1部分：基于平面光波导（PLC）的光功率分路器

Issued on: October 26, 2024

Implemented on: February 1, 2025

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

1 Scope	1
2 Normative references	1
3 Terms and Definitions	1
4 Abbreviations 3 5 categories	3
5.1 Classification by number of input/output ports	3
5.2 Classification by optical interface type	3
6 Technical Requirements	4
6.1 Optical properties	4
6.2 High power transmission performance requirements	5
6.3 Appearance requirements	5
6.4 Environmental Compliance	5
7 Test Method	6
7.1 Test Environment	6
7.2 Test conditions	6
7.3 Working Bandwidth	7
7.4 Insertion loss	10
7.5 Directionality	12
7.6 Channel Uniformity	13
7.7 Polarization-dependent loss	13
7.8 Return Loss	14
8 Reliability Test	15
8.1 Reliability test environment requirements	15
8.2 Reliability test requirements	15
8.3 Failure criteria	17
9 Inspection Rules	17
9.1 Inspection categories	17
9.2 Factory Inspection	17
9.3 Type inspection	18
10 Marking, packaging, transportation and storage	19
10.1 Signs	19
10.2 Packaging	19
10.3 Transportation	19

19 Appendix A (Informative) Schematic diagram of device packaging structure	20 A.1 Adapter-type optical splitter	20 A.2 Plug-type optical splitter	22 A.3 Pigtail Optical Splitter	23
---	--------------------------------------	-----------------------------------	---------------------------------	----

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part

1. Structure and drafting rules for standardization documents" Drafting. This document is Part 1 of GB/T 28511 Planar Waveguide Integrated Optical Devices. GB/T 28511 has been published as follows part.

1. Optical power splitters based on planar lightguide (PLC);
2. Dense Wavelength Division Multiplexing (DWDM) filters based on arrayed waveguide grating (AWG) technology. This document replaces GB/T 28511.1-2012 "Planar lightguide integrated optical circuit devices Part

1. Planar lightguide (PLC) based Compared with GB/T 28511.1-2012, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

a) Modified some terms and definitions. Optical power splitter (see 3.1, 2012 edition 3.1), channel insertion loss/insertion loss (see 3.6,

3.5 of the 2012 edition), channel uniformity (see 3.8,

3.7 of the 2012 edition), polarization-dependent loss (see 3.9, 2012 edition)

3.8 of 2012), definition of return loss (see 3.10,

3.9 of 2012 edition); added some terms and definitions. PLC devices (see 3.4), PLC components (see 3.5), jumpers (see 3.11);

b) Added a chapter on "Abbreviations" (see Chapter 4);

c) The classification by operating bandwidth has been deleted (see

4.1 of the 2012 edition); the classification by optical interface type has been added (see 5.2);

d) Added 1x2, 1x12, 1x128, and 1x256 categories and corresponding indicators, and changed 1x4, 1x8, 1x16, 1x24, Parameters and notes for 1x32 and 1x64 (see Table 1, Table 1 of the 2012 edition);

1 Scope

GB/T 28511.1-2024 specifies the PLC optical power splitter, the component that divides

one fibre into many in a passive optical network. It is the most-produced photonic integrated device in the world and China makes most of them: every fibre-to-the-home split, one into eight, sixteen or thirty-two, passes through one, and its insertion loss, uniformity and polarisation dependence set the optical budget of the whole access network. The standard sets the classification, by number of input and output ports and by optical interface type, and then the technical requirements: the optical properties, insertion loss, uniformity, return loss, directivity, polarisation dependent loss and wavelength dependence across the operating bands, the mechanical and environmental requirements including the temperature cycling and damp heat behaviour that determine field life, and the requirements on the package, pigtails and connectors. It then covers the test methods, the inspection rules and the marking, packaging, transport and storage. For a component maker or a network operator specifying splitters, this is the acceptance text. It takes effect on 1 February 2025.

This document defines the terms and Definitions, abbreviations, specifies requirements for optical characteristics, transmission performance, packaging structure, etc., describes corresponding test methods, specifies inspection rules, Marking, packaging, transportation and storage, etc. This document applies to the design, development, production and inspection of single-mode fiber-coupled PLC optical splitter equalizing devices and components.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document. For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to This document.

GB/T 191 Pictorial symbols for packaging, storage and transportation

GB/T 2828.1 Sampling procedures for inspection by attributes Part

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 Optical power splitter opticalpowersplitter Optical passive devices used to realize power coupling and distribution functions of optical signals.

3.2 An optical power splitter manufactured using planar optical waveguide technology.

3.3 operating bandwidth The optical wavelength range that meets the optical performance index requirements of PLC optical splitters.