GPON – GigaLine® Passive Optical Network for smart buildings

The Quality Connection

LEONI
GPON (Gigabit-capable Passive Optical Network)

GPON is a passive one fiber optical network. Inherited from FTTH’s (Fiber To The Home) long-distance technology, the FTTO (Fibre To The Office) or POL (Passive Optical LAN) solution is now part of a new approach to tertiary (horizontal) cabling pushed by GPON technologies.

The growing deployment of fiber optics in the territories and now even in homes, is now coming to offices.

Synonymous with sustainability, savings and security, GPON stands out in a trend of a market that is moving towards cloud computing, smart building and the convergence of networked applications.

Main characteristics of GPON

- **Consistent bandwidth** e.g. 2.5 upto 10 GBE
- **Technological durability**
- **Passive system** (energy saving, maintenance, licenses)
- **All network applications** (IT, IP telephony, IP video, Wifi, POE, IPTV, RFTV, analog telephony, analog video…)
- **Increased security in the local network infrastructure**
- **Transmission distance** (simple, fast and easily adjustable installation)
- **Gain of space, weight, components** (no specific cable trays, no secondary technical rooms, reduced environmental impact)
- **Optimization OPEX, CAPEX and R.O.I** (Operating Expenditure, Capital Expenditure, Return On Investment)
- **Ideal for large and / or complex sites** (shopping centers, hospital, hotel complexes, campus, stadium, concert halls, classified sites, asbestos sites, …)
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Data Communication & Networks
Profile

Intelligent solution for energy and data management

We’re taking the smart route to managing bigger volumes of data.

Since the beginnings of the world of digital data, we’ve provided our customers with the power to innovate and visionary steps designed to deliver high-performance components for communication channels worldwide. New challenges are now faced as part of the digitalization of efficient energy and data management, smart cities and the Internet of Things. To ensure greater customer focus and a wider choice of business models, the future is all about capturing and exploiting these data flows.

We’re the experts in channelling data. Connectivity is our business. For over 40 years, we’ve been developing reliable, high-performance transmission systems for bigger bandwidth and higher speeds – and always with an eye on the application, the specification – and our customers worldwide. Today, our product portfolio covers the entire spectrum of transmission standards for data and communication networks.

This is the engine that drives our ‘Passion for Intelligent Energy and Data Solutions’. We get data to work for us and for you – for greater efficiency and long-term business success. We will use innovative products for continuous network monitoring and optimization, for eliminating potential bottlenecks and faults, and to ensure the optimum planning and configuration of your solution. We will use intelligent solutions to analyse network infrastructure, and to channel your data and energy more efficiently.

We’re channelling data again – but this time, our smart data will be working for you.

Let’s use data intelligence to grow our business together.

The LEONI group
LEONI is a global provider of products, solutions and services for energy and data management in the automotive sector and other industries. The value chain encompasses wires, optical fibers, standardised cables, special cables and assembled systems as well as intelligent products and smart services. As an innovation partner and solutions provider, LEONI supports its customers with pronounced development and systems expertise. The market-listed group of companies employs more than 88,000 people in 31 countries and generated consolidated sales of EUR 4.9 billion in 2017.

Further informations www.leoni.com
The cities thus offer their residents access to increasingly high flows to everyone’s home, and now even in buildings for professional use.

In Europe, the more recent FTTH deployment, and by the political will of many states, tends to increase the interest of investors and entrepreneurs for GPON networks to promote digital access in all companies (FTTB: Fiber to the Business)

### FTTH/B Global Ranking – Sep 2017

**Household Penetration of countries* with more than 1% household penetration**

*Economies with at least 200,000 households

**Source:** IDATE for FTTH Council Europe, February 2018
Technology
The GPON is a purely passive cabling system and has a low energy consumption.

This “point-to-multipoint” optical solution allows to share part of the infrastructure between several users. The key element of the architecture is a “1 to n” passive optical coupler (splitter) that distributes the optical signal to many access points.

The GPON uses TDM (Time Division Multiplexing) for 32 or 64 (or 128) users sharing a bit rate of 2.5 Gbit/s for the downstream direction (OLT ➔ ONT) and 1.25 Gbit/s for the upstream direction (ONT ➔ OLT).

Through its technological durability, it frees itself from complex upgrades in the face of upcoming technological developments such as 10GPON, XGPON and TWDM-GPON.

Particularly suited to digital applications, the GPON allows the pooling of many networks (IP telephony, IP video, analog telephony, analog video, Wifi, POE, IPTV, RFTV, video protection, access control, …).

The structure of a GPON network.

› **OLT** (Optical Line Termination) separates the access network from the access line.

› **Splitter** distributes the optical signal to ONT’s.

› **ONT** (Optical Network Termination) is the termination point of the optical fiber network.
Producer of significant savings in terms of investments (CAPEX), it is sustainable in the face of technological developments, easy to update, easy and quick to install.

Insensitive to EMC disturbances, the GPON travels with strong currents and does not require a dedicated cable path. Its optical mode gives it, moreover, a real security of the transmissions.

Its bandwidth is substantial and the transmission distance can reach 5 km. It requires fewer or smaller technology rooms and therefore frees up space for users.

Highly scalable, the network architecture can be modified or extended simply and quickly. Workspaces are therefore adaptable to wish. Significant savings come from the cost of building operations. Occupying little space in terms of infrastructure, it is very suitable for complex buildings, large, and old or even classified (stadiums, campuses, hospitals, multisites, hotel complexes, military and government sites …).

### Environmental added value

Environmental impact is now a priority for building owners, businesses and real estate investors.

GPON does not consume natural resources like copper. Its environmental impact is therefore more favorable. It requires less electrical energy to operate and air conditioning. The GPON, by its durability, does not require new successive wiring for the normative upgrade. Thus, it provides a better carbon footprint that does not generate repetitive industrial waste.

In addition, the technological longevity of GPON cabling undoubtedly improves real estate return on investment (ROI).

### Real estate added value

For many reasons, the GPON generates operating savings (OPEX) and valuation of real estate assets.

Compact, it is installable without major adaptation of a building. It preserves the aesthetics but also the content, especially if the building is classified. With the majority of passive elements (apart from the unifying switch), the GPON is energy efficient. It is actually less prone to breakdowns, maintenance costs incurred and expenses for license renewals.

Its installation is simple, including buildings that are difficult to access or have a complex architecture. Structural costs are reduced, fewer technical rooms, less space for the LAN, less flammable components, fewer cable paths, …

Enables all network applications, it emphasizes the Smart Building aspect which ultimately values the real estate asset concerned. Therefore such a building can be synonymous with surplus value during a possible resale.

The GPON also highlights the attractiveness of a site by its technological level (university) or its financial potential (performance in terms of security, energy consumption, lower insurance premiums etc.)
GigaLine® 2 core drop cable

Use
For GPON applications and for direct connector assembly.
For inhouse cabling.

Construction
1. Two optical fibers E9/125 G657.A2, colours blue and orange
2. Strength elements Non-metallic (GFK)
3. Cable sheath Halogen-free, flame-retardant compound
4. Sheath colour White

Advantages
- easy to strip
- simple installation
- space saving

Type KL-I-F(ZN)H 2 E9/125 OS2 G657.A2

Thermal properties
- Transport/storage: –20 °C to +60 °C
- Installation: –10 °C to +60 °C
- Operating temp.: –20 °C to +60 °C

Mechanical characteristics
- Min. bend radius (over flat side):
  - static: 10 x outer diameter
  - dynamic: 20 x outer diameter
- Max. crush strength short-term: 1000 N/dm

Fire behaviour
- Smoke density: IEC 61034
- Halogen free: IEC 60754-1
- Flame retardancy: IEC 60332-1-2
- Class: Eca, acc. to EN 50575 / EN 50390
- DoP: CCNCS0000001

<table>
<thead>
<tr>
<th>Fibers</th>
<th>Dimensions</th>
<th>Weight approx.</th>
<th>Tensile strength</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>E9/125 G657.A2</td>
<td>2.0 x 3.0 mm</td>
<td>9.0 kg/km</td>
<td>80 N</td>
<td>LKD 8BC2 2005 0000</td>
</tr>
</tbody>
</table>
GigaLine® Semi preassembled secondary link
2 SC/APC sx + pigtail OS2 G657.A2 for GPON applications

GigaLine® Preassembled link

Description
Semi preassembled secondary link for GPON applications.
FO drop cable with 2 SC/APC or 2 LC/APC on one side.
One pigtail SC/APC or LC/APC.

Construction
- Length of single elements: 60 cm
- Cable dimension: 2.0 mm x 3.0 mm
- Cable colour: white
- Pigtail: semitight buffer 0.9 mm, length 2.0 m

Thermal properties
- Transport/storage: –20 °C to +60 °C
- Installation: –5 °C to +50 °C
- Operating temp.: –20 °C to +60 °C

Optical characteristics
- Insertion loss: < 0.3 dB
- Return loss: > 35 dB (APC)

Mechanical characteristics
- Min. bend radius:
  - static: 35 mm
  - dynamic: 65 mm
  - for single elements: 30 mm
- Max. tensile force: 600 N
- Max. crush strength: 1000 N/dm

Advantages
- no on site assembly
- one connector in reserve
- simple installation
- space saving
- upgradeable

<table>
<thead>
<tr>
<th>Description</th>
<th>Connector colour</th>
<th>Fiber type</th>
<th>Length</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaLine® link</td>
<td>Green</td>
<td>G657.A2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semi preassembled secondary</td>
<td></td>
<td></td>
<td>10.0 m</td>
<td>LKD 9DG0 0039 0100</td>
</tr>
<tr>
<td>2 SC / APC</td>
<td></td>
<td></td>
<td>20.0 m</td>
<td>LKD 9DG0 0039 0200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30.0 m</td>
<td>LKD 9DG0 0039 0300</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40.0 m</td>
<td>LKD 9DG0 0039 0400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50.0 m</td>
<td>LKD 9DG0 0039 0500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60.0 m</td>
<td>LKD 9DG0 0039 0600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70.0 m</td>
<td>LKD 9DG0 0039 0700</td>
</tr>
<tr>
<td>GigaLine® link</td>
<td>Green</td>
<td>G657.A2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>semi preassembled secondary</td>
<td></td>
<td></td>
<td>10.0 m</td>
<td>LKD 9DG0 0052 0100</td>
</tr>
<tr>
<td>2 LC / APC</td>
<td></td>
<td></td>
<td>20.0 m</td>
<td>LKD 9DG0 0052 0200</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30.0 m</td>
<td>LKD 9DG0 0052 0300</td>
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<td></td>
<td></td>
<td></td>
<td>40.0 m</td>
<td>LKD 9DG0 0052 0400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50.0 m</td>
<td>LKD 9DG0 0052 0500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>60.0 m</td>
<td>LKD 9DG0 0052 0600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70.0 m</td>
<td>LKD 9DG0 0052 0700</td>
</tr>
</tbody>
</table>

www.leoni-data.com
**GigaLine® FO splitter**

**Use**

For GPON applications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product type</td>
<td></td>
<td>1x2 1x8 1x16 1x32</td>
</tr>
<tr>
<td>Operating wavelength</td>
<td>Nm</td>
<td>1260 to 1650</td>
</tr>
<tr>
<td>Insertion loss</td>
<td>typ. dB</td>
<td>3.6 10.9 14.2 17.2</td>
</tr>
<tr>
<td></td>
<td>max. dB</td>
<td>4.3 11.3 14.5 17.8</td>
</tr>
<tr>
<td>Uniformity (max.)</td>
<td>dB</td>
<td>0.5 0.8 1.4 1.5</td>
</tr>
<tr>
<td>PDL (max.)</td>
<td>dB</td>
<td>0.2 0.3 0.3 0.3</td>
</tr>
<tr>
<td>TDL (max.)</td>
<td>dB</td>
<td>0.5</td>
</tr>
<tr>
<td>Return loss</td>
<td>dB</td>
<td>≥55 (APC type connectors) / 50 (UPC type connectors)</td>
</tr>
<tr>
<td>Directivity</td>
<td>dB</td>
<td>≥55</td>
</tr>
<tr>
<td>Operating &amp; storage temperature</td>
<td>°C</td>
<td>–40 to +85</td>
</tr>
<tr>
<td>Connector types</td>
<td></td>
<td>LC, SC</td>
</tr>
<tr>
<td>Housing dimensions</td>
<td>mm</td>
<td>90 x 20 x 9.5 100 x 80 x 10 120 x 80 x 18 120 x 80 x 18</td>
</tr>
</tbody>
</table>

**Advantages**

- low insertion and low polarization dependent loss
- high return loss
- uniform power splitting
- compact design
- wide operating wavelength
- excellent environmental & mechanical stability

**Description**

<table>
<thead>
<tr>
<th>Description</th>
<th>Fiber type</th>
<th>Connector type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaLine® splitter housing 1x8</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0019 0000</td>
</tr>
<tr>
<td>GigaLine® splitter housing 1x16</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0018 0000</td>
</tr>
<tr>
<td>GigaLine® splitter housing 1x32</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0017 0000</td>
</tr>
</tbody>
</table>
GigaLine® FO wall mounting splitter box

Use
For GPON applications.

Properties
- wall mounting housing
- compact design
- lockable

Construction

<table>
<thead>
<tr>
<th>Description</th>
<th>Fiber type</th>
<th>Connector type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaLine® splitter wall box  1x8</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0011 0000</td>
</tr>
<tr>
<td>GigaLine® splitter wall box  1x16</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0012 0000</td>
</tr>
<tr>
<td>GigaLine® splitter wall box  1x32</td>
<td>G657.A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0 0013 0000</td>
</tr>
</tbody>
</table>

Advantages
- robust
- easy to install
- lockable
- dust proof

Description Fiber type Connector type Order no.
GigaLine® splitter wall box  1x8 G657.A2 SC/APC 8° LKD 9DG0 0011 0000
GigaLine® splitter wall box  1x16 G657.A2 SC/APC 8° LKD 9DG0 0012 0000
GigaLine® splitter wall box  1x32 G657.A2 SC/APC 8° LKD 9DG0 0013 0000

Optical characteristics
see table on page 10

Configuration
Equipment SC simplex, LC duplex

Scope of delivery
- Housing complete with front panel, cover and fixing bracket, adapters
- splitter up to 1 to 32
- one lock and two keys
**GigaLine® FO splitter panel**
Box 19" / 1 RU, splitter 1/2 to 32

---

**Use**
For GPON applications.

**Properties**
The housing depth is continuously adjustable by up to 50 mm.
Telescopic and removable drawer.

**Construction**
<table>
<thead>
<tr>
<th>Housing</th>
<th>Aluminium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front panel</td>
<td>Steel sheet, powder coated, colour: grey RAL 7035</td>
</tr>
<tr>
<td>Labelling</td>
<td>Channel 1–12 / 1–24</td>
</tr>
<tr>
<td>Dimensions</td>
<td>19&quot; / 1 RU</td>
</tr>
<tr>
<td></td>
<td>44 mm x 483 mm x 220 mm (HxWxD)</td>
</tr>
<tr>
<td>Weight</td>
<td>approx. 2 kg</td>
</tr>
</tbody>
</table>

**Optical characteristics**
see table on page 10

**Configuration**
Equipment SC simplex, LC duplex

**Scope of delivery**
Housing complete with front panel, cover and fixing bracket, adapters, 1 splitter up to 1 to 32

---

### Advantages
- extremely light
- telescopic housing
- easy to install

<table>
<thead>
<tr>
<th>Description</th>
<th>Splitters</th>
<th>Fiber type</th>
<th>Connector type</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaLine® splitter 19&quot; box</td>
<td>1x8</td>
<td>G657A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0-0005 0000</td>
</tr>
<tr>
<td>GigaLine® splitter 19&quot; box</td>
<td>1x16</td>
<td>G657A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0-0006 0000</td>
</tr>
<tr>
<td>GigaLine® splitter 19&quot; box</td>
<td>1x32</td>
<td>G657A2</td>
<td>SC/APC 8°</td>
<td>LKD 9DG0-0007 0000</td>
</tr>
</tbody>
</table>
GigaLine® FO splice box, pull out
Box 19" / 1 RU, SC dx, fiber G657.A2

Description
Telescopic fiber optic patch panel for up to 48 fibers.
Suitable for terminating with pigtails.

Properties
The housing depth is continuously adjustable by up to 50 mm.
Telescopic and removable drawer.

Construction
Housing: Aluminium
Front panel: Steel sheet, powder coated, colour: grey RAL 7035
Pigtails: Pigtails ready for splicing, secondary coating removed and placed in the cassette, connector plugged (colours acc. to IEC 60304)
Labelling: Channel 1–12 / 1–24
Dimensions: 19" / 1 RU
44 mm x 483 mm x 220 mm (HxWxD)
Weight: approx. 2 kg

Optical characteristics
Insertion loss: for all fiber types (typ.) 0.15 dB (max.) 0.30 dB
Return loss: E9/125 PC OS2 low bend G657.A2 > 50 dB
(min.) E9/125 APC OS2 low bend G657.A2 > 65 dB

Configuration
Equipment: SC simplex, LC duplex

Scope of delivery
Housing complete with front panel, cover and fixing bracket,
adapters, pigtails, 1x M20 gland, 4x cable tie, 1x blind cover
20mm, twist lock, splice tray, splice holder, cover

Accessories (optional)
Break out bracket for fixing cables with cable ties

Order no.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Incl. heat shrink splice protections</td>
<td>Incl. heat shrink splice protections</td>
<td>Incl. crimp splice protections</td>
<td>Incl. crimp splice protections</td>
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<tr>
<td>24</td>
<td>LKD 9D31 A545 0000</td>
<td>LKD 9D31 A387 0000</td>
<td>LKD 9D31 A556 0000</td>
<td>LKD 9D31 A557 0000</td>
</tr>
</tbody>
</table>

Advantages
- extremely light
- telescopic housing
- easy to install
- excellent optical properties
GigaLine® FO wall outlet 45 x 45
assembled with adapter

Advantages
- compatible to french switch range

GigaLine® Wall outlet 45 x 45

French design
Wall outlet for installation in french style wall outlet systems.
Mountable in conventional frames 45 x 45.

Construction
- Housing body: ABS
- Colours: Signal white, RAL 9010
- Ports: 1
- Shutter: Transparent, with space for LASER label
- Labelling field: 35 mm x 12 mm
- Assembling: SC/APC simplex adapter (green)
- Mounting: in steps of 90°

Dimension
45 mm x 45 mm x 31 mm (H x B x D),

<table>
<thead>
<tr>
<th>Article</th>
<th>PU.</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GigaLine® wall outlet 45 x 45 with shutter, SC/APC simplex adapter, green</td>
<td>10*</td>
<td>LKD 9DG0 0046 0000</td>
</tr>
<tr>
<td>GigaLine® wall outlet 45 x 45 with shutter, LC/APC duplex adapter, green</td>
<td>10*</td>
<td>LKD 9DG0 0059 0000</td>
</tr>
</tbody>
</table>

* packed in a cardboard box
**GigaLine® FO Patch SC and LC simplex**

OS2 G657.A2

**Description**

Simplex patch cord for passiv optical network

**Construction**

- **Cable type**: Simplex cable
- **Fiber**: G657.A2 SC simplex or LC simplex
- **Strain relief**: Aramid
- **Cable sheath**: Halogen-free compound
- **Sheath colour**: OS2 (yellow)
- **Cable diameter**: 2.1 mm
- **Wiring**: A to B

**Thermal properties**

- **Transport/storage**: –25 °C to +70 °C
- **Installation**: –5 °C to +50 °C
- **Operating temperature**: –10 °C to +70 °C

**Advantages**

- Robust design
- Excellent optical values

**Mechanical characteristics**

<table>
<thead>
<tr>
<th>Static Bending radius</th>
<th>Dynamic Bending radius</th>
<th>Tensile strength single element</th>
<th>Tensile strength aramid</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 mm</td>
<td>65 mm</td>
<td>30 mm</td>
<td></td>
</tr>
</tbody>
</table>

**Optical characteristics**

- **Insertion loss**: < 0.3 dB (typ.)
- **Return loss**: OS2 > 50 dB (PC)
- **(min.)**: > 65 dB (APC)

**Fire behaviour**

- **Flame retardancy**: IEC 60332-1 / IEC 60332-3-24
- **Halogen-free**: IEC 60754-2
- **Smoke density**: IEC 61034

**Cable length**

See table, other connector types and lengths on request.

### Lengths and Connector Types

<table>
<thead>
<tr>
<th>Length</th>
<th>Connector Colour</th>
<th>Fiber Type</th>
<th>Description</th>
<th>Order no.</th>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 m</td>
<td>Green</td>
<td>G657A2</td>
<td>GigaLine® Patch simplex SC / APC – SC / APC</td>
<td>LKD 9A13 1696 0005</td>
<td>GigaLine® Patch simplex LC / APC – LC / APC</td>
<td>LKD 9A13 1703 0005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LKD 9A13 1696 0010</td>
<td></td>
<td>LKD 9A13 1703 0010</td>
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<td>LKD 9A13 1696 0030</td>
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<td>LKD 9A13 1703 0030</td>
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<td></td>
<td></td>
<td></td>
<td>LKD 9A13 1696 0100</td>
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<td>LKD 9A13 1703 0100</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>LKD 9A13 1696 0010</td>
<td></td>
<td>LKD 9A13 1703 0010</td>
</tr>
<tr>
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<td></td>
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<td></td>
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<td>LKD 9A13 1703 0030</td>
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<td></td>
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<td>LKD 9A13 1703 0100</td>
</tr>
<tr>
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<td>LKD 9A13 1670 0010</td>
<td></td>
<td>LKD 9A13 1709 0010</td>
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<tr>
<td></td>
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<td>LKD 9A13 1670 0030</td>
<td></td>
<td>LKD 9A13 1709 0030</td>
</tr>
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<td></td>
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<td></td>
<td>LKD 9A13 1670 0100</td>
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<td>LKD 9A13 1709 0100</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LKD 9A13 1670 0010</td>
<td></td>
<td>LKD 9A13 1709 0010</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>LKD 9A13 1670 0030</td>
<td></td>
<td>LKD 9A13 1709 0030</td>
</tr>
<tr>
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<td></td>
<td>LKD 9A13 1670 0100</td>
<td></td>
<td>LKD 9A13 1709 0100</td>
</tr>
</tbody>
</table>
**GigaLine® FO splice cassette, cover and splice holder**

**GigaLine® accessories**

**Description**
- **Splice cassette**
  For using in wall and rackmount fiber enclosures, patch panels and distribution boxes. Designed to contain splice holders and protect splice protectors and manage the incoming and outgoing fibers. Stackable for max. two splice holders for 2x 6 splices.

- **Splice cover**
  To protect the fibers in the highest splice cassette.

- **Splice holders**
  1. Fig. 3 for 6 heat shrink splice protectors.
  2. Fig. 4 for 12 crimp splice protectors.

**Properties**
- Splice cassette according to IEC 61073, DIN 47662.

**Construction**
- **Splice cassette**
  Plastic housing
  Dimensions: 8 mm x 92 mm x 155 mm (HxWxL)

- **Splice cover**
  Plastic housing
  Dimensions: 3 mm x 92 mm x 155 mm (HxWxL)

**Mechanical characteristics**
- Bending radius static: > 30 mm

**Advantages**
- Completes the GPON programme

---

<table>
<thead>
<tr>
<th>Fig.</th>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GigaLine® splice cassette</td>
<td>KC000010</td>
</tr>
<tr>
<td>2</td>
<td>GigaLine® splice cover</td>
<td>KC000011</td>
</tr>
<tr>
<td>3</td>
<td>GigaLine® splice holder for 6 heat shrink splice protectors</td>
<td>KC000022</td>
</tr>
<tr>
<td>4</td>
<td>GigaLine® splice holder for 12 crimp splice protectors</td>
<td>KC000012</td>
</tr>
</tbody>
</table>
**GigaLine®** FO SC pigtail and LC pigtail

with fiber type G657.A2

---

### GigaLine® Pigatils

**Description**

Pigtail for patch panels and distribution boxes.

**Connector**

SC (IEC61754-4) / LC (IEC61754-20)

**Pigtail construction**

<table>
<thead>
<tr>
<th>Length</th>
<th>Buffer</th>
<th>Colours</th>
<th>Connector and boot colour</th>
<th>Fiber type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 m</td>
<td>Semi tight Ø 0.9 mm</td>
<td>Pigtail set acc. to IEC 60304: red, green, blue, yellow, white, grey, brown, violet, turquoise, black, orange, pink</td>
<td>Singlemode / APC OS2</td>
<td>E9/125 OS2 low bend (G657.A2, IEC60793-2-50 B6_a2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Singlemode / PC OS2</td>
<td></td>
</tr>
</tbody>
</table>

**Ferrule**

Ceramic

**Advantages**

- easy to install
- excellent optical values

---

### Thermal properties

- **Installation**
  - \(-5 \, ^\circ C\) to +50 \, ^\circ C\)
- **Operating temperature**
  - \(-25 \, ^\circ C\) to +70 \, ^\circ C\)

### Optical characteristics

- **Insertion loss** (IEC 61300-3-4, method B)
  - 0.15 dB (typical)
  - 0.30 dB (max.)
- **Return loss** (IEC61300-3-6) see table

### Mechanical characteristics

- **Surface**
  - acc. to ISO/IEC61300-3-35
- **Bending radius**
  - ≥ 30 mm

---

<table>
<thead>
<tr>
<th>Fig.</th>
<th>Description</th>
<th>Housing colour</th>
<th>Return loss</th>
<th>Buffer colour</th>
<th>Length</th>
<th>PU (set)</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GigaLine® Pigtales G657.A2 SC / APC 8°</td>
<td>green</td>
<td>&gt; 65 dB</td>
<td>yellow</td>
<td>2.0 m</td>
<td>8</td>
<td>LKD 9D00 0287 0000</td>
</tr>
<tr>
<td>2</td>
<td>GigaLine® Pigtales G657.A2 SC / UPC 8°</td>
<td>blue</td>
<td>&gt; 50 dB</td>
<td></td>
<td></td>
<td></td>
<td>LKD 9D00 0288 0000</td>
</tr>
<tr>
<td>3</td>
<td>GigaLine® Pigtales G657.A2 LC / APC 8°</td>
<td>green</td>
<td>&gt; 65 dB</td>
<td></td>
<td></td>
<td></td>
<td>LKD 9D00 0291 0000</td>
</tr>
<tr>
<td>4</td>
<td>GigaLine® Pigtales G657.A2 LC / UPC 8°</td>
<td>blue</td>
<td>&gt; 50 dB</td>
<td></td>
<td></td>
<td></td>
<td>LKD 9D00 0292 0000</td>
</tr>
</tbody>
</table>

---

www.leoni-data.com
**GigaLine® FO attenuator**

Type LC / APC, SC / PC, SC / APC

---

**Description**

To reduce the signal in an optical transmission link. It has to be established in order to avoid the risk of overloading the optical receiver due to insufficient line attenuation. Attenuators are available up to 30 dB.

---

**Construction**

<table>
<thead>
<tr>
<th>Connector</th>
<th>Ferrule</th>
<th>Housing</th>
</tr>
</thead>
<tbody>
<tr>
<td>to adaptor</td>
<td>ceramics</td>
<td>plastics</td>
</tr>
</tbody>
</table>

---

**Thermal properties**

<table>
<thead>
<tr>
<th>Installation</th>
<th>Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 °C to +80 °C</td>
<td>-40 °C to +80 °C</td>
</tr>
</tbody>
</table>

---

**Advantages**

- excellent environmental stability
- attenuation stability
- excellent return loss
- polarization insensitive
- easy installation

---

**Optical characteristics**

<table>
<thead>
<tr>
<th>Insertion loss</th>
<th>Colour</th>
<th>Attenuation</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 5 dB</td>
<td>green</td>
<td>3 dB</td>
<td>LKD 9DG0 0001 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0002 0000</td>
</tr>
<tr>
<td>6 to 10 dB</td>
<td>blue</td>
<td>3 dB</td>
<td>LKD 9DG0 0003 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0004 0000</td>
</tr>
<tr>
<td>11 to 15 dB</td>
<td>green</td>
<td>3 dB</td>
<td>LKD 9DG0 0049 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0050 0000</td>
</tr>
<tr>
<td>16 to 20 dB</td>
<td>blue</td>
<td>3 dB</td>
<td>LKD 9DG0 0047 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0048 0000</td>
</tr>
<tr>
<td>&gt; 20 dB</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Return loss**

<table>
<thead>
<tr>
<th>≥ 50 dB (PC)</th>
<th>≥ 60 dB (APC)</th>
</tr>
</thead>
</table>

**Standards**

- SC (IEC61754-4) or LC (IEC61754-20)
- Telcordia GR-910-core requirement

---

**Fig. Description Colour Attenuation Order no.**

<table>
<thead>
<tr>
<th>Fig.</th>
<th>Description</th>
<th>Colour</th>
<th>Attenuation</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GigaLine® Attenuator with connector type SC / APC</td>
<td>green</td>
<td>3 dB</td>
<td>LKD 9DG0 0001 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0002 0000</td>
</tr>
<tr>
<td>2</td>
<td>GigaLine® Attenuator with connector type SC / UPC</td>
<td>blue</td>
<td>3 dB</td>
<td>LKD 9DG0 0003 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0004 0000</td>
</tr>
<tr>
<td>3</td>
<td>GigaLine® Attenuator with connector type LC / APC</td>
<td>green</td>
<td>3 dB</td>
<td>LKD 9DG0 0049 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0050 0000</td>
</tr>
<tr>
<td>4</td>
<td>GigaLine® Attenuator with connector type LC / UPC</td>
<td>blue</td>
<td>3 dB</td>
<td>LKD 9DG0 0047 0000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 dB</td>
<td>LKD 9DG0 0048 0000</td>
</tr>
</tbody>
</table>
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