# Contents

## Introduction
A Complete Offer to Cover All Environments .................................................................................................................. 9-2
Worldwide Radiall Fiber Optic Presence .......................................................................................................................... 9-2
End-to-end Harness and Optical System Solutions ........................................................................................................ 9-3
Radiall’s Fiber Optic Mission ........................................................................................................................................... 9-3

## Indoor Cable Assemblies
Presentation ..................................................................................................................................................................... 9-4
Components for Indoor Cable Assemblies ...................................................................................................................... 9-5
How to Order .................................................................................................................................................................... 9-6

## Outdoor Cable Assemblies
Presentation ..................................................................................................................................................................... 9-7
Components for Outdoor Cable Assemblies ................................................................................................................... 9-8
How to Order .................................................................................................................................................................... 9-9
Standard Part Numbers for RXF Cable Assemblies ............................................................................................... 9-10 to 9-12
Standard Part Numbers for R2CT® Cable Assemblies ............................................................................................ 9-13
Standard Part Numbers for OSIS® Cable Assemblies ..................................................................................... 9-14 to 9-15

## Harsh Environment Cable Assemblies
Presentation ..................................................................................................................................................................... 9-16
Components for Harsh Environment Cable Assemblies ............................................................................................... 9-17 to 9-18
How to Order .................................................................................................................................................................... 9-19
Standard Jumpers for Harsh Environments ................................................................................................................. 9-20
MT Based Cable Assemblies ........................................................................................................................................ 9-21
EB Based Cable Assemblies ........................................................................................................................................ 9-22

## Tactical Cable Assemblies
Presentation ..................................................................................................................................................................... 9-23
Components for Tactical Assemblies ............................................................................................................................ 9-24
How to Order .................................................................................................................................................................... 9-25
Accessories ....................................................................................................................................................................... 9-26
Product Range Extension .............................................................................................................................................. 9-26

## Harnesses and Optical Systems
Presentation ..................................................................................................................................................................... 9-27
Components for Harnesses and Optical Systems ........................................................................................................ 9-28
Hybrid Electrical/Optical Systems ................................................................................................................................ 9-29
Fiber Management and Optical Solutions Layout ........................................................................................................ 9-29
Accessories and Protection .............................................................................................................................................. 9-29

Go online for data sheets & assembly instructions. Visit [www.radiall.com](http://www.radiall.com) and enter the part number.
Introduction

A COMPLETE OFFER TO COVER ALL ENVIRONMENTS

With 40 years of experience in fiber optics, Radiall is an expert in interconnect fiber optic systems. Radiall designs, manufactures and delivers custom cable assemblies with performances specifically adapted to meet customers’ requirements and environments.

Indoor Environments
Radiall cable assemblies for indoor applications can be used in stable operational environments for temperature ranges of -20° to +70°C for Telecom applications. They provide high bandwidth, durability and are cost efficient.

Outdoor Environments
Temperature ranges for outdoor applications are typically from -40°C to +85°C. Radiall cable assemblies and harnesses for outdoor applications (ex: FTTA) feature durability and ease of integration while maintaining high optical performances.

Harsh Environments
Optical systems for harsh environments must withstand extreme temperature ranges, typically from -55°C to +125°C, and high levels of shock and vibration. They are especially dedicated to military and aerospace applications. Radiall’s experience, combined with an extensive range of products developed specifically for harsh environments, allows Radiall to provide high quality cable assemblies and harnesses adapted to these environments.

Tactical Environments
Tactical cable assemblies are field deployable and operate in unstable and severe environmental conditions. Radiall provides ruggedized solutions, using tactical Expanded Beam connectors, to enable quick, reliable and easy integration for advanced communication systems in the field.

WORLDWIDE RADIALL FIBER OPTIC PRESENCE

Radiall has a global manufacturing presence. An International sales network and qualified distributors cover every region around the world. The result is quick and detailed technical support for all requests.
Characteristics and Performance

END-TO-END HARNESS AND OPTICAL SYSTEM SOLUTIONS
With an extensive product range, Radiall supports customers from the design to the production and the full industrial release of fiber optic harnesses and optical systems.

Design and Engineering
- Experienced and specialized R&D teams with more than 100 patents on optical interconnect solutions
- Dedicated design centers for design, development and prototyping
- High reactivity is made possible by close collaboration between sales, R&D and production teams

Radiall Manufacturing Capabilities
- Worldwide presence to ensure the proximity needed to provide the best quality, service and delivery performance
- Flexibility to handle high, low and mixed volumes with the same high level of quality

High-quality and Large Variety of Components
- Optical fibers and cables
- Connectors and contacts
- Cable protection and fiber management accessories

Optimized Processes
- Design, development and modeling of the optical solution
- Customer support services

Test and Quality Insurance
- Qualified test laboratories to perform product qualifications
- Radiall facilities feature state-of-the-art equipment and are all certified ISO9001-V2008 and AS9100, fully supporting the customer’s quality system requirements
- Radiall optical systems are designed, manufactured and tested in accordance with all of the relevant industry standards and customers’ specifications
- All measurements and quality reports can be delivered upon request

RADIALL’S FIBER OPTIC MISSION

End-to-End Fiber Optic solutions for demanding applications
40 years experience in Fiber Optic
Extensive test, qualification and laser manufacturing capabilities

Constant pursuit of Fiber Optic innovation
High added-value engineering

High-end optical connectors and optimized accessories
Optical systems, harnesses and integrated solutions design and production
Radiall’s expertise at your service through high quality product, training and support
Indoor Cable Assemblies

PRESENTATION
Radiall provides optimized cable assembly solutions for indoor applications, taking into account cost, availability and performance.

Cable assemblies for indoor applications are ideal for telecom, industrial, instrumentation and medical markets. These cable assemblies are used in controlled and relatively stable environments such as wireless, FTTX, data centers, switch centers and CATV applications.

Typical Indoor Requirements
- Operational temperature from -20°C to +70°C
- High bandwidth
- High durability (mating/unmating)
- Cost optimized

Radiall Key Factors
- Design to cost
- Mass-production capability
- High reactivity: quality in short lead time

Radiall Guarantee of Quality
- Optical measurements (IL, RL) are performed according to the IEC 61300 standards before shipment
- Visual inspection of the end face geometry to ensure the cable assembly meets the defined criteria
- Test measurement sheets with detailed reporting of the performance can be requested
**Indoor Cable Assemblies**

**COMPONENTS FOR INDOOR CABLE ASSEMBLIES**

**Typical Optical Fibers:**
Radiall can accommodate various types of fiber, including the most popular fibers used for data transmission:
- SingleMode 9/125 µm
- MultiMode 50/125 µm OM2, OM3 and OM4
- MultiMode 62.5/125 µm

**Typical Cables for Indoor Environments:**
- Indoor cables withstand temperature ranges from -20°C to +70°C
- Compliant to GR-409 Telcordia standard specifications
- Duplex, simplex and multi-fiber configurations are available
- Cable diameter from 0.9 mm to 3 mm
- Loose and tight structure cables

Radiall can work with most cables required by the customer’s specific needs. The structure of the cable is a key parameter in the choice of the connector or the contact and is usually determined by the system design. A feasibility study may be conducted to validate the selected connector/cable combination.

**Polishing Processes Available:**
Depending on specific requirements and application, the following polishing process may be used:
- PC: Physical Contact for MultiMode or SingleMode
- UPC: Ultra Physical Contact for MultiMode or SingleMode
- APC (8°): Angled Physical Contact for SingleMode only. For higher performance of Return Loss due to the angled end face.

Refer to Section 12, Technical Information, for more information on cable structure, polishing, testing and inspection.

**TYPICAL CONNECTORS FOR INDOOR ENVIRONMENTS**

**LC connectors**
IEC 61754-20 standard
Radiall is an official licensee to manufacture and supply LC connectors. Available in simplex and duplex configurations.

**SC connectors**
IEC 61754-4 standard
Available in simplex and duplex configurations.

**ST connectors**
IEC 61754-2 standard
Also available in sealed configurations.

**FC connectors**
IEC 61754-13 standard

Please refer to Section 4, LC, SC and ST Series, for more detailed information.
Radiall can produce many other connectors, contacts or fiber types. For any additional information, please contact your local Radiall representative.
Indoor Cable Assemblies

HOW TO ORDER
Radiall designs, manufactures and delivers high quality cable assemblies for indoor applications based on existing components listed above. The cable assemblies are tested for insertion loss and face visual inspection following the IEC 61300 standards.

Build-to-print:
With the build-to-print solution, Radiall complies with customer requirements, offering flexible design and manufacturing processes to build assemblies to the exact specifications. Please provide a print or requirement description to your local representative. A Technical Data Sheet will then be provided for validation.

Standard Jumper:
Using the part number builder, define the cable assembly part number by selecting the fiber optic contact and/or connector type for each end, cable type and length. Standard jumpers are considered catalog items with short lead times due to direct availability of components and established manufacturing processes.

PART NUMBER BUILDER:

End 1:

<table>
<thead>
<tr>
<th>Part</th>
<th>Description</th>
<th>Contact Type</th>
<th>Connector Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCMM</td>
<td>LC MM</td>
<td>MultiMode</td>
<td>UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>LCSM</td>
<td>LC MM</td>
<td>SingleMode</td>
<td>APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>LCSMM</td>
<td>LC MM</td>
<td>SingleMode</td>
<td>APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>SCMM</td>
<td>SC MM</td>
<td>MultiMode</td>
<td>UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>SCSM</td>
<td>SC MM</td>
<td>SingleMode</td>
<td>APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>FCMM</td>
<td>FC MM</td>
<td>MultiMode</td>
<td>UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>FCSM</td>
<td>FC MM</td>
<td>SingleMode</td>
<td>APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>STMM</td>
<td>ST MM</td>
<td>MultiMode</td>
<td>UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>STSM</td>
<td>ST MM</td>
<td>SingleMode</td>
<td>UPC (RL&gt;50dB)</td>
</tr>
</tbody>
</table>

Cable:

- 10: MM 50/125 μm, tight, Simplex, commercial grade
- 11: MM 50/125 μm, tight, Simplex, commercial grade
- 13: MM 50/125 μm, loose, Simplex, commercial grade
- 60: SM 9/125 μm, tight, Simplex, commercial grade
- 27: MM 50/125 μm, loose, Simplex, commercial grade
- 39: MM 50/125 μm, loose, Simplex, commercial grade
- 23: MM 62.5/125 μm, loose, Simplex, commercial grade
- 40: MM 62.5/125 μm, loose, Scindex, commercial grade
- 73: SM 9/125 μm, loose, Simplex, commercial grade
- 77: SM 9/125 μm, loose, Scindex, commercial grade

End 2:

See end 1
X no termination (pigtail)

Length of the cable in centimeters

<table>
<thead>
<tr>
<th>Length of the cable</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>from 12 to 100 cm</td>
<td>0/+2.4 cm</td>
</tr>
<tr>
<td>from 100 to 1500 cm</td>
<td>0/+3.4 cm</td>
</tr>
<tr>
<td>from 1500 to 3000 cm</td>
<td>0/+4.4 cm</td>
</tr>
<tr>
<td>from 3000 to 5000 cm</td>
<td>0/+17.4 cm</td>
</tr>
</tbody>
</table>

To validate your part number please consult your Radiall representative.

Technical datasheets are available upon request.
Outdoor Cable Assemblies

PRESENTATION
Radiall offers a wide range of cable assemblies for Telecom and Industrial applications in outdoor environments, manufacturing and delivering optimized optical link solutions in the field incorporating durability, performance, ease of integration and cost effective solutions.

Outdoor cable assemblies can sustain unstable environmental conditions and broad operating temperature ranges as in FTTX and telecom installation markets, energy distribution networks, smart grids, broadcasting, security and industrial applications.

Typical Outdoor Requirements
- High optical performance
- Robust connection to withstand severe external conditions such as bad weather
- Operational temperature from -40°C to +85°C
- Less sensitivity to corrosion and pollution
- High tensile strength
- High resistance to crushes, humidity and UV radiation

Radiall Key Factors
- Proven and ruggedized high quality components
- Designed and manufactured in Radiall facilities
- Wide variety of manufacturable assemblies available
- Custom solutions for specific applications
- Mass-production capacity

Radiall Guarantee of Quality
- Optical measurements (IL, RL) are performed according to the IEC 61300 standards before shipment
- Visual inspection of the end face geometry to ensure the cable assembly meets the defined criteria
- Test measurement sheets with detailed reporting of the performance can be requested
- Radiall can conduct other tests according to specific requirements on demand
**Outdoor Cable Assemblies**

**COMPONENTS FOR OUTDOOR CABLE ASSEMBLIES**

**Typical Optical Fibers:**
Radiall can accommodate various types of fiber, including the most popular fibers used for data transmission:
- SingleMode 9/125 µm
- MultiMode 50/125 µm OM2, OM3 and OM4
- MultiMode 62.5/125 µm

**Typical Cables for Outdoor Environments:**
- Outdoor grade cable: temperature range -40°C to +85°C
- Simplex, duplex and multi-fiber cables
- Tight structure cables and breakout cables

Note: Other types of cable can be used to answer to specific customer technical requirements: specific temperature range, larger diameters, armored and anti-rodent configurations, ruggedized telecom cables, etc.
For any additional information, please contact your local Radiall representative.

**Polishing Processes Available:**
Depending on requirements and applications the following processes may be used:
- PC: Physical Contact for MultiMode or SingleMode
- UPC: Ultra Physical Contact for SingleMode or MultiMode
- APC (8°): Angled Physical Contact for SingleMode only. For higher performance of return loss due to the angled end face.

**TYPICAL CONNECTORS FOR OUTDOOR ENVIRONMENTS**

RXF (2 to 6 channels)
Screwing locking device with IP68 sealing connection.
Refer to RXF connectors in Section 5 for more information.

R2CT®
Flexible waterproof connection.
Plug equipped with LC (simplex or duplex) or SC simplex.
Refer to R2CT® connectors in Section 6 for more information.

OSIS®
Quick lock push-pull and stackable connection.
Plug equipped with LC (simplex or duplex)
Refer to OSIS® connectors in Section 7 for more information.

Radiall can produce standard interface connectors such as LC, SC, FC and ST for outdoor cable assemblies.
For any additional information, please contact your local Radiall representative.
**Outdoor Cable Assemblies**

**HOW TO ORDER**
Radiall can provide custom configurations of optical cable assemblies for outdoor use based on existing components listed above. Assemblies can be customized to fit with specific application requirements such as labeling, length, etc.

All products will be manufactured in AS9100 certified assembly lines. The outdoor assemblies are visually inspected and tested per the criteria from IEC 61300 and/or the specified industry standards.

**Customer Specification:**
Based on cable assemblies specifications, Radiall will study and propose the best solution, providing a compliance matrix for validation.

**Configure a Cable Assembly:**
1. Series: RXF, R2CT®, OSIS®, LC, etc.
2. Connector end 1 + protective cap
3. Connector end 2 + protective cap
4. Fiber and cable type
5. Length (in meters or millimeters)
Radiall will provide a Technical DataSheet (TDS) for validation.

**Select a Cable Assembly Among Standard Part Numbers:**
Radiall designs, manufactures and supplies standard outdoor cable assemblies. A standard configuration combines standard fiber optic connectors and cables with standard length and tolerances. Standard outdoor cable assemblies are catalog items with short lead times due to the direct availability of the components.
Outdoor Cable Assemblies

STANDARD PART NUMBERS FOR RXF CABLE ASSEMBLIES

OPTICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Wave-length</th>
<th>1310-1550 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>max 0.5 dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>&gt;50 dB</td>
</tr>
</tbody>
</table>

Insertion Loss against a reference patchcord: IEC 61300-3-4 Method B
Return Loss: IEC 61300-3-6

Note: the optical performances also depend on the fiber or cable construction.
All RXF connectors in cable assemblies are provided with a dust cap (red vinyl).
All measurements and quality reports can be delivered upon request.

ENVIRONMENTAL CHARACTERISTICS

| Operating Temperature Range | -40°C/+85°C |

R2F Socket Square Flange to LC Duplex – Indoor Simplex Cable Ø2 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 855 220</td>
<td>L=1 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 858 220</td>
<td>L=1 m</td>
</tr>
</tbody>
</table>

Note: Other lengths are available upon request.

R4F Socket Hexagonal to 2 x LC Duplex – Indoor Simplex Cable Ø2 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 855 240</td>
<td>L=1 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 858 240</td>
<td>L=1 m</td>
</tr>
</tbody>
</table>

Note: Other lengths are available upon request.
Outdoor Cable Assemblies

R2F Plug to LC Duplex – Outdoor Field Cable Ø5 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 855 620-XX</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 858 620-XX</td>
</tr>
</tbody>
</table>

(*): replace “XX” by the length in meters
Standard length: 5 m and 50 m
Ex: F760 855 620-05 for 5 m

R2F Plug to R2F Plug – Outdoor Field Cable Ø5 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 885 620-XX</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 888 620-XX</td>
</tr>
</tbody>
</table>

(*): replace “XX” by the length in meters
Standard length: 5 m and 50 m
Ex: F760 885 620-05 for 5 m
Outdoor Cable Assemblies

R4F Plug to 2 x LC Duplex – Outdoor Field Cable Ø5 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 855 640-XX</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 858 640-XX</td>
</tr>
</tbody>
</table>

(*): replace “XX” by the length in meters
Standard length: 5 m and 50 m
Ex: F760 855 640-05 for 5 m

R4F Plug to R4F Plug – Outdoor Field Cable Ø5 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 885 640-XX</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>F760 888 640-XX</td>
</tr>
</tbody>
</table>

(*): replace “XX” by the length in meters
Standard length: 5 m and 50 m
Ex: F760 885 640-05 for 5 m
Outdoor Cable Assemblies

STANDARD PART NUMBERS FOR R2CT® CABLE ASSEMBLIES

![Cable Assembly Image]

OPTICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Wave Length</th>
<th>1310-1550 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>max 0.5 dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>&gt;45 dB</td>
</tr>
</tbody>
</table>

Insertion loss against a reference patchcord: IEC 61300-3-4 Method B
Return loss: IEC 61300-3-6

Note: the optical performances also depend on the fiber or cable construction.

ENVIRONMENTAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Operating Temperature Range</th>
<th>-40°C/+85°C</th>
</tr>
</thead>
</table>

R2CT® Plug to LC Duplex – Outdoor Field Cable Ø7 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G657a</td>
<td>R2CTC 855 700-01</td>
<td>L=1 m</td>
</tr>
<tr>
<td>SM 9/125 µm G657a</td>
<td>R2CTC 855 700-02</td>
<td>L=2 m</td>
</tr>
<tr>
<td>SM 9/125 µm G657a</td>
<td>R2CTC 855 700-03</td>
<td>L=3 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>R2CTC 858 700-01</td>
<td>L=1 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>R2CTC 858 700-02</td>
<td>L=2 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>R2CTC 858 700-03</td>
<td>L=3 m</td>
</tr>
</tbody>
</table>

Note: Other lengths are available upon request.
Outdoor Cable Assemblies

STANDARD PART NUMBERS FOR OSIS® CABLE ASSEMBLIES

OPTICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Wave-length</th>
<th>1310-1550 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss</td>
<td>max 0.5 dB</td>
</tr>
<tr>
<td>Return Loss</td>
<td>&gt;45 dB</td>
</tr>
</tbody>
</table>

Insertion Loss against a reference patchcord: IEC 61300-3-4 Method B
Return Loss: IEC 61300-3-6

Note: the optical performances also depend on the fiber or cable construction.

ENVIRONMENTAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Operating Temperature Range</th>
<th>-40°C/+85°C</th>
</tr>
</thead>
</table>

OSIS® Plug to LC Duplex – Outdoor Field Cable Ø5 mm

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G657a</td>
<td>OSISC 855 500-01</td>
<td>L=1 m</td>
</tr>
<tr>
<td>SM 9/125 µm G657a</td>
<td>OSISC 855 500-02</td>
<td>L=2 m</td>
</tr>
<tr>
<td>SM 9/125 µm G657a</td>
<td>OSISC 855 500-03</td>
<td>L=3 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>OSISC 858 500-01</td>
<td>L=1 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>OS ISC 858 500-02</td>
<td>L=2 m</td>
</tr>
<tr>
<td>MM 50/125 µm OM2</td>
<td>OSISC 858 500-03</td>
<td>L=3 m</td>
</tr>
</tbody>
</table>

Note: Other lengths are available upon request.
Outdoor Cable Assemblies

STANDARD PART NUMBERS FOR LC CABLE ASSEMBLIES

**LC Duplex to LC Duplex – Outdoor Field Cable Ø7 mm**

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 555 670-XXX</td>
</tr>
</tbody>
</table>

(*): replace “XXX” by the length in meters
Standard lengths (in meters) for SM: 1, 2, 5, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 125, 150 m
Ex: F760 555 670-005 for L=5 m
Note: Other lengths and MultiMode are available upon request.

**12 LC to LC – Outdoor Field Cable Ø8 mm**

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Part Number (*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 9/125 µm G652</td>
<td>F760 555 612-XXX</td>
</tr>
</tbody>
</table>

(*): replace “XXX” by the length in meters
Standard lengths (in meters) for SM: 5, 10, 20, 30, 40, 50, 70, 100, 200 m
Ex: F760 555 612-005 for L=5 m
Note: Other lengths and MultiMode are available upon request.
**Harsh Environment Cable Assemblies**

**PRESENTATION**

Recognized worldwide for its expertise, Radiall is a leading manufacturer of fiber optic solutions in harsh environments, chosen by major aerospace and military companies for the constant quality of products, extensive product range and reliable service. We supply our customers with high quality and high performance patchcords and harness assemblies that fulfill the demanding requirements of the aerospace and defense markets.

Harsh environment cable assemblies can withstand unstable and extreme environmental conditions as in radars, sensors, pressurized areas, avionics data transmission or In-Flight Entertainment applications and more.

**Typical Requirements for Harsh Environment Applications**

- High optical performance
- Robust connection to withstand shocks and vibrations
- Operational temperature from -55°C to +125°C and beyond
- Lightweight and small form factor
- High density and high channel count
- Less sensitivity to corrosion, pressure and humidity

**Radiall Key Factors**

- Chosen manufacturer for major aerospace companies for over 10 years
- Proven, rugged and high quality components
- Expertise and support to deliver the optimal solution according to the application
- Ability to design according to customer print or from Radiall expertise
- Innovation in designing and manufacturing processes to deliver cost optimized and reliable solutions

**Radiall Guarantee of Quality**

- Assemblies are visually inspected and tested per the criteria from the relevant industry standards (ARINC, EN, SAE, IEC)
- All products for aerospace applications are manufactured in AS9100 certified assembly lines
- Test measurement sheets with detailed reporting of the performance can be delivered
- Radiall can conduct and supply other test data and qualification test reports to meet specific requirements
**Typical Optical Fibers:**
Radiall can accommodate various types of fiber, including the most popular fibers used for data transmission:
- SingleMode 9/125 µm
- MultiMode 50/125 µm OM2, OM3 and OM4
- MultiMode 62.5/125 µm or larger core fibers

**Typical Cables for Indoor Environments:**
- Aerospace grade cable, loose structure, ARINC 802, temperature range (-55°C/+125°C and beyond)
- Aerospace grade cable, tight structure, ARINC 802, temperature range (-55°C/+125°C and beyond)
- Commercial grade cable "not for flight" for ground test applications
- Military cable
- Ruggedized, armored and anti-rodent telecom cable for outdoor applications
- Simplex, duplex and multi-fiber cables

Note: Standard temperatures are listed above but higher temperatures can be achieved with specific cables.

Radiall can work with most cable types required by the customer. The structure of the cable is a key parameter in the choice of the connector and/or the contact, it is usually determined by system design. A feasibility study may be conducted to validate the selected connector/cable combination.

**Polishing Processes Available:**
Depending on specific requirements application, the following process may be used:
- PC: Physical Contact for MultiMode or SingleMode
- UPC: Ultra Physical Contact for SingleMode or MultiMode.
- APC (8°): Angled Physical Contact for SingleMode only. For higher performance of Return Loss due to the angled end face.
TYPICAL FIBER OPTIC CONTACTS FOR HARSH ENVIRONMENTS

### LuxCis® ARINC 801 contact
- Designed to fit into standard electrical cavities within circular and rectangular multipin connectors.
- MIL-PRF-29504 type termini are described in several military standards. Radiall has developed its own design, adding improved features to this standard part.

### MIL-PRF-29504 type termini
- Standardized contact: ARINC 801, EN4639-101 compliant, AS5590, AS5591, BACT64A, ABS1906-01
- High density with 1.25 mm ferrule
- MultiMode, SingleMode and SM APC polishing available
- Hermaphroditic contact
- Same contact fits a wide range of multipin connectors

### ABS1379 contact
- Radiall ABS1379 optical contact is Airbus qualified ABS1379-003 per EN 4531-101. Based on the standardized product design, Radiall has improved the sealing function and the fiber accompanying process.

### Key Features & Benefits:
- Key Features & Benefits:
  - Standardized contact: ARINC 801, EN4639-101 compliant, AS5590, AS5591, BACT64A, ABS1906-01
  - High density with 1.25 mm ferrule
  - MultiMode, SingleMode and SM APC polishing available
  - Hermaphroditic contact
  - Same contact fits a wide range of multipin connectors

### Key Features & Benefits:
- Key Features & Benefits:
  - Robust construction with spring loaded butt-joint
  - Standard 2.5 mm diameter ferrule
  - To be used with MultiMode fibers only
  - Key and bayonet systems to prevent rotation
  - Integrated sealing

### TYPICAL CONNECTORS FOR HARSH ENVIRONMENTS

#### Ruggedized LC connectors
- IEC 61754-20 standard
- Available in simplex and duplex configurations
- Radiall is an official licensee to manufacture and supply LC connectors

#### Ruggedized SC connectors
- IEC 61754-4 standard
- Available in simplex and duplex configurations

#### Ruggedized FC connectors
- IEC 61754-13 standard

#### Ruggedized ST connectors
- IEC 61754-2 standard

Radiall can produce many other connectors or contacts. For any additional information, please contact your local Radiall representative.
Harsh Environment Cable Assemblies

HOW TO ORDER

Radiall designs, manufactures and delivers either build-to-print and custom cable assemblies or standard jumpers to withstand harsh environment conditions. The cable assemblies can be customized to accommodate specific requests such as labeling, lengths and packaging. All products will be manufactured in AS9100 certified assembly lines and assembly processes allow for low, high and mixed volume requirements.

Build-to-print:
With the build-to-print solution, Radiall complies with customer requirements, offering flexible design and manufacturing processes to build assemblies to the exact specifications. A Technical Data Sheet or compliance matrix will then be provided for validation.

The best adapted fiber optic interconnect solution will be used, including MT ferrules, Expanded Beam inserts and contacts.

Standard Jumpers:
Using the part number builder (see next page), define the specific cable assembly by selecting a fiber optic contact/connector for each end, cable type and length from the available choices. Standard jumpers are considered catalog items with short lead times due to direct availability of components and established manufacturing processes.
**Harsh Environment Cable Assemblies**

**STANDARD JUMPERS FOR HARSH ENVIRONMENTS**
Radiall designs, manufactures and delivers high quality cable assemblies. They are manufactured in AS9100 certified assembly lines. Each cable is visually inspected and tested before shipment.

**PART NUMBER BUILDER**

<table>
<thead>
<tr>
<th>Part Number Builder</th>
<th>LUXCISMM 52 LCMM L100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>End 1:</strong></td>
<td></td>
</tr>
<tr>
<td>LUXCISMM</td>
<td>LuxCis® MultiMode</td>
</tr>
<tr>
<td>LUXCISSM</td>
<td>LuxCis® SingleMode UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>LUXCISSM8</td>
<td>LuxCis® SingleMode APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>LCMM</td>
<td>LC MultiMode</td>
</tr>
<tr>
<td>LCSM</td>
<td>LC SingleMode UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>LCSM8</td>
<td>LC SingleMode APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>SCM</td>
<td>SC MultiMode</td>
</tr>
<tr>
<td>SCSM</td>
<td>SC SingleMode UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>SCMSM</td>
<td>SC SingleMode APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>FCMM</td>
<td>FC MultiMode</td>
</tr>
<tr>
<td>FCMSM</td>
<td>FC SingleMode UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>FCMSM8</td>
<td>FC SingleMode APC 8° (RL&gt;65dB)</td>
</tr>
<tr>
<td>STMM</td>
<td>ST MultiMode</td>
</tr>
<tr>
<td>STSM</td>
<td>ST SingleMode UPC (RL&gt;50dB)</td>
</tr>
<tr>
<td>ABS1379MM</td>
<td>ABS1379 MultiMode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Cable:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>14</strong> 900 μm MM 62.5/125 μm loose Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>15</strong> 900 μm MM 62.5/125 μm tight Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>16</strong> 900 μm MM 50/125 μm loose Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>13</strong> 900 μm MM 62.5/125 μm tight Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>11</strong> 900 μm MM 50/125 μm loose Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>10</strong> 900 μm SM 9/125 μm tight Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>52</strong> 1.8-2 mm MM 62.5/125 μm loose Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>52D</strong> 1.8-2 mm MM 62.5/125 μm loose Duplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>53</strong> 1.8-2 mm MM 62.5/125 μm tight Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>55</strong> 1.8-2 mm MM 50/125 μm loose Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>78</strong> 1.8-2mm MM 50/125 μm tight Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>92</strong> 1.8-2 mm SM 9/125 μm loose Simplex aerospace grade</td>
<td></td>
</tr>
<tr>
<td><strong>23</strong> 1.8-2 mm MM 62.5/125 μm loose Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>40</strong> 1.8-2 mm MM 62.5/125 μm loose Scindex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>27</strong> 1.8-2 mm MM 50/125 μm loose Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>39</strong> 1.8-2 mm MM 50/125 μm loose Scindex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>73</strong> 1.8-2 mm SM 9/125 μm loose Simplex commercial grade</td>
<td></td>
</tr>
<tr>
<td><strong>77</strong> 1.8-2 mm SM 9/125 μm loose Scindex commercial grade</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>End2:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>See end 1</td>
<td></td>
</tr>
<tr>
<td>X no termination</td>
<td></td>
</tr>
</tbody>
</table>

**Length of the cable in centimeters**

<table>
<thead>
<tr>
<th>Standard Length Tolerance in Centimeters</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>from 12 to 100 cm</td>
<td>0/+2.4 cm</td>
</tr>
<tr>
<td>from 100 to 1500 cm</td>
<td>0/+3.4 cm</td>
</tr>
<tr>
<td>from 1500 to 3000 cm</td>
<td>0/+4.4 cm</td>
</tr>
<tr>
<td>from 3000 to 5000 cm</td>
<td>0/+17.4 cm</td>
</tr>
</tbody>
</table>

To validate your part number please contact your local Radiall representative. Technical datasheets are available upon request. Specific requirements such as additional testing, specific labeling and additional protection of the cable can be accommodated as a custom cable assembly.
**Harsh Environment Cable Assemblies**

**MT BASED CABLE ASSEMBLIES**
Radiall is designing, manufacturing and delivering rugged cable assemblies equipped with MT ferrule interconnect solutions. Widely used in telecom and data center applications, the MT ferrule provides high density interconnection which makes it also attractive for aerospace and defense applications.

**MT Ferrule Key Features and Benefits:**
- High density
- Lightweight interconnection
- Physical contact termini providing low optical losses

**Applications:**
- Active Component interface
- Radars
- IFE (In Flight Entertainment)
- Displays

To answer customer needs for an end-to-end solution, Radiall is developing a full range of interconnect solutions around the MT ferrule in correlation with Optical Active Components. Refer to Section 10, Active Components, for more detail on emitters, receivers and transceivers product lines.

**MT Fan-out Configurations:**
Radiall’s fan-out configuration enables transition from a high density 12 channel ribbon or round cable to singularly fanned-out round fibers, terminated with the best fitted connectors according to the application and customer needs.

**MT Interconnect Solutions:**
The MT Cis, MT Cartridge Interconnect Solution, expands the range of applications of the MT ferrule in harsh environment applications.

Radiall MT-Cis protects a standard MT ferrule and enables enhanced alignment of the fibers to maintain excellent optical performance in harsh environmental and mechanical conditions. This unique design is meant to be used inside the box in mating adapters, board connectors (VITA type) or in multipin connectors.

**Features:**
- MT-Cis to be used in a variety of connectors and adapters
- Compatible with ribbon cords and round cables
- Easy insertion/extraction latching mechanism
- Perfectly suited to terminate pigtailed D-Light multichannel transceivers

For any additional information, please contact your local Radiall representative.
**Harsh Environment Cable Assemblies**

**EB BASED CABLE ASSEMBLIES**
Radiall designs, manufactures and delivers cable assemblies with Expanded Beam interconnect solutions. The Expanded Beam offer for harsh environments includes 2 product ranges: the EB-LuxCis® product range and EB contacts interconnect solutions.

**EB-LuxCis® Product Range:**
The EB-LuxCis® product range combines the widely used LuxCis® ARINC 801 fiber optic contact inserted in a 2 or 4 channel (MM or SM) Expanded Beam insert, which can be used in various circular or rectangular connectors.

The EB-LuxCis® features a variety of multipin connectors such as MIL-DTL-38999, EN4165 modules, EPX® EN4644 and NSX ARINC 600. For any additional information, please contact your local Radiall representative.

**EB Contacts for Multipin Connectors:**
Radiall also provides cable assemblies with EB contacts for MIL-DTL-38999 connectors. Expanded Beam contacts fit in standard size 16 electrical cavities to incorporate EB technology in these multipin connectors.

EB contacts are also available for other multipin connectors.
For any additional information, please contact your local Radiall representative.
**Tactical Cable Assemblies**

**PRESENTATION**

Radiall produces high quality tactical cable assemblies for a wide range of demanding military and harsh environment field applications.

Two main technologies exist in fiber optic connections for tactical environments: Physical Contact technology and Expanded Beam technology. Radiall will use the best of both alternatives to deliver ruggedized and field deployable cable assemblies.

Tactical cable assemblies operate in unstable and severe environmental conditions, such as in radars, military radio communication, intercom systems and many other applications.

**Defense**

**Typical Requirements for Harsh Environment Applications**
- Fast and trouble-free integration in the field
- Easy to use and trouble-free maintenance
- Extremely high mating durability
- Less sensitivity to pollution, dirt and dust
- Ruggedized connection, high resistance to crushing and shock
- High tensile strength

**Radiall Key Factors**
- Proven technology with high quality components for harsh environments
- Easy to integrate with hermaphroditic connections enabling blind mating and daisy chaining
- Application, environmental factors and costs are considered throughout design to provide an optimal solution
- Field support and training
- Turnkey factory assembled cable assemblies

**Radiall Guarantee of Quality**
- Tactical cable assemblies are visually inspected and tested per the criteria from the relevant industry standards
- We can deliver test measurement data with detailed reports on the performance of the cable assemblies
- Radiall can conduct other tests according to your requirements upon request
**Tactical Cable Assemblies**

**COMPONENTS FOR TACTICAL CABLE ASSEMBLIES**

**Typical Optical Fibers:**
Radiall can accommodate various types of fiber, including the most popular fibers used for data transmission:
- SingleMode 9/125 µm
- MultiMode 50/125 µm OM2, OM3 and OM4
- MultiMode 62.5/125 µm or larger core fiber

**Typical Cables for Tactical Applications:**
- Military tactical multi-fiber cables including anti-rodent, high crush resistance or armored cables
- Outdoor multi-fiber cables
- Various cable diameters can be accommodated

For any other requests or specific cable requirements, please contact your local Radiall representative.

**Typical Connectors for Tactical Applications:**
- Tactical Expanded Beam connectors (refer to Section 3, Expanded Beam Solutions, for more detail)
- LuxCis® ARINC 801 interconnect product range (refer to Sections 1 and 2 for more detail on LuxCis® ARINC 801 contact and interconnect solutions)
- Ruggedized LC, SC, ST and FC connectors (refer to Section 4 for more detail on LC, SC and ST connectors)

Radiall can produce many other connectors or contacts. Please contact Radiall for more information.

**CHARACTERISTICS OF TACTICAL EXPANDED BEAM CONNECTORS**

**OPTICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>MultiMode PC 1300 nm</th>
<th>SingleMode PC 1310 nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion Loss* (typical)</td>
<td>0.7 dB</td>
<td>0.7 dB</td>
</tr>
<tr>
<td>Insertion Loss (maximum)</td>
<td>1.5 dB</td>
<td>2 dB</td>
</tr>
<tr>
<td>Return Loss**</td>
<td>&gt;34 dB</td>
<td></td>
</tr>
</tbody>
</table>

*When tested with reference quality launch/receive cable assemblies
**RL tested unmated

**ENVIRONMENTAL AND MECHANICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature Range</td>
<td>-40°C/+85°C</td>
</tr>
<tr>
<td>Mating Endurance</td>
<td>Up to 3000 mating cycles</td>
</tr>
</tbody>
</table>
Tactical Cable Assemblies

HOW TO ORDER
Use this configurator to define a part number for standard tactical cable assemblies using Expanded Beam Junior size tactical connectors. EB Junior size tactical connectors are designed to MIL-DTL-83526/20 & /21 mechanical interface standards.

F739 series: EB tactical cable assembly

End 1: Junior size EB tactical connector
0: Plug
2: D-hole receptacle low profile, fan-out type for 1.6 to 1.8 mm simplex cable
3: D-hole receptacle, for 5 to 6 mm tactical cable
5: Square flange receptacle low profile, fan-out type for 1.6 to 1.8 mm simplex cable
6: Square flange receptacle, for 5 to 6 mm tactical cable

End 2:
0: Junior size EB plug
2: Free end
3: LC PC connector
4: LC APC connector
5: ST PC connector
6: SC PC connector
7: LuxCis® ARINC 801 APC contact
8: FC PC connector
9: LuxCis® ARINC 801 PC contact

Number of channels: 2 or 4

Optimal wavelength:
2: SingleMode 1310 nm
3: SingleMode 1550 nm
4: MultiMode 850 nm & 1300 nm with 50/125 μm OM3 fiber
5: MultiMode 850 nm & 1300 nm with 50/125 μm fiber
6: MultiMode 850 nm & 1300 nm with 62.5/125 μm fiber

Cable type:
1: Multi-fiber cable, diameter 5 to 6 mm, for plug and standard receptacle
4: Multi-fiber cable, diameter 5 to 6 mm, anti-rodent with bittering agent, for plug and standard receptacle
5: Simplex fiber, diameter 1.6 to 1.8 mm for fan-out receptacle [low-profile] only
6: Multi-fiber armored cable, for plug and standard receptacle

Reel:
0: No cable reel (applicable for cable up to 20 m length)
1: Field deployable reel
5: Reel for backpack (applicable for cable up to 900 m cable length)
6: Disposable reel

Length unit:
C: Centimeter
M: Meter

Length of the cable (3 digits)

Each cable assembly is labeled with a heat shrink sleeve with Radiall PN and date code. For any other cable assembly configuration or specific requirements (additional testing, specific labeling, additional protection or different type of cable), please contact your local Radiall representative and a TDS for validation will be provided.
Tactical Cable Assemblies

ACCESSORIES
Radiall provides cable assemblies with various field orientated accessories such as reels and backpacks reels.

Standard cable drums are available in 2 sizes:
Gantry Reel – size A
Gantry Reel – size B

Gantry drum, with braking device and handle crank

<table>
<thead>
<tr>
<th>Size</th>
<th>Color</th>
<th>Weight</th>
<th>Return Loss (RL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Black</td>
<td>5.90 kg</td>
<td>Up to 280 m (with a 6 mm cable)</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>8.20 kg</td>
<td>Up to 450 m (with a 6 mm cable)</td>
</tr>
</tbody>
</table>

Not all accessories are displayed in this catalog.
Radiall is also designing other Expanded Beam solutions that provide:
- Smaller size with the mini insert (shrunken version of the Junior insert)
- More channels
- Hybrid configurations
- Environment specific designs
For any additional information, please contact your local Radiall representative.
Harnesses and Optical Systems

PRESENTATION
Radiall also manufactures high performance optical systems, boxes and complex harnesses for the various market segments. Designs are based on customer prints or designed by Radiall to meet customers’ requirements and specific applications. Having 40 years of experience in fiber optic technology, Radiall’s optical systems demonstrate our expertise and technical know-how. Radiall’s worldwide presence and expertise has made us the supplier of choice for major companies all around the globe.

Radiall Key Factors
Radiall provides a complete solution to address the most complex optical design requirements. From the design, materials sourcing, prototyping and full-scale production, Radiall handles it all whether it’s simple point-to-point or complex multi-branch optical systems.

Radiall Guarantee of Quality
- Optical systems are visually inspected and tested per the criteria from the relevant industry standards (ARINC, EN, SAE, IEC)
- All products are manufactured in AS9100 certified assembly lines
- Radiall can deliver test measurement data with detailed reports on the performances of the cable assemblies
- Radiall can conduct other tests according to requirements upon request
Harnesses and Optical Systems

COMPONENTS FOR HARNESSES AND OPTICAL SYSTEMS

Typical Optical Fibers:
Radiall can accommodate various types of fiber, including the most popular fibers used for data transmission:
- SingleMode 9/125 µm
- MultiMode 50/125 µm OM2, OM3 and OM4
- MultiMode 62.5/125 µm or larger core fiber

Typical Cables for Harnesses and Optical Systems:
- Simplex, duplex and multi-fiber cables
- Loose, tight and ultra tight structure cables
- Aerospace grade cable temperature range (-55°C/+125°C)
- Ruggedized telecom cables for outdoor applications

Note: Standard temperatures are listed above but higher temperatures can be achieved with specific cables.

Polishing Processes Available:
Depending on the customer's needs and according to the application, the following process can be used:
- PC: Physical Contact for MultiMode or SingleMode connection
- UPC: Ultra Physical Contact for SingleMode or MultiMode
- APC (8°): Angled Physical Contact for SingleMode. For higher performance of Return Loss due to the angled end face.

TYPICAL CONNECTORS FOR HARNESSES AND OPTICAL SYSTEMS

Circular Connectors

Single channel LxC-R® connectors
MIL-DTL-38999 type connectors

Rectangular Connectors

EPX®/EN4644 connectors
NSX/ARINC 600 connectors
DSX/ARINC 404 connectors

Radiall can produce and supply many other connectors or contacts. Please contact your local Radiall representative for more information.
**Harnesses and Optical Systems**

**HYBRID ELECTRICAL/OPTICAL SYSTEMS**
Radiall has the expertise to provide hybrid solutions for harsh environments. The use of hybrid components can reduce the overall system size and complexity. Knowledge of both technologies allows Radiall to offer customers electrical/optical systems.

**FIBER MANAGEMENT AND OPTICAL SOLUTIONS LAYOUT**
Fiber management and routing are key to an optimal optical system. Radiall delivers the optimal solution to handle, protect and improve the performance and longevity of your system.

Radiall’s dedicated engineering teams:
- Analyze the project
- Source the necessary components and materials within Radiall’s extensive range of products and on the market
- Devise a complete solution to ease access, repair-ability and modularity in dense circuitry with wiring schematics, fiber protection and routing instructions

**ACCESSORIES AND PROTECTION**
Radiall can also provide a wide range of accessories, cable protection, backshells and customized protection.

For more information about optical system configuration, please contact your local Radiall representative.