Firecomms™

enlightened innovation

Company Presentation

January 2023

Massimo Belotti

Global Sales

TABLE OF CONTENTS

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01

ABOUT

Firecomms™

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Founded in Cork, Ireland

A spin-out company from the Tyndall National Institute.
Firecomms pioneered efficient resonant cavity LEDs (RCLEDs) and the connector-less OptoLock® transceiver for Plastic Optical Fiber (POF).

Firecomms
YOUR TRUSTED PARTNER

2001

2004
Firecomms' launches its MoST FOT for automotive

2007
Firecomms' launches its OptoLock® connector for bare-POF connectivity in the home-networking market for IPTV

2012
Firecomms' launches its RedLink® range of industrial grade fiber optic transmitters and receivers

2013
Firecomms' establishes inhouse ISO9000/14000 certified manufacturing facilities in Tongxiang, China. And expands its partnership network in Asia

2017
Firecomms strengthens its POF product portfolio

2020
Firecomms' launches GigE speeds

2021
Firecomms acquires the Molex' SMI POF Transceiver line-up

Global Company Presence

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Firecomms: Tongxiang, China

Operations team responsible for the volume production of high-quality, industrial grade opto-electronic components and modules. Provides pilot line production capability for customer specific product development.

Firecomms: Cork, Ireland

R&D and Quality teams responsible for new product development, prototyping, test and evaluation. Core competencies in compound semiconductor design, analog IC design, opto-electronics engineering and reliability and product qualification. Marketing and Sales support, product planning and logistics coordination.

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OUR MISSION

"Accelerating the evolution of machine communication."

OUR VISION

To be a World-class opto-electronics solutions provider, supporting our customers with innovative products and services.

QUALITY AND SERVICE ASSURANCE

We continually pursue reliability and quality in our products and processes; always striving to provide a service level unmatched by our competitors.

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In addition to the development of Firecomms' standard products, Firecomms prides itself in *working closely and quickly* with its customers to understand their needs and requirements and to then develop market ready custom designed solutions in a cost effective manner and subsequently provide low-cost production capability.

Customer Requirements Consultation

Design Concepts

Prototype

Test and Verification

Mass Production

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Vertical Integration

02
CORE TECHNOLOGIES

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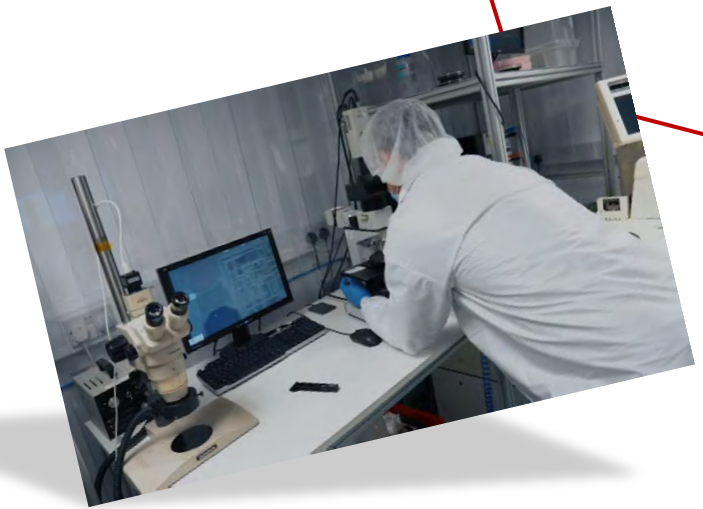
Firecomms Core Technologies



In-House Photonics III-V Semiconductor	In-House IC's CMOS Semiconductor	In-House Device Assembly Packaging & Connectors
High Speed Resonant Cavity LED / VCSEL	Custom designed for fiber applications	Optical, electrical and mechanical modelling
Visible Light Range 455 ~ 680nm Near IR 850nm	Specialized Mixed Silicon IC team	Low cost, reliable transparent mould and high temp leadframes
Resonant Cavity technology for low current consumption	Novel driver IC architectures	Production assembly and test techniques
Optical beam shaping for efficient coupling and long term reliability	Robust Receiver IC topologies	Innovative connector design OptoLock®, RedLink®, LC
Cost effective 4" wafer processing	Cost effective 35 nm 8" process	High Reliability assembly operations

03
PRODUCT PORTFOLIO

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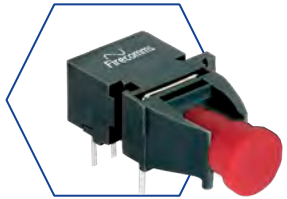
Firecomms Product Families Overview

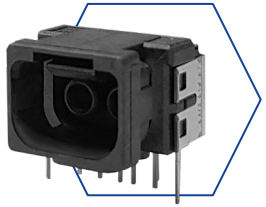


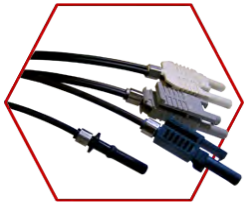
RedLink® fiber optic transmitters and receivers are extensively used for communication or command and control links in various industrial applications. The RedLink® range are designed to operate at DC-1/5/10/50 MBd.

The patented design of **OptoLock®** plugless fiber optic transceivers provide instant termination of bare POF cables to greatly simplify field termination and reduce installation time. These transceivers are available at DC-50/125/250/1250 Mbps data rates.

Firecomms' **LC terminated transceivers** comply to the IEC standard 61754-20 Ed.2. The LC family expands the use of this popular form factor for use with POF or Hard Clad Silica (HCS®) cables. Transceivers are available at DC-50/125/250/1250 Mbps data rates.

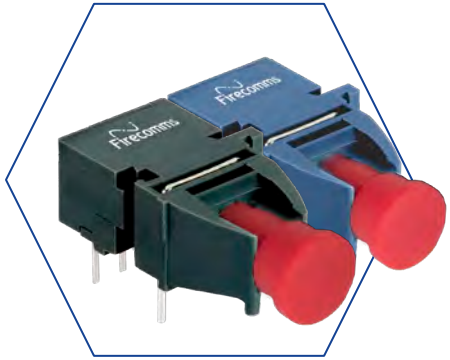
Firecomms' **SMI transceivers** comply to the IEEE1394b standard developed for communication over plastic optic fibre. The Small Media Interface has a small form factor with plug options that include a self releasing lock on the plug offering pull force on the cable in excess of 100 N. Non-magnetic versions are available for Medical device applications





Firecomms' **Cable & Plug Connector and Accessory products** complete the offering by providing the flexibility to choose exactly the right cable solutions including passive interconnectors and POF cutters to meet installation requirements. Firecomms provide pre-terminated cable assemblies.

RedLink® Product Range – Transmitters & Receivers



RedLink® Features

- Compatible with Versatile Link connector system
- Proven interoperability with competitors; enhanced performance
- Features Resonant Cavity LED based transmitters for high efficiency and improved Rise/Fall times
- Fully integrated monolithic receivers for enhanced EMI immunity
- Available in horizontal, vertical and tilted packages
- Ranges from DC-1/5/10/50 MBd

RedLink® Applications

- **Motor Drives** – Electric Ships, Compressors, Motors, Fans, Elevators, Traction/Propulsion Control
- **Renewable Energy** – Solar/Wind, Electric Autos (battery mgmt.)
- **Grid Control** – HVDC, SVC, CSC, Relay Control
- **Medical Imaging** – MRI, C-T, PET, X-Ray
- **Industrial Networking** – Command & Control, Fieldbus Communications
- **Control and Sensing** of high voltage semiconductors – IGBT, Thyristor, MOSFET, SiC, GaN
- **Communication links** between high voltage controller boards

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RedLink®
Transmitter (Tx)

Data rate	Distance (m)	nm	Voltage	Input
DC – 1 MBd	200 (POF)	530 Green	5V	TTL/CMOS (with APP cct)
DC – 1 MBd	50 (POF)	650 Red	5V	TTL/CMOS (with APP cct)
DC – 5 MBd	50 (POF)	650 Red	3.3V and 5V	TTL/CMOS (with APP cct)
DC – 10 MBd	50 (POF) 300 (PCS)	650 Red	3.3V and 5V	TTL/CMOS (with APP cct)
DC – 50 MBd	50 (POF) 300 (PCS)	650 Red	3.3V and 5V	TTL/CMOS

RedLink®
Receiver (Rx)

Data rate	Distance (m)	Voltage	Output
DC – 1 MBd	200 (POF) 50 (POF)	3.3 V and 5V	TTL/CMOS
DC – 5 MBd	50 (POF)	3.3V and 5V	TTL/CMOS
DC – 10 MBd	50 (POF) 300 (PCS)	3.3V and 5V	TTL/CMOS
DC – 50 MBd	50 (POF) 300 (PCS)	3.3V and 5V	TTL/CMOS
DC-250 MBd (125 MHz, Min UI 4 ns)	50 (POF) 300 (PCS)	Analog	Floating

*All receivers can operate with 530 nm Green , 650 nm Red , 850 nm Infrared sources of light

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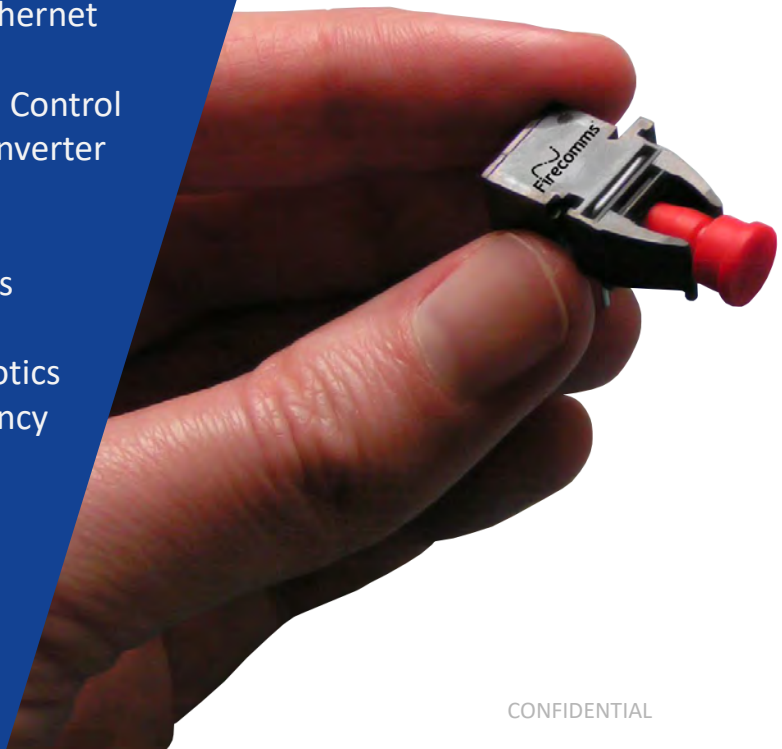
Typical applications for RedLink®

- Intelligent Gate Driver
- Isolated BUS, Ethernet
- Power Inverter
- Isolated Voltage Control
- Isolated ADC converter
- Solar Inverter
- Fiber adapter
- Digital Interfaces
- HVDC
- Robotics & Cobotics
- Variable Frequency Drive



- IGBT Power Module
- MRI / CT control boards
- Motor Drives
- Smart Grid Controls
- Fieldbus communication
- Power Converter
- Railway traction control
- Welding Machines

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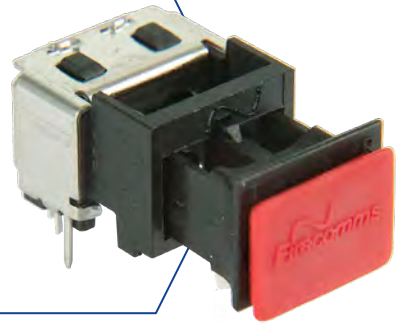
OptoLock® Product Range



OptoLock® Features

- Bare fiber connection (plugless)
- Customize length of cabling on site
- Quick field termination
- Pull Force > 30N
- Patents: US 7,597,485, US 7,905,665, CN 101501545, CN 102135650

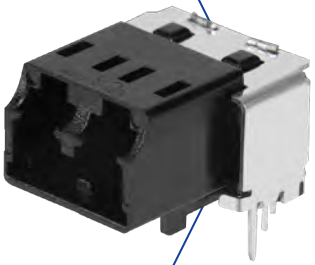
Data Communication / Ethernet Applications	
FB01GKUJ	850 nm (IR)/1.25 Gbps/RSSI/SLVDS/-40°C to +85°C
FB2M5KRR	650 nm/10~250 Mbps/RSSI/50 m POF/LVDS/-40°C to +85°C
FB2M5KVR	650 nm/10~250 Mbps/SD/50 m POF/LVDS/-40°C to +85°C
Sensing applications	
FB00AKAR	650 nm/0~-10 dBm Tx/0.3 A/W responsivity/- 40°C to +85°C Analog
Command and control applications	
FE50MKIR	DC 50 MBd - 40°C to +85°C, inverting/non-inverting
FE50MKNR	

OptoLock® Connector IEC61754-20Ed.2.0 highlights

- EMI / EMC immunity – a fully integrated photodiode and amplifier providing high immunity to interference from motors, contactors, mains voltage, RF sources etc.

- Low and High-Speed Options
  - DC-50 MBd in the Optolock® connector for the industrial control market. **Max. link length is 50 m.**
  - GigE data-rates for applications such as Ethernet/Profinet/EtherCAT data links - for plugless point-to-point data links requiring high immunity and isolation from the local environment. **Max. link length is 3 m.**

LC Transceiver Product Range

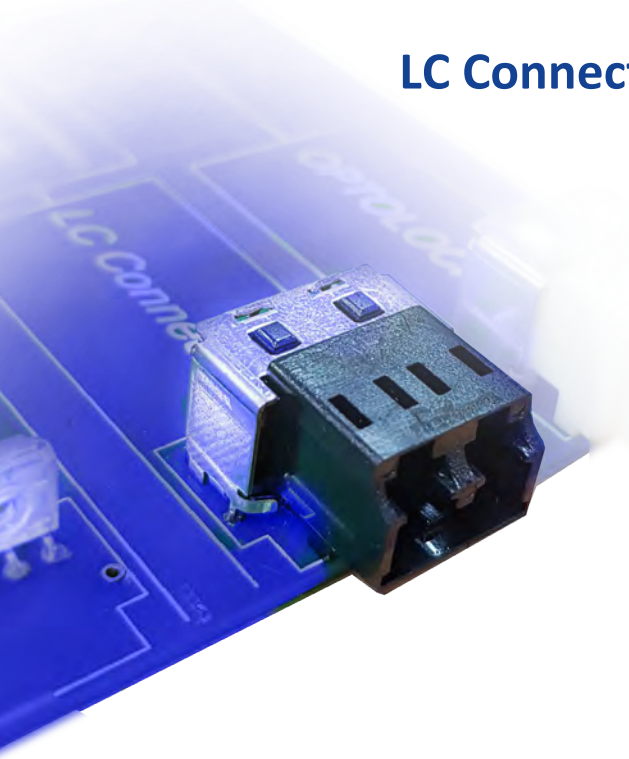


LC Interface

- Industry Standard connector
- IEC-61754-20 Ed.2.0 compliant
- Quick field termination
- Pull Force > 70N

Data Communication / Ethernet Applications	
FB2M5LRR	650 nm/10~250 Mbps/RSSI/50 m POF/LVDS/-40°C to +85°C
FB2M5LVR	650 nm/10~250 Mbps/SD/50 m POF/LVDS/-40°C to +85°C
Sensing applications	
FB00ALAR	650 nm/0~-10 dBm Tx/0.3 A/W responsivity/- 40°C to +85°C Analog
Command and control applications	
FE50MLIR	DC 50 MBd - 40°C to +85°C, inverting/non-inverting
FE50MLNR	

LC Connector for POF IEC61754-20Ed.2.0 highlights



- **A Non-magnetic Solution/Option for use in high magnetic fields such as MRI scanners or X-ray applications**

- EMI / EMC immunity – a fully integrated Photodiode and amplifier providing high immunity to interference from motors, contactors, mains voltage, RF sources etc.

- Low and High Speed Options:
  - DC-50 MBd in the LC connector for the industrial control market
  - GigE data-rates for applications such as Ethernet/Profinet/EtherCAT data links - for point-to-point data links requiring high immunity and isolation from the local environment.

Typical applications for Optolock®, LC and Free Space

- Media Converter
- Fiber Optic Converter
- Factory Automation
- Home Networking

- Power Generation and Distribution systems
- MRI / CT communication board
- RJ45 / Copper replacement in LED Full Color Panel
- Communication boards
- Industrial Networking
- Wireless data communication
- Robots & Cobots

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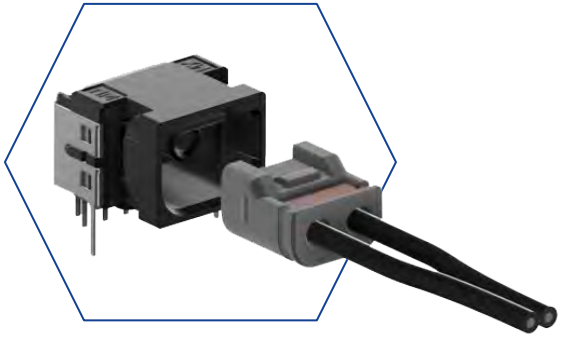
SMI Transceiver Product Range



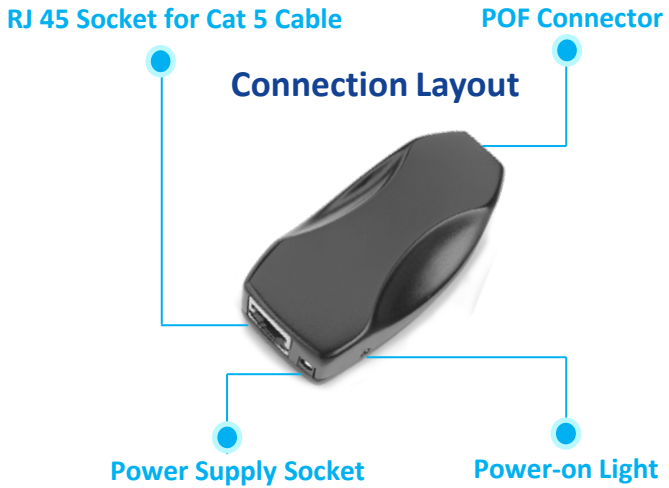
SMI Interface

- Industry Standard connector
- IEEE-1394b compliant
- Quick field termination
- Plug retention force > 100 N (when engaged)
- 21 N to unlock using built-in unlocking mechanism (long body plug)/ unlock tool for short body plug
- Duplex communication (each connector contains a transmitter and a receiver)
- TTL/LVTTL compatible logic level signaling for command and control applications
- Dual power supply / power rail operation (5V and 3.3V)
- Inverting and Non-inverting options for the receiver logic output state. This facilitates light on logic for on and off logic states that are required for alarm status hold applications
- Passive interface options for cabinet and housing pass through

Command and control applications	
FE50MSIR	DC-50 MBd SMI connector with inverting output on RX
FE50MSNR	DC-50 MBd SMI connector with non-inverting output on RX

Fast Ethernet Media Converter

- Part number: **FY-ENC-KSU**
- Enables low cost and rugged optical data networks
- RoHS compliant
- CE marked
- Different Power supply options (EU / US / UK)



Kit
(Includes Media Converter, 15 cm Cat 5e Cable and DC power supply)

- Converts Ethernet over copper to Ethernet over plastic optical fiber
- 100 Mbps data (125 MBd) throughput sends high speed Fast Ethernet up to 80 meters over POF
- High speed 650 nm Resonant Cavity LED
- Compatible with IEEE 802.3u Fast Ethernet data communications standard

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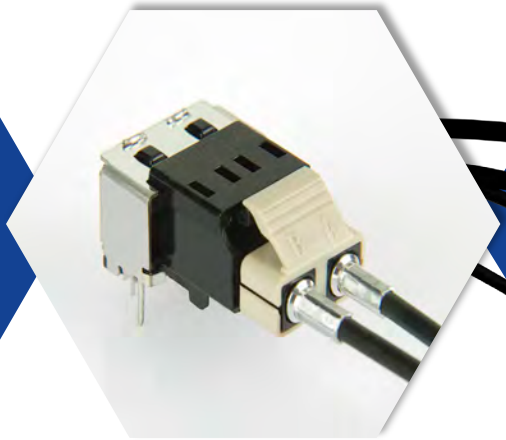
4 Port Fast Ethernet POF Switch

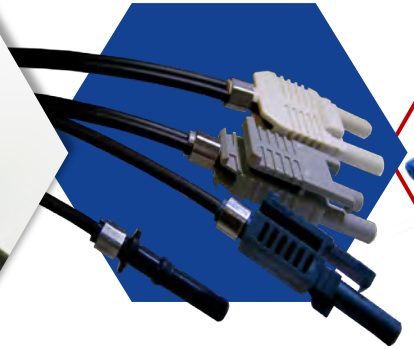
- Part number: **FY-ES3-KSU**
- Ideal for a small Ethernet network
- Layer 2 switch
- Support EtherCAT
- Applications:

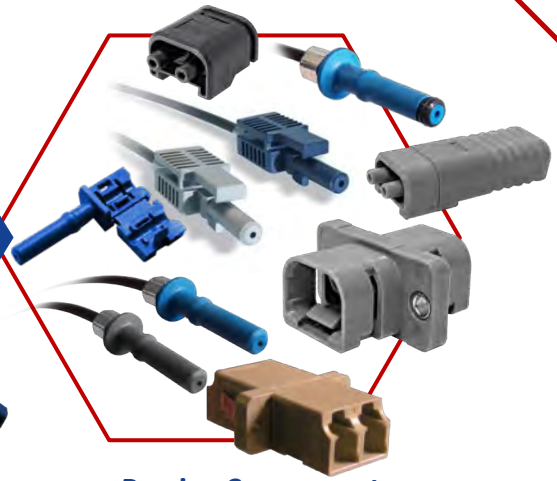
  - Home / Office installations
  - Internal Ethernet/EtherCAT inside an Industrial machine
  - Can be used in the environment of High Tension Equipment (Power substations)

POF Switch Kit Ordering Information	
FY-ES3-KKS	US Single End Kit
FY-ES3-KKL	UK Single End Kit
FY-ES3-KKG	EU Single End Kit
F02269-102	US Power Supply
F02269-101	UK Power Supply
F02269-103	EU Power Supply

Cable Offering POF







Bare Cable

- Simplex or duplex format
- 500m/reel simplex
- 500m/reel duplex

LC Cable

- Duplex only format
- Standard offering of 1m/5m/10m/30m
- Product list to include:
  - Cable Assemblies
  - Connectors & Dust plugs

RedLink® Cable

- Simplex or Simplex w/Latch
- Duplex or Duplex w/Latch
- Standard offering of 1m/5m/10m/30m
- Compatible with Versatile Link
- Product list to include:
  - Cable Assemblies only

Passive Components

- Latching Simplex plug
- Simplex Sealed Friction Plug
- Crimpless Simplex plug
- Friction Simplex plug
- SMI passives
- Passive interconnect
- LC – LC passive inline connector

04

KEY MARKETS AND EVALUATION TOOLS

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Firecomms Key Markets

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Firecomms Key Markets by Product Family

OptoLock®

RedLink®

LC Transceivers

SMI

INDUSTRIAL CONTROL

Robots

Drives & Inverters

Renewable Energy

Traction Control

Industrial Automation

SMI | OptoLock® | RedLink® | LC Transceivers

MEDICAL TECHNOLOGY

MRI Imaging

Patient monitoring Sensor

SMI | OptoLock® | RedLink® | LC Transceivers

CONSUMER – UTILITY

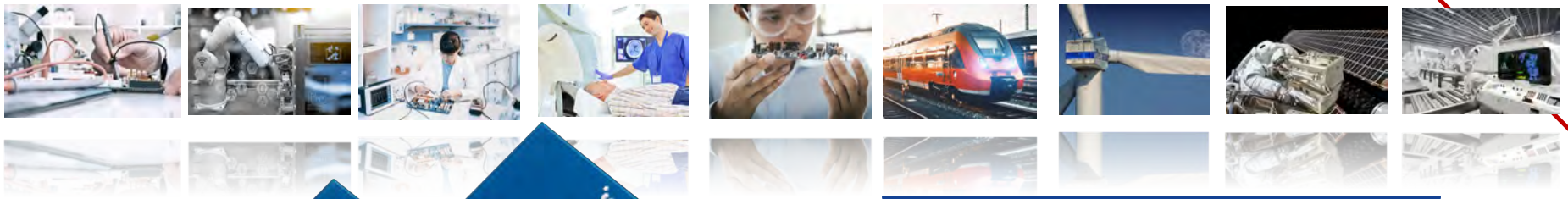
IPTV

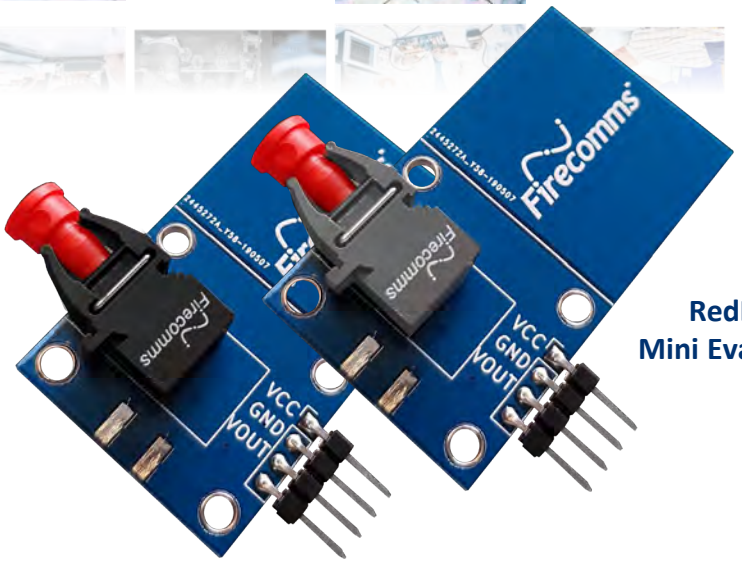
Smart Metering

Retro-Fit Home/Premise Networks

OptoLock® | LC Transceivers

Firecomms Evaluation Boards





RedLink®
Mini Eval Boards

RedLink® Mini Eval Boards	
EVAL-FT50MHNR	50 MBd Transmitter
EVAL-FR50MHNR	50 MBd Receiver
EVAL-FT10MHNR	10 MBd Transmitter
EVAL- FR10DHIR	10 MBd Receiver
EVAL-FT05MHNR	5 MBd Transmitter
EVAL- FR05DHIR	5 MBd Receiver

- DC- 5/10/50 MBd RedLink® Mini Eval Boards
- Non-standard Evaluation Boards are available upon request with extended delivery times

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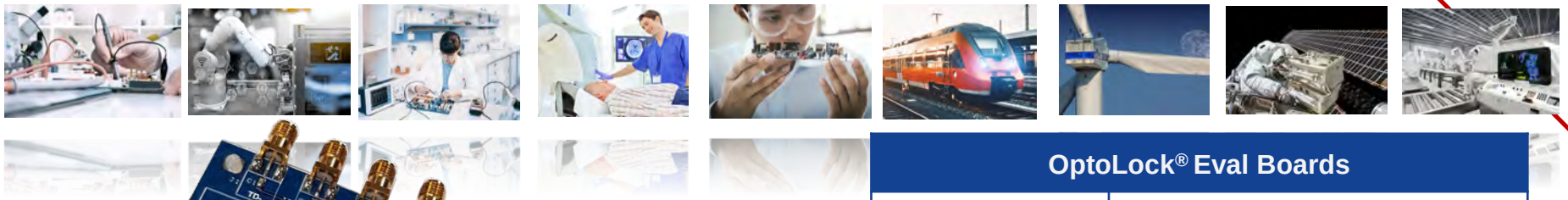
Firecomms Evaluation Boards



OptoLock®
Eval Boards

LC Transceivers
Eval Boards

OptoLock® Eval Boards	
EVAL - FB2M5KVR	10-250 Mbps Signal Detect
EVAL - FB2M5KRR	10-250 Mbps RSSI
EVAL - FE50MKIR	DC-50 MBd Inverting Output
EVAL - FE50MKNR	DC-50 MBd Non-Inverting Output
LC Transceiver Eval Boards	
EVAL - FB2M5LVR	10-250 Mbps Signal Detect
EVAL - FB2M5LRR	10-250 Mbps RSSI
EVAL - FE50MLIR	DC-50 MBd Inverting Output
EVAL - FE50MLNR	DC-50 MBd Non-Inverting Output

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05

WHY US?

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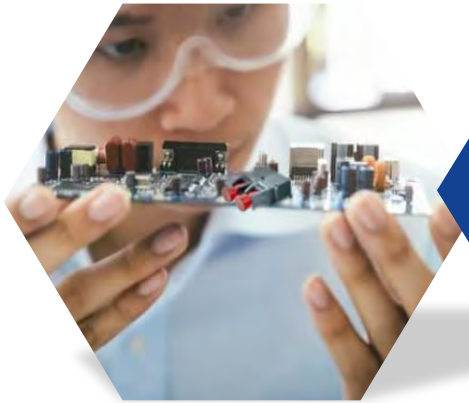
Why Firecomms ?



Industry experienced global team focused on design, development and in-house manufacturing of fiber optic transceivers for a wide variety of applications

It's our core business!

Complete in-house product development, manufacturing and support disciplines

- Photonic design
- Silicon IC design
- Mechanical packaging design
- Company owned volume manufacturing operations (no 3rd party CM)
- Industry standard products and customer driven custom devices

We pride ourselves on the collaborative, hands-on approach we take with our customers on their projects...

- Using our industry proven standard products

AND/OR

- Developing discrete custom devices:

- Enhanced performance versions of our devices
- With customer application specific features
- Across the range of volumes

Your Key Firecomms Contacts

Reach the person you need, and solve any issue as soon as possible

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