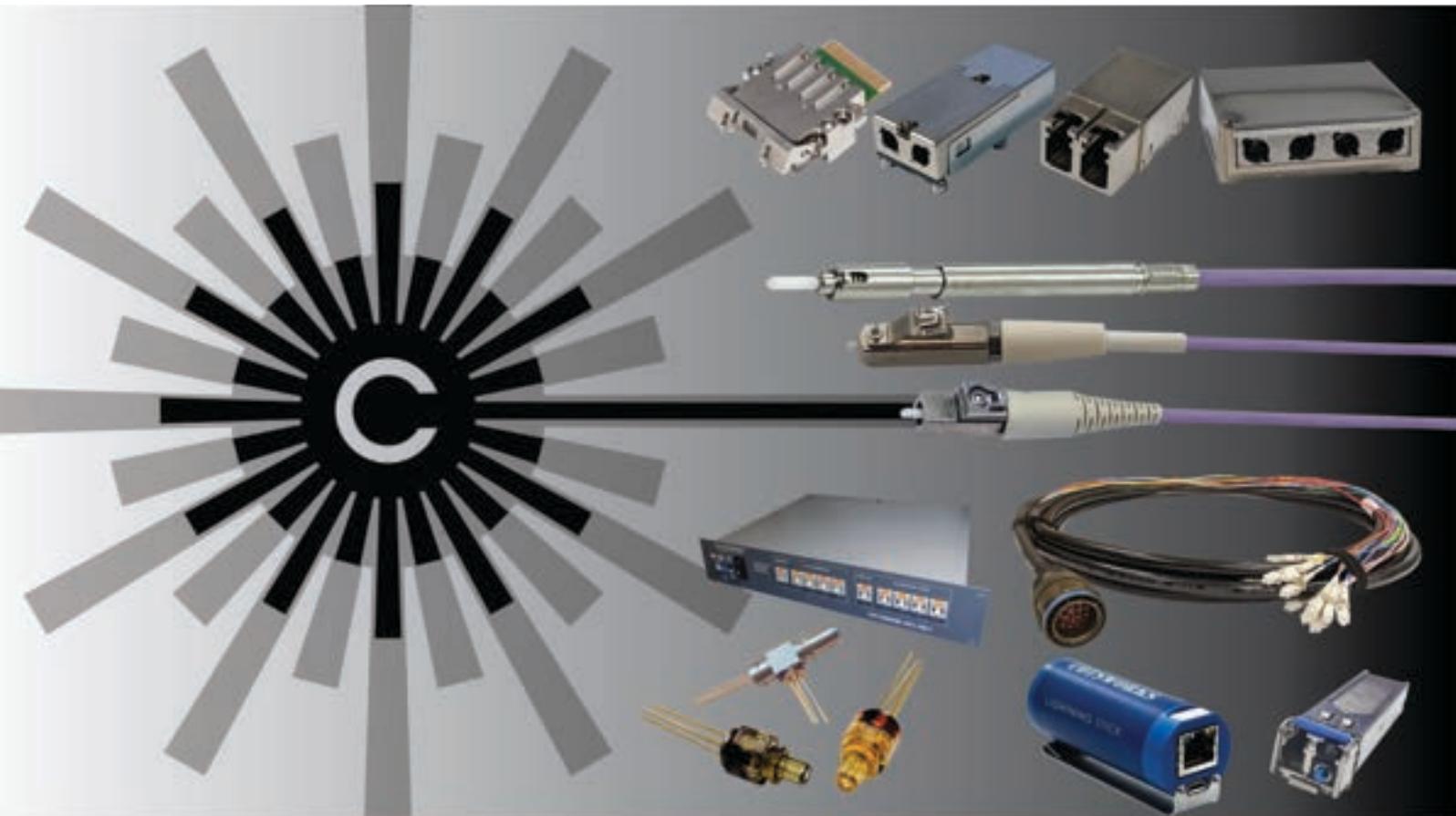


COTSWORKS®



Product Guide



ESL

28G-LR4

CWDM

ESL

28G-SR

850nm

ESL

RCP

28G-SR

RCP

10G-SX-TX

SPOT

CE: Card Edge

850nm

850nm

850nm

850nm

ESL

10G-SR-TX

850nm

RCP

10G-LR4-DX

CWDM

RCP

10G-SX-RX

850nm

SPOT

10/28G

850nm

RJ

10G-LR4

CWDM

RJ

28G-SR

850nm

RJ

3G-EX

1310nm

RJ

3G-SDI-LX

850nm

RJ

3G-SDI-TX2/RX2

850nm

SFP28

25G-SR

850nm

SFF

3G-TX2

850nm

ESL

10G-SR-RX

850nm

RCP

10G-LR4-TX

CWDM

RCP

5G-SX-DX

850nm

SPOT

1/10/40G

850nm

RJ

10G-CWDM

CWDM

RJ

10G-SX

850nm

RJ

3G-LX

1310nm

RJ

3G-SDI-TX2/RX2

850nm

SFP

1G-SX/LX

850nm

SFF

3G-RX2

850nm

ESL

10G-BR10-23

1270/1330nm

RCP

10G-LR4-RX

CWDM

RCP

5G-SX-TX

850nm

QSFP

28G

850nm

RJ

10G-DWDM

PIN

C-BAND

RJ

10G-TX2/RX2

850nm

RJ

3G-ZX

1550nm

RJ

1G-DX

1310nm

RJ

155M-FX-DPLX

1300nm

SFP+

10G-SR

850nm

SFF

4G-SX-DPLX

850nm

ESL

10G-BR10-32

1270/1330nm

RCP

10G-SX-DX

850nm

RCP

5G-SX-RX

850nm

QSFP

1/10/40G

850nm

RJ

10G-DW-E

APD

C-BAND

RJ

5G-SX-(C)

850nm

RJ

3G-TX2/RX2

850nm

RJ

155M-FX-DPLX

1300nm

SFP+

10G-LR

1310nm

SFF

4G-LX-DPLX

1310nm



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TOSA
OPTICAL SUB
ASSEMBLY
TX

ROSA
OPTICAL SUB
ASSEMBLY
RX

BOSA
OPTICAL SUB
ASSEMBLY
BI-DI

PKG
CHIP ON BOARD
CUSTOM DESIGN

AS 9100

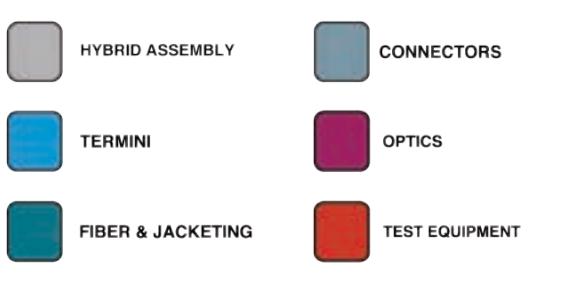
ISO 9001

MIL STD 810

OIT
OPTICAL
INTEGRATED
TEST PLATFORM
SM & NM
980nm

SFP+
802.3cz
980nm

Rugged Optical Product Platform



MT-T MT TAB SM & MM	CB C-BEAM MM	HD HIGH DENSITY CABLING SM & MM	SHP SHIPBOARD SM & MM	MIL D38999 SM & MM
MT-T MT TAB KIT SM & MM	ELIO ARINC 801 2.5mm SM & MM	MMF MULTI MODE FIBER 60/125µm	PTFE TEFLON SM & MM	µM MICRO D38999 SM & MM
COM COMMERCIAL ST, FC, SC	A801 ARINC 801 1.25mm SM & MM	MT EXPANDED BEAM SM & MM	29504 POF M29504 SM & MM	MMF+ MULTI MODE FIBER 100/140µm
SFB G-35/53 1310/1550nm	HM HERMETIC POTTED CONN SM & MM	LC LC CONNECTOR SM & MM	A801 LIGHTLY™ SM & MM	MT BREAKOUT SM & MM
SFB G-35/53 1310/1550nm	IC INTERPOSER CARD ASSEMBLY KJW/CPW/SFD	LC-R LC RUGGED SM & MM	A801 POF SM & MM	29504 M29504/48.5 SM & MM
SFB G-8X10 1310/1550nm	PT PIGTAIL ASSEMBLY S/UPC/UPF/UPC	LC-T LC TAB SM & MM	LC-801 LOCKING TAB ARINC 801 ADAPTER SM & MM	SMF SINGLE MODE FIBER 5µm-Sum
SFB M-35/53 1310/1550nm	LAC 10G-SR-TX/RX 250nm	LC-T DUPLEX SM & MM	LC-T801 METAL LATCH ARINC 801 ADAPTER SM & MM	MT 66 & 8T SM & MM
LEN GRIN/BALL ASPERE FIBER	VCSEL VERTICAL CAVITY SURFACE EMITTING LASER	FP FABRY PEROT LASER	EML EXTERNALLY MODULATED LASER	DFB DISTRIBUTED FEEDBACK LASER
LS LIGHTNING STICK 1G ETHERNET	OC OPTO-CUBE 10G ETHERNET	VFL VISUAL FAULT LOCATOR VFL-SFP	RMS RUGGED MECHANICAL SPLICER SM & MM	LED LIGHT EMITTING DIODE DIODE
MIL-STD-883	NIST	ITAR	FDA CLASS 1 LASER EYE SAFETY	MUX LR4, SWDM, CWDM, DWDM SM & MM
3155	EVAL OPTICAL SPLITTER SM & MM	EVAL EVALUATION BOARD SM & MM	LI LUCIOL INSTRUMENTS OTDR	KI KINGFISHER INTERNATIONAL PM / LS
SOSA	SAE	EN	ATEX	

InterConnect

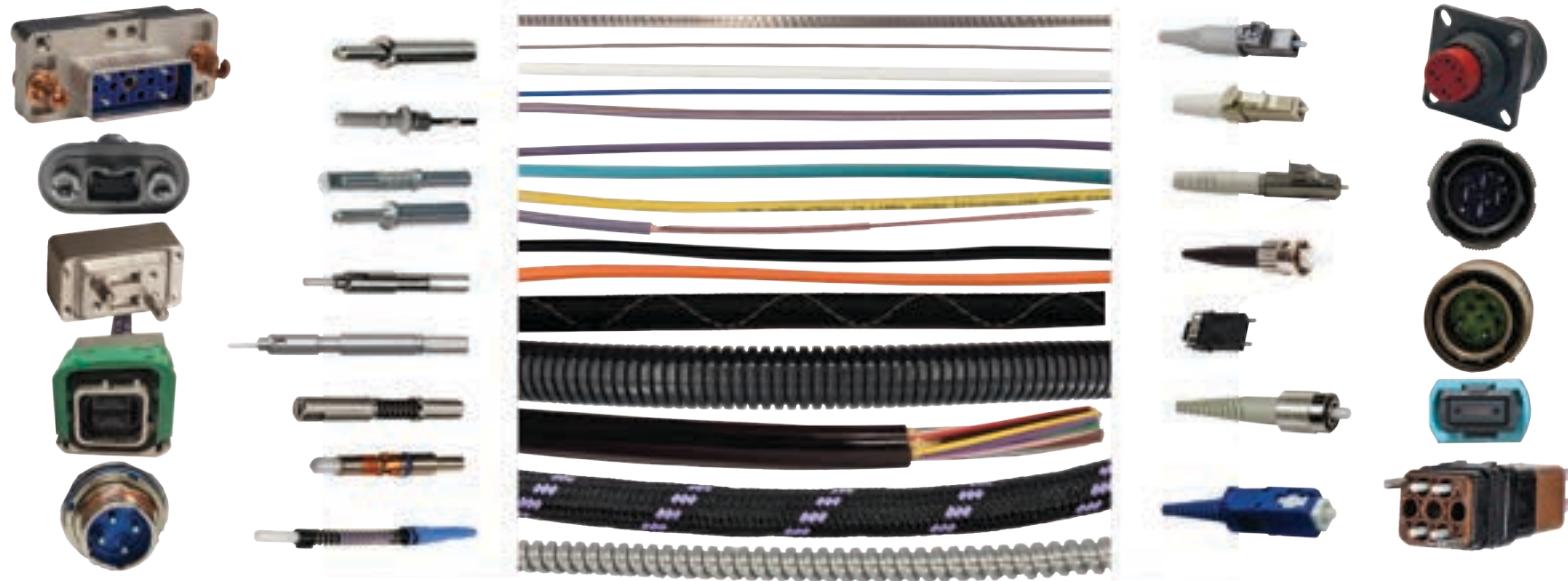
Complex Cable Assemblies



Hybrid Assemblies

Our Capabilities

COTSWORKS designs and manufactures fiber optic cable assemblies, including high density termini and connectors. Testing is performed on every cable assembly with the option to image and scan the endface geometry which is tracked to serialization of assemblies. COTSWORKS utilizes high-quality Commercial-Off-The-Shelf materials with qualified processes based upon MIL Standards. Components are processed under AS9100 operational procedures for required traceability. COTSWORKS manufacturing teams are experts in the field of fiber optic harness design and are available to support new designs and legacy application builds to strengthen customers supply chain on long term programs.



Optical Fiber Cable Accessories

COTSWORKS offers optical fiber cable accessories for single fiber and multifiber optical networks. Through innovation, COTSWORKS designs specialized connectors and adapters for singlemode and multimode optical fibers. For instance, MT-T (a ruggedized connector to be used with an MT ferrule and COTSWORKS' SPOT-CE transceiver) and SpliceWORKS (a rugged mechanical splice for harsh environments). COTSWORKS creates robust assemblies to support optical multiplexing for CWDM and DWDM applications and network monitoring using Mux/DeMux and splitter/combiners. COTSWORKS works with industry leading suppliers to provide network services and solutions, simplifying supply chain and supporting industry growth.

OptoMUX

SpliceWORKS

Adapters

Optical Splitter

Rugged Test Probe

MT-T

Rotary Joint



ASR

Product Platform Overview

COTSWORKS, INC. designs and manufactures rugged optical components and subsystems to operate in harsh environments. Products are utilized worldwide in commercial and military aerospace, military tactical, oil and gas, and other industrial markets.

Founded in 2006, the company is headquartered in Cleveland, OH supporting the Americas and Asia while COTSWORKS GmbH, located in Fulda Germany, supports Europe and the Middle East.

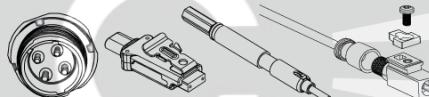
Over 100,000 mission critical rugged opto-electronic and interconnect products are produced each year in our state-of-the-art manufacturing facility. The company maintains a quality program with ISO 9100:2015 + AS9100:D Certification and ATEX compliance.

Opto-Electronic



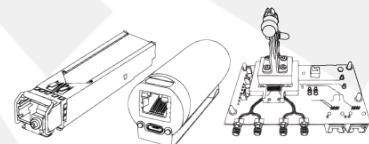
COTSWORKS offers a variety of transceivers with electrical interfaces enabling pluggable, surface mount, or thru-hole solder attach. Optical interfaces include industry-standard LC, COTSWORKS' unique ruggedized metal LC, ARINC 801, or pigtails. All transceivers operate at industrial temperatures as defined in MIL-STD-883 or MIL-STD-810-type environments. Standard or custom components meet shock, vibration, temperature, mechanical force, and environmental compliances.

Interconnect



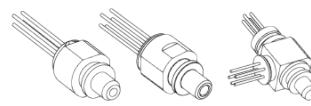
COTSWORKS offers a wide range of robust, reliable, and high-performing fiber optic cable assemblies and harnesses, focusing on ruggedized and harsh environment applications. Combining in-house component designs with qualified connectors, termini and cable, COTSWORKS produces finished flight-ready assemblies. Through our stringent manufacturing processes, these assemblies meet or exceed the requirements of the commercial and military aerospace environments. Utilizing product knowledge across multiple disciplines, COTSWORKS collaborates with customers to design custom solutions from product concept to manufacturing phase, and provides support for these assemblies years after initial installation.

Optical Test Equipment



COTSWORKS offers optical test equipment for transceiver validation, optical network troubleshooting, and custom test equipment to support OEM's production of optical systems. COTSWORKS' solutions include media converters, Optical Integrated Test (OITs) equipment, transceiver evaluation boards, and optical test sets. Custom OITs are available to support in-line power monitoring, variable attenuation, optical switching, and spectrum analysis. Transceiver evaluation boards are offered for in-house testing, programming, and troubleshooting during software development and system integration. Through streamlined automation, execution, data recording and system analysis, COTSWORKS' optical test equipment provides assurance that the components and network will adhere to customer specifications.

Optical Sub-Assembly



COTSWORKS offers Optical Sub-Assemblies (OSAs), which are critical components in any transceiver. Vertical integration of COTSWORKS' TOSA and ROSA components ensures improved quality and reduced lead times. COTSWORKS maintains full control over design and integration, supported by an approved dual-source vendor list for all raw materials and sub-assemblies.

Optical Test Equipment

COTSWORKS offers media converters, Optical Integrated Test equipment, Visual Fault Locators, and evaluation boards. COTSWORKS' wide range of testing equipment makes inspection, testing, and certifying fiber optics easier. COTSWORKS has partnered with Kingfisher and Luciol to provide a full test suite.

Media Converters

COTSWORKS' media converters provide optical-to-copper signal conversion with built-in diagnostics for both field and lab applications. The OptoCube supports 10G Ethernet, while the Lightning Stick offers 1G Ethernet in a compact, rugged design.

Features

- Optical-to-copper media conversion with built-in diagnostics
- Support for 100Base, 1000Base-X, and 10GBASE-X fiber interfaces
- 10/100/1000Base-T and 2.5G/5G/10GBase-T copper port speeds
- Network switch compatibility and embedded fiber/copper cable diagnostics
- Industry-standard USB for power and link monitoring



Optical Integrated Test

COTSWORKS' OITs are designed to be integrated into a preproduction line to validate the performance of the optical link. OITs support in-line power monitoring, variable attenuation, optical switching, and spectrum analysis, making them ideal for OEMs and their manufacturing partners.

Features

- 2, 4, 12, or 36 port configurations in standard 19" rack 2U
- User specified port operation, function and performance
- Built-in cable calibration tools lower frequency of optical fiber referencing
- API commands for Python scripting
- Dedicated interface port for PC monitor and control



VFL-SFP

COTSWORKS' Visual Fault Locator Small Form-Factor Pluggable is designed to detect breaks in fiber optic cables through software control or manual operation. The VFL-SFP is to be used with any standard MSA or SFP port, ethernet switches, servers or the Lightning Stick.

Features

- 650nm LED transmitter
- Class 2M Laser
- Pushbutton control or software control via I2C interface
- Detects breaks in fiber cables
- LC connector
- Operational in any standard SFP port, ethernet switches, servers, and Lightning Stick™



Evaluation Boards

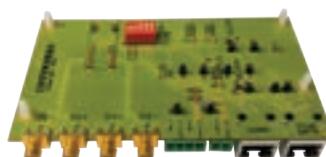


RJ

COTSWORKS' Evaluation Boards are designed to work seamlessly with COTSWORKS' transceivers, providing an essential platform for testing, programming, and troubleshooting optical transceivers. These boards facilitate customer integration by allowing comprehensive evaluation of both electrical and optical signals. The SPOT Evaluation Board, specifically for COTSWORKS' parallel transceivers, enables users to test the new Ferule Detection Sensor (FDS™) functionality, which helps determine if connectivity is established. By utilizing these evaluation boards, customers can streamline transceiver integration and ensure optimal performance in their systems



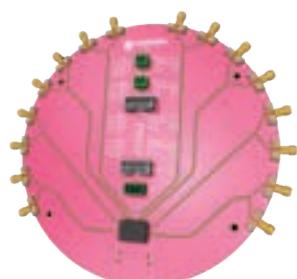
SFF/SFB



Dual SFF



RCP



SPOT

Optical Sub-Assemblies



COTSWORKS specializes in designing and manufacturing optical sub-assemblies with in-house optical design and TO-level prototyping capabilities. Through vertical integration of TOSA and ROSA components, operating from 1 to 28Gbps, COTSWORKS ensures improved quality, reduced lead-times, and full control over design and integration. This process is supported by an approved dual-source vendor list for all raw material and sub-assemblies. Optical sub-assemblies are designed, developed and manufactured in COTSWORKS Fiber Optics Research Center of Excellence (FORCE).

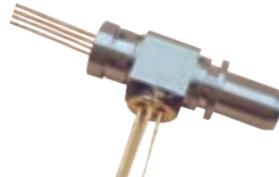
TOSA



ROSA



BOSA



- Converts electrical signals into optical pulses
- 5G/10G/28 Gbps data rates
- 850nm, 980nm, SWDM, CWDM, CWDM4, DWDM, LR4
- High power for 5G & 10G
- -40°C to 95°C and up to 105°C operating temperature

- Converts optical pulses to electrical signals
- 5G/10G/28 Gbps data rates
- 850nm, 980nm, SWDM, CWDM, CWDM4, DWDM, LR4
- RX sensitivity better than industry spec
- -40°C to 95°C operating temperature

- Transmits and receives light at two wavelengths in one mechanical package
- 100Mbps/1G/10G/28 Gbps data rates
- 1310/1550nm FP/DFB, 1270/1330nm DFB
- Hermetic package seals TO can into metal block by welding and/or epoxying
- -40°C to 95°C operating temperature

CUSTOM Optical Sub-Assemblies



Building upon experience in designing and manufacturing standard optical sub-assemblies, COTSWORKS has the expertise to design and develop custom OSAs. From complex TO cans to hermetic butterfly packages, COTSWORKS delivers customized solutions driven by customer specifications. The company's expertise spans a wide range of optical sources paired with high-performance receivers for both communication and sensing applications. Whether it's a specialized optical assembly or a fully integrated solution, COTSWORKS works with customers to develop the right OSA for the application.



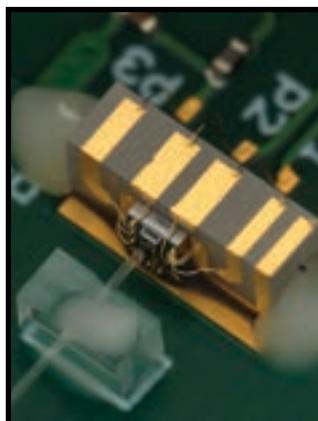
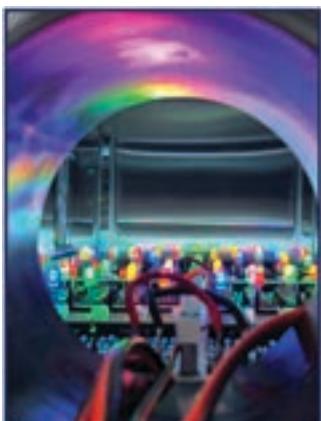
FORCE

COTSWORKS Fiber Optics Research Center of Excellence (FORCE) is an ISO 7, Class 10,000 Cleanroom that houses precision optical alignment, encapsulation, and test equipment capable of producing OSAs with industry standard and/or unique functionality, performance, and mechanical characteristics.

Manufacturing Capabilities: Burn-in, active alignment and capping, curing, performance testing, harsh-environment reliability testing, visual and optical inspection.

FORCE R&D Capabilities: Optical design, wire-bonding, epoxy die-attach, bond testing (wire pull and shear, die shear), micro laser-engraving, fiber lens forming, chip on board optical engines.

Developing FORCE Capabilities: Optical filter design, lens creation and selection, TO-cap and package lid welding, eutectic die-attach, hermeticity testing.



Opto-Electronic

RJ



RJ Module Jack (RJ) is a high-performance miniature duplex data link for opto-electronic communication over single mode or multimode optical fiber.



- 155 Mbps – 28 Gbps compliant to 802.3 Ethernet, Fibre Channel Infiniband, sFPDP, XAUI, FCAV/ARINC 818, and more
- Duplex LC fiber interface or ARINC 801 with adapter
- Surface mount electrical connector with screw or solder posts for a secure connection

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range		
RJ-28G-SR	3–28 Gbps	MM	850nm	VCSEL	PIN	-3dBm	2.4dBm	-11.1dBm	8.1dB	-40°C to 85°C	-	-
RJ-10G-SX	6–10 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-1dBm	-11.1dBm	6.1dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-10G-TX2	6–10 Gbps	MM	850nm	VCSEL	-	-5dBm	-0.8dBm	-	-	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-10G-RX2	6–10 Gbps	MM	850nm	-	PIN	-	-	-11.1dBm	-	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-10G-LR4	6–10 Gbps	SM	CWDM	DFB	PIN	-5dBm	0.5dBm	-14dBm	9dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-10G-CWDM	5–10 Gbps	SM	CWDM	EML	PIN	-1dBm	3dBm	-15dBm	14dB	-40°C to 85°C	-	-
RJ-10G-DWDM	6–10 Gbps	SM	DWDM	EML	PIN	-2dBm	2dBm	-17dBm	15dB	-40°C to 85°C	-	-
RJ-10G-DW-E	6–10 Gbps	SM	DWDM	EML	APD	0dBm	2dBm	-22.8dBm	22.8dB	-40°C to 85°C	-	-
RJ-5G-SX(-C)	125 Mbps–3 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-1dBm	-14dBm	9dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-3G-ZX	125 Mbps–3 Gbps	SM	1550nm	DFB	PIN	-1dBm	5dBm	-16dBm	15dB	-40°C to 85°C	-	-
RJ-3G-LX	125 Mbps–3 Gbps	SM	1310nm	FP	PIN	-5dBm	1dBm	-20dBm	15dB	-40°C to 85°C	-40°C to 95°C	-
RJ-3G-EX	125 Mbps–3 Gbps	SM	1310nm	DFB	PIN	-1dBm	3dBm	-20dBm	19dB	-40°C to 85°C	-	-
RJ-3G-TX2	1–3 Gbps	MM	850nm	VCSEL	-	-5dBm	-1dBm	-	-	-40°C to 85°C	-40°C to 95°C	-
RJ-3G-RX2	1–3 Gbps	MM	850nm	-	PIN	-	-	-15dBm	-	-40°C to 85°C	-40°C to 95°C	-
RJ-3G-S-LX	1–3 Gbps	SM	1310nm	FP	PIN	-7dBm	1dBm	-20dBm	13dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
RJ-3G-SDI-TX2	3 Gbps	MM	850nm	VCSEL	-	-5dBm	-1dBm	-	-	-40°C to 85°C	-40°C to 95°C	-
RJ-3G-SDI-RX2	3 Gbps	MM	850nm	-	PIN	-	-	-15dBm	-	-40°C to 85°C	-	-
RJ-1G-DX	1 Gbps	MM	1310nm	FP	PIN	-6.5dBm	-3dBm	-21dBm	14.5dB	-40°C to 85°C	-	-
RJ-155M-FX	155 Mbps	MM	1300nm	LED	PIN	-20dBm	-14dBm	-33dBm	13dB	-40°C to 85°C	-	-

RCP



Rugged Chip Scale Pluggable (RCP™) is a four-channel, electrically pluggable quad transmitter, quad receiver, or dual-duplex device.



- 1–10 Gbps compliant to 802.3 Ethernet, Fibre Channel, Infiniband, sFPDP, XAUI, FC-AV/ARINC 818, and more
- Quad ARINC 801 optical interface for rugged connectivity
- Electrically pluggable to a wave solderable connector with silicone gasket/screws

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range		
RCP-10G-LR4-DX	6–10 Gbps	SM	CWDM	DFB	PIN	-5dBm	0.5dBm	-14dBm	9dB	-40°C to 85°C	-	-
RCP-10G-LR4-TX	6–10 Gbps	SM	CWDM	DFB	-	-5dBm	0.5dBm	-	-	-40°C to 85°C	-	-
RCP-10G-LR4-RX	6–10 Gbps	SM	CWDM	DFB	PIN	-	-	-14dBm	-	-40°C to 85°C	-	-
RCP-10G-SX-DX	6–10 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-0.8dBm	-12dBm	7dB	-40°C to 85°C	-40°C to 95°C	-
RCP-10G-SX-TX	6–10 Gbps	MM	850nm	VCSEL	-	-5dBm	-0.8dBm	-	-	-40°C to 85°C	-40°C to 95°C	-
RCP-10G-SX-RX	6–10 Gbps	MM	850nm	-	PIN	-	-	-12dBm	-	-40°C to 85°C	-40°C to 95°C	-
RCP-5G-SX-DX	1–5 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-1dBm	-14dBm	9dB	-40°C to 85°C	-40°C to 95°C	-40°C to 100°C
RCP-5G-SX-TX	1–5 Gbps	MM	850nm	VCSEL	-	-5dBm	-1dBm	-	-	-40°C to 85°C	-40°C to 95°C	-40°C to 100°C
RCP-5G-SX-RX	1–5 Gbps	MM	850nm	-	PIN	-	-	-14dBm	-	-40°C to 85°C	-40°C to 95°C	-40°C to 100°C

ESSENTIAL



Essential™ is a two-channel electrically pluggable optical transceiver capable of duplex, dual transmitter or dual receiver configurations.



- 1–28 Gbps compliant to 802.3z, 802.3ae, and other Ethernet, Fibre Channel, Infiniband, sFPDP, XAUI, FC-AV/ARINC 818 protocols as well as support for SDI transmission (And 10–28G LR4 in development)
- ARINC 801 optical interface for rugged connectivity
- Electrically pluggable to a wave solderable connector with screws

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range		
ESL-10G-SR-DX	1–10 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-1dBm	-11.1dBm	6.1dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
ESL-10G-SR-TX	1–10 Gbps	MM	850nm	VCSEL	-	-5dBm	-1dBm	-	-	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
ESL-10G-SR-RX	1–10 Gbps	MM	850nm	-	PIN	-	-	-11.1dBm	-	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
ESL-10G-BR10	6–10 Gbps	SM	1270/1330nm	DFB	PIN	-8.2dBm	0.5dBm	-14.4dBm	6.2dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C
ESL-28G-SR	3–28 Gbps	MM	850nm	VCSEL	PIN	-3dBm	2.4dBm	-11.1dBm	8.1dB	-40°C to 85°C	-40°C to 95°C	-55°C to 95°C

SFF/B



Small Form Factor and Bi-Directional (SFF/B) is a rugged industry standard form factor with options for duplex or bi-directional functionality.



- Industry standard 2x5/7 electrical footprint
- Digital Diagnostics per SFF-8472
- Rugged LC connector housing including screw mounted OSAs
- Conformal coated for harsh environment use
- Ethernet, Fiber Channel, sFPDP, A818, Infiniband, PCIe, and more

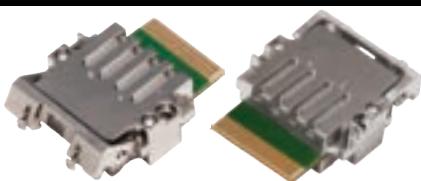
Opto-Electronic



Rugged Pluggable Optical Transceivers

COTSWORKS Opto-Electronics features SPOT (Secure Parallel Optical Transceiver) and other MSA compliant rugged pluggable optical transceivers. SPOT comes in either mid-board mount (SPOT) or card edge mount (SPOT-CE) and utilizes industry standard QSFP electrical board mounted connectors. SPOT is designed for use in harsh environments with a novel rugged enclosure and sensor for reliable optical connection. SPOT and SPOT-CE come in 1/10/40 and 25/100 Gbps Ethernet and are 33% smaller and lighter than QSFPs. This transceiver line can be conformally coated for operation in salt/fog or high humidity environments. They are designed and built with high quality optical, electrical, and mechanical components including OSAs from COTSWORKS. The internal memory map is controlled and locked by COTSWORKS to prevent tampering. All products operate at or above IEEE and MSA requirements for optical link budgets.

SPOT



Secure Parallel Optical Transceiver featuring a rugged low-profile design, electrically pluggable interface, and separable MT ferrule.



- 4Tx/4Rx Parallel 850nm VCSEL and PIN Array
- 1/10/40 Gbps data rates per IEEE SX/SR/SR4 standard
- Industry standard electrical QSFP card-edge connector
- MT-R "clamp" is a secure means of holding the MT ferrule in place in rugged operating environments
- Superior optical performance vs. standard
- SFF-8636 MSA compliant control and diagnostics
- Ferrule Detection Sensor (FDS™) for MT ferrule and MT-R clamp
- SPOT with MT-R is designed for mid-board applications

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range
SPOT	1/10/40 Gbps	MM	850nm	VCSEL	PIN	-4.3dBm OMA	0dBm	-11.3dBm @ 10G OMA -17dBm @ 1G	7dB @ 10G 12.7dB @ 1G	-40°C to 85°C -40°C to 95°C

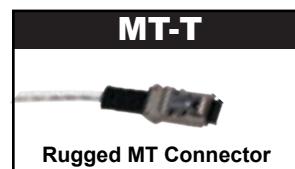
SPOT-CE



Secure Parallel Optical Transceiver - Card Edge featuring a rugged low-profile design, an electrically pluggable interface with a separable MT-T Optical Interconnect.



- 4Tx/4Rx Parallel 850nm VCSEL and PIN array
- 1/10/40 Gbps data rates per IEEE SX/SR/SR4
- Electrical QSFP card-edge connector
- Superior optical performance vs. standard
- SFF-8636 MSA compliant control and diagnostics
- Ferrule Detection Sensor (FDS™) for MT-T
- SPOT-CE with MT-T is designed for card edge applications
- MT-T "tab" is a separable and secure means of holding the MT ferrule in place in rugged operating environments



Rugged MT Connector

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range
SPOT-CE	1/10/40 Gbps	MM	850nm	VCSEL	PIN	-4.3dBm OMA	0dBm	-11.3dBm @ 10G OMA -17dBm @ 1G	7dB @ 10G 12.7dB @ 1G	-40°C to 85°C -40°C to 95°C

QSFP



The Quad Small Form Factor Pluggable is an 8-channel, compact, hot-swappable rugged pluggable optical transceiver with 2 configurations: 1/10/40 and 25/100 Gbps.



- MPO or pigtailed fiber optic interface
- Firmware and memory map controlled by COTSWORKS
- 1/10/40 Gbps Ethernet meeting all IEEE specifications, and MSA requirements, enabling legacy transceiver compatibility
- 4x25 Gbps for 100 Gbps with additional link budget over standard parts

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range
QSFP+40G-SR4	1/10/40 Gbps	MM	850nm	VCSEL	PIN	-4.3dBm OMA	0dBm	-11.3dBm @ 10G OMA	7dB @ 10G	-40°C to 85°C
QSFP28-100G-SR4	100 Gbps	MM	850nm	VCSEL	PIN	-4dBm	2.4 dBm	-10.3 dBm	6.3 dB	-40°C to 85°C

SFP



The Small Form Factor Pluggable is a 2-channel, compact, hot-swappable rugged pluggable optical transceiver with speeds ranging from 1 to 28 Gbps.



- Duplex LC or pigtailed optic interface
- Firmware and memory map controlled by COTSWORKS
- Meets all IEEE specifications, and MSA requirements

Part Number	Data Rate	Fiber	Wavelength	Tx	Rx	P. Out Min	P. Out Max	Rx Sens Max	Link Budget Min	Operating Temperature Range
SFP+10G-LR	1/10 Gbps	SM	1310nm	DFB	PIN	-5.2dBm	0.5dBm	-12.6dBm	7.4dB	-40°C to 85°C
SFP+10G-SR	1-10 Gbps	MM	850nm	VCSEL	PIN	-5dBm	-1dBm	-11.1dBm	6.1dB	-40°C to 85°C
SFP28G-SR	10-28 Gbps	MM	850nm	VCSEL	PIN	-3dBm OMA	2.4dBm	-11.1dBm	8.1dB	-40°C to 85°C



Cage Code: 49T62

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