

COTSWORKS[®]

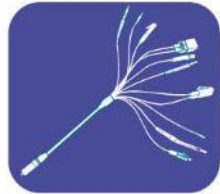
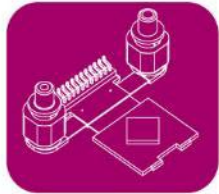
FORCE:

Processing Optical Semiconductors into Rugged Industry Standard Packages

CONTACT COTSWORKS FOR MORE INFORMATION UNDER NDA

www.cotsworks.com

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About COTSWORKS

COTSWORKS, INC. is an innovative manufacturer of rugged optical components and subsystems for harsh environment networking and sensing applications.



Commercial OR Custom-Off-The-Shelf components are integrated across multiple engineering disciplines to WORK in the most consistent, highest quality, performance, and cost-effective process and configurations.

Optical Transceivers, Simplex and Complex Cables, and Test Equipment are designed for Commercial and Military Aerospace, Military Tactical, Industrial & Energy, Rugged Networking and Sensor markets.



AS9100, ISO 9001, and ATEX certified, founded in 2006, with 100+ employees in North America, Europe, and representatives in Asia and Middle East. Privately funded with investment from Industry leaders.



Elemental Product Platforms

ESL 28G-LR4 CWDM	<ul style="list-style-type: none"> 4-CHANNEL PLUGGABLE: RCP™ 2-CHANNEL PLUGGABLE: ESSENTIAL™ 2-CHANNEL PLUGGABLE: SF P 8-CHANNEL PLUGGABLE: SPOT™/QSFP 2-CHANNEL SOLDERED: RJ 2-CHANNEL SOLDERED: SFF 1-CHANNEL SOLDERED: SFB HYBRID ASSEMBLY CONNECTORS TERMINI FIBER & JACKETING OPTICS TEST EQUIPMENT 										MT-T MT TAB SM & MM	CB C-BEAM MM	HD HIGH DENSITY CABLING SM & MM	SHP SHIPBOARD SM & MM	MIL D38999 SM & MM			
ESL 28G-SR 850nm	RCP 28G-SR 850nm	RCP 10G-SX-TX 850nm	SPOT CE: Card Edge 850nm	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	PVC CHLORIDE SM & MM	A600 ARINC 600 SM & MM								
ESL 10G-SR-DX 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	SFP28 25G-SR 850nm	SFF 3G-TX2 850nm	SFB 3G-35/53 1310/1550nm	HM HERMETIC POTTED CONN SM & MM	LC LC CONNECTOR SM & MM	A801 LIGHTLY™ SM & MM	MT BREAKOUT SM & MM	29504 M29504/4&5 SM & MM	SMF SINGLE MODE FIBER 5µm-9µm	PE POLYETHYLENE SM & MM	TF TFOCA SM & MM
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	SFB G-35/53 1310/1550nm	IC INTERPOSER CARD ASSEMBLY RJ/RCP/SFF/SFB	LC-R LC RUGGED SM & MM	A801 POF SM & MM	MT MTP/MPO SM & MM	29504 M29504/14&15 SM & MM	PLX SIMPLEX/ DUPLEX SM & MM	POF PLASTIC OPTICAL FIBER 1mm	NAV M28876 SM & MM
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	SFP+ 10G-SR 850nm	SFF 4G-SX-DPLX 850nm	SFB G-BX10 1310/1550nm	PT PIGTAIL ASSEMBLY RJ/RCP/SFF/SFB	LC-T LC TAB SM & MM	LC-801 LOCKING TAB ARINC 801 ADAPTER SM & MM	VITA 66 & 87 SM & MM	29504 M29504/20&21 SM & MM	CPLX COMPLEX/ MULTI-CH SM & MM	PMMA ACRYLIC 50µm-1mm	EN EN4165 SM & MM
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	SFB M-35/53 1310/1550nm	LAC 10G-SR-TX/RX 850nm	LC-T DUPLX SM & MM	LC-T801 METAL LATCH ARINC 801 ADAPTER SM & MM	MT MECHANICAL TRANSFER SM & MM	JMSP JEWEL SOCKET JEWEL PIN SM & MM	RIBN RIBBON FIBER SM & MM	HYB HYBRID ASSEMBLY COPPER/FIBER	EPX EN4644 SM & MM

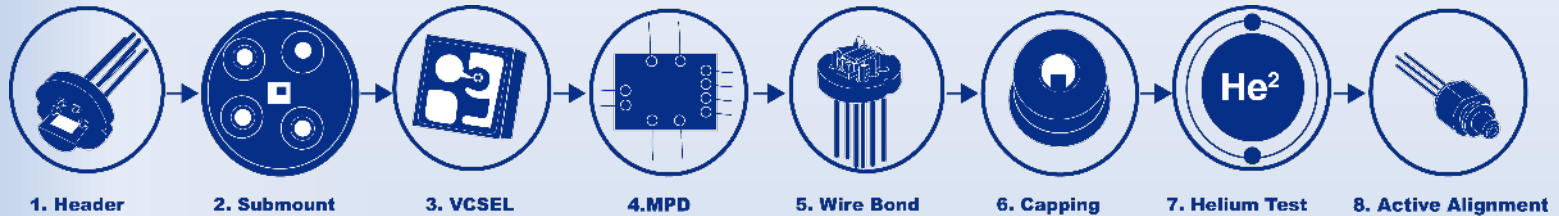
USA:
749 Miner Rd.
Highland Heights, OH 44135
26301 Curtiss Wright Pkwy
Richmond Heights, OH 44135

EMEA:
Am Alten Schlachthof 4
36037 Fulda, Germany



FORCE Elements	TOSA OPTICAL SUB ASSEMBLY TX	ROSA OPTICAL SUB ASSEMBLY RX	BOSA OPTICAL SUB ASSEMBLY BI-DI	PKG CHIP ON BOARD CUSTOM DESIGN	LENS GRIN/BALL ASPHERE FIBER	VCSEL VERTICAL CAVITY SURFACE EMITTING LASER	FP FABRY PEROT LASER	EML EXTERNALLY MODULATED LASER	DFB DISTRIBUTED FEEDBACK LASER	LED LIGHT EMITTING DIODE	APD AVALANCHE PHOTODIODE	PIN PIN DIODE	TIA TRANS IMPEDANCE AMPLIFIER DIE
AS 9100	ISO 9001	MIL STD 810	MIL STD 883	NIST	ITAR	FDA CLASS 1 LASER EYE SAFETY	ARINC	SOSA	SAE	EN	ATEX		
OIT OPTICAL INTEGRATED TEST PLATFORM SM & MM	SFP+ 802.3oz 980nm	LS LIGHTNING STICK 1G ETHERNET	OC OPTO-CUBE 10G ETHERNET	VFL VISUAL FAULT LOCATOR VFL-SFP	RMS RUGGED MECHANICAL SPLICE SM & MM	MUX LR4, SWDM, CWDM, DWDM SM & MM	3155 OPTICAL SPLITTER SM & MM	EVAL EVALUATION BOARD SM & MM	LI LUCILIC INSTRUMENTS OTDR	KI KINGFISHER INTERNATIONAL PM / LS			

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 Optical Sub-Assemblies (OSAs) with industry standard and/or unique functionality, performance, and mechanical characteristics.

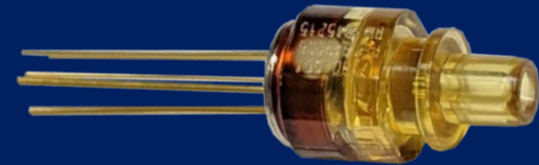
- **Manufacturing Capabilities:** Burn-in, active alignment and capping, curing, performance testing, harsh-environment reliability testing, visual and optical inspection.
- **R&D Capabilities:** Optical Design, wire-bonding, epoxy die-bonding, bond testing (wire pull and shear, die shear), micro laser-engraving, 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, hermiticity testing.



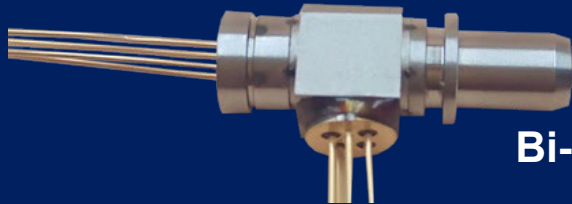
OSAs (Optical Sub Assemblies)



TOSA
Transmitter Optical Sub-Assembly



ROSA
Receiver Optical Sub-Assembly



BOSA
Bi-Directional Optical Sub-Assembly
(Coming in 2025)



CUSTOM
Different TO can sizes or
hermetic gold boxes or other

Features

- TO can based
- Ultem resin caps
- Metal welded caps
- MM or SM
- Custom ID or OD
- Pigtailed
- Fiber lensing
- Internal lensing

OSAs are available for sale, integration, or in transceivers

Coming in 2025: Faster MM, Single Mode, Quad Engines

Q1

- 1-10/14-28Gbps MM ROSA
- 1-28Gbps CWDM4 TOSA

Q2

- 1-28Gbps CWDM TOSA
- 100/1000Mbps 31/55nm FP

Q3

- Defocused FP TOSA (MM)
- 31/55, 27/33 BOSA (SM/MM)

Q4

- 1/10/40Gbps Optical Engine
- 10/28Gbps Optical Engine

Released Products

850nm 5G TOSA

850nm 10G TOSA

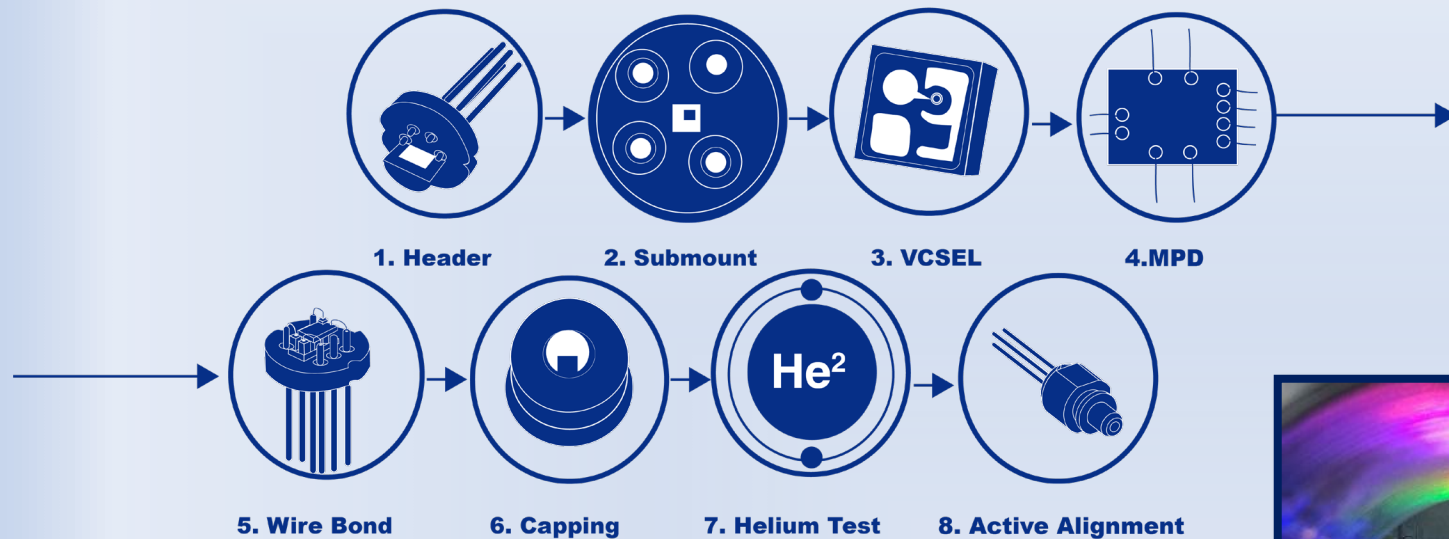
High Power 850nm 5G TOSA

High Power 850nm 10G TOSA

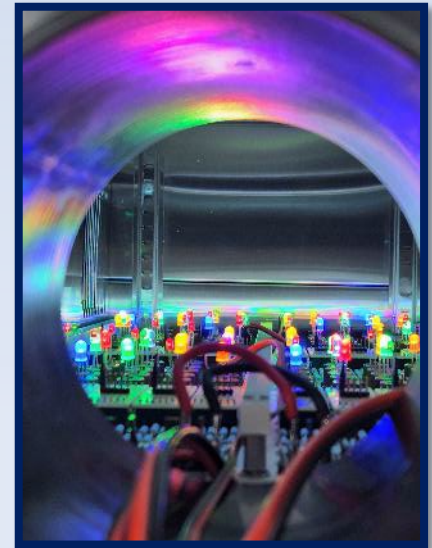
ROSA 850nm 5G

ROSA 850nm 10G

Example: TOSA Assembly Process Flow



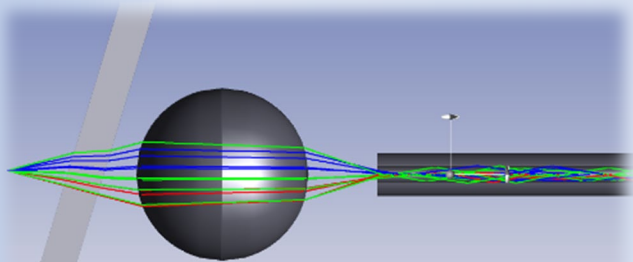
- All COTSWORKS TO parts go through a burn-in test to confirm functionality during and after exposure to harsh conditions
- FORCE-developed parts are processed for 96 hours at 85°C prior to release to production



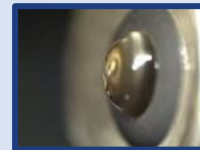
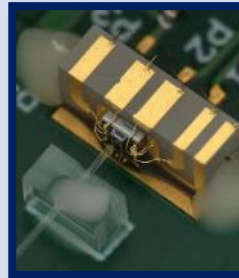
OSA burn-in demo

Optical Design

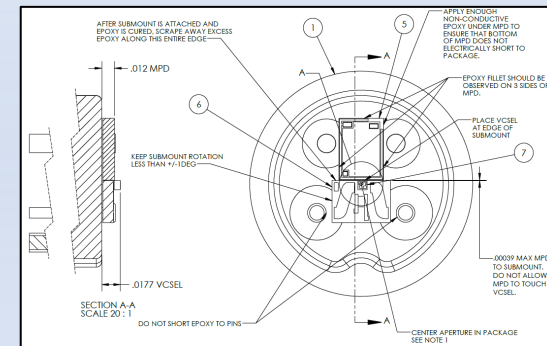
- COTSWORKS optical engineering team can design optical subassemblies in TO or “gold box” packages
- Benefits to USA based design team:
 - Control over supply chain and critical IP
 - Ability to model and predict product performance
 - Tolerancing analysis on minor misalignments
 - ITAR compliant or ITAR free output
 - Model to prototype to test to production capability



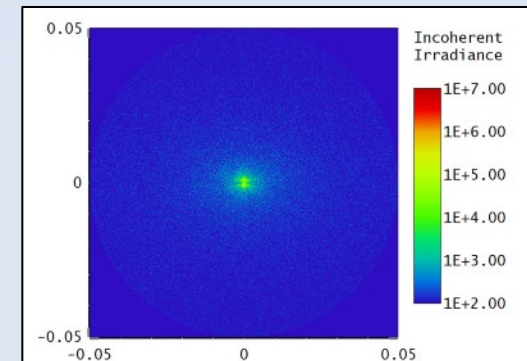
850nm VCSEL fiber coupled with a ball lens



Magnified images of special builds



Sample TO design



Modeled Encircled Flux

Company Information

Quality System:

ISO 9001:2015 + AS9100:D CERT-0124317

ATEX Compliant, OP IS

S20.20 ESD program

J Standard electronic parts work

Compliant to FAR 52.204-2, DFARS 252:204-7012

NIST 800-171 Compliance in process



Aerospace and Electronics
Industry Quality Standards



FDA/CDRH Laser Safety Test
and Manufacturing Support



International Traffic in
Arms Regulations



ESD handling and Facility Testing,
Operation, and Certification



Harsh environments including
Oil and Gas compliance



Foreign Object Debris Procedures,
Auditing, and Training

Company Information:

EIN/Tax ID: 20-4055028

Vendor License: 18-90016

CAGE Code: 49T62

ECCN: EAR99

ITAR: M37737

USA

749 Miner Rd

Highland Heights, OH 44143

p. 440.446.8800

EMEA

Am Alten Schlachthof 4

36037 Fulda, Germany

+49 (0) 661 9786 9200

www.ruggedfiberoptics.com

