



SEL-2829 Fiber-Optic Transceiver

Single-Mode Fiber-Optic Transceiver for Medium-Distance Links



*Communicate
Up to 23 Kilometers
With EIA-232 Port-Powered
Transceivers*

Features and Benefits

- **Flexible, Long-Range Fiber-Optic Communication**
Send serial data up to 23 kilometers using single-mode optical fiber with standard ST® connectors. Use data rates from 0-40,000 bits per second. Use selector switch to choose between DCE and DTE standard pin configurations, and eliminate the use of adapters.
- **Easy Application**
Plug transceiver directly onto a standard 9-pin serial connector (DB-9). No special mounting is required. Receives power from the host device via the connector; no separate power supply or power wiring is needed. Transmits continuous light pulses for simpler testing with an optical meter. Apply with ST preterminated fiber cables.
- **Secure and Reliable Data Transfer**
Communicate with maximum bit error rate (BER) of 10^{-9} . Far less susceptible to EMI/RFI than copper links. Edge emitting laser provides component isolation and low power consumption.
- **Improved Safety**
Provides improved isolation from ground potential rise and other electrical hazards compared to copper connections.

Making Electric Power Safer, More Reliable, and More Economical®

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Application Information

Connecting and Disconnecting Fiber Cable

Use the supplied connector caps to cover ST connectors that are not connected to a fiber cable. If the SEL-2829 is transmitting data, and both ST connectors are open, the transmitted (TXD) light signals may reflect off external objects into the receiver (RXD) ST connector. The reflected signals appear as messages sent from a remote SEL-2829.

Determining Maximum Cable Length

To calculate the maximum cable length for your application, first obtain the following specifications from your optical fiber supplier, based on a 1300 nm optical source and the required temperature range:

1. Fiber loss (or attenuation) in dB/km
2. Connector loss in dB
3. Splice loss in dB

The total optical power provided by the SEL-2829 is 14 dB. Determine the power lost in connectors by multiplying the number of connectors by the connector loss. Determine the power lost in splices by multiplying the number of splices by the splice loss. Subtract the power lost in splices and connectors from the total optical power to determine the available optical power. Calculate the maximum cable length by dividing the available optical power by the fiber loss.

Example

Fiber Type 9.3 μ m

Connector Loss 2 dB/Connector

Splice Loss (fusion) 0.2 dB/Splice

Fiber Loss @ 1310 nm 0.4 dB/km

SEL-2829 Optical Budget 14 dB

Less Connector Loss (2 x 2 dB) -4 dB

Less Splice Loss (4 x 0.2 dB) -0.8 dB

Available Power 9.2 dB

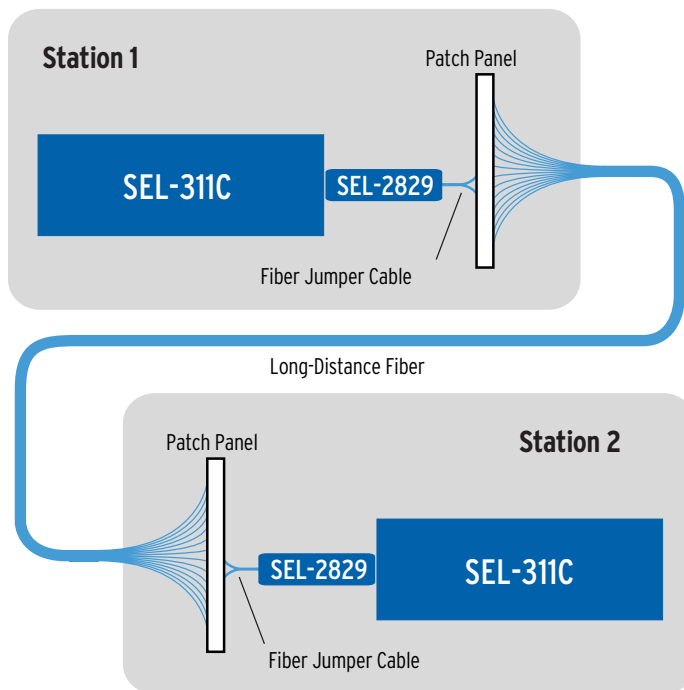
Maximum Cable Length 9.2 dB/0.4 dB/km = 23/km

Fiber Loss Test With Optical Meter

1. Configure your optical meter to measure 1300 nm wavelength.
2. Temporarily connect optical meter to transmit ST connector (T) of local transceiver, and note dBm reading.
3. Temporarily connect the fiber-optic cable that would go to the receive ST connector (R) of the remote transceiver to the meter, and note dBm reading. Note: The difference between the readings in Steps 2 and 3 should not exceed 14 dB. (If measured readings exceed 14 dB, the fiber's attenuation is too great.)
4. Repeat Steps 1-3 using transmit ST connector (T) of remote transceiver and receive ST connector (R) of local transceiver.

Interstation Teleprotection Example

Connect the SEL-2829 to the EIA-232 port of SEL relays on opposite ends of a protected line, and connect them with two fibers. Use MIRRORING BITS™ communications for teleprotection schemes including POTT, DCUB, or DCB.



Technical Specifications

■ Connect Directly to DB-9 Serial Ports

Compatible with SEL-200, -300, -500, and -700 series relays, SEL-2032/2030/2020, SEL-2100, SEL-DTA2, and SEL-RTS

■ Projection From DB-9 Connector

5.0" (12.7 mm) typical, including fiber-optic connector and minimum cable bend radius

■ Data Rate

0-40,000 bits per second, full-duplex, no jumpers or settings

■ Data Delay

36 μ s plus 5 μ s/km of fiber

■ Optical Source

1310 nm (infrared) LED transmitter

Typical average transmit level: -3.6 to -17.1 dBm

■ Operating Temperature

-40° to +85°C

■ Power Requirements

Receives power from the transmit-data input pin plus one other power input pin in the DB-9 connector. The SEL-2829 does not support hardware handshaking. Non-SEL devices should provide at least the current and voltage indicated below. More current is required at higher supply voltages:

DCE Pin 3 or DTE Pin 2 (Transmit Data): 11 mA at ± 5.2 Vdc, and

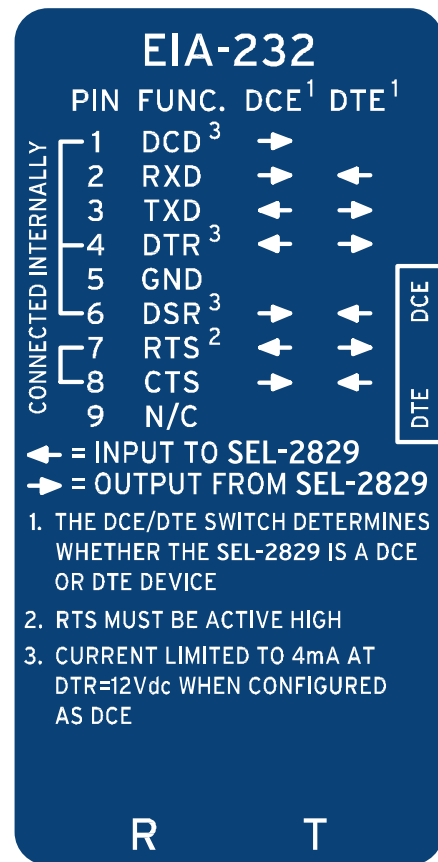
DCE Pin 4 or DTE Pin 6: 11 mA at -5.2 Vdc, or

DCE Pin 7 or DTE Pin 8: 11 mA at +5.2 Vdc

■ Connectors and Cable

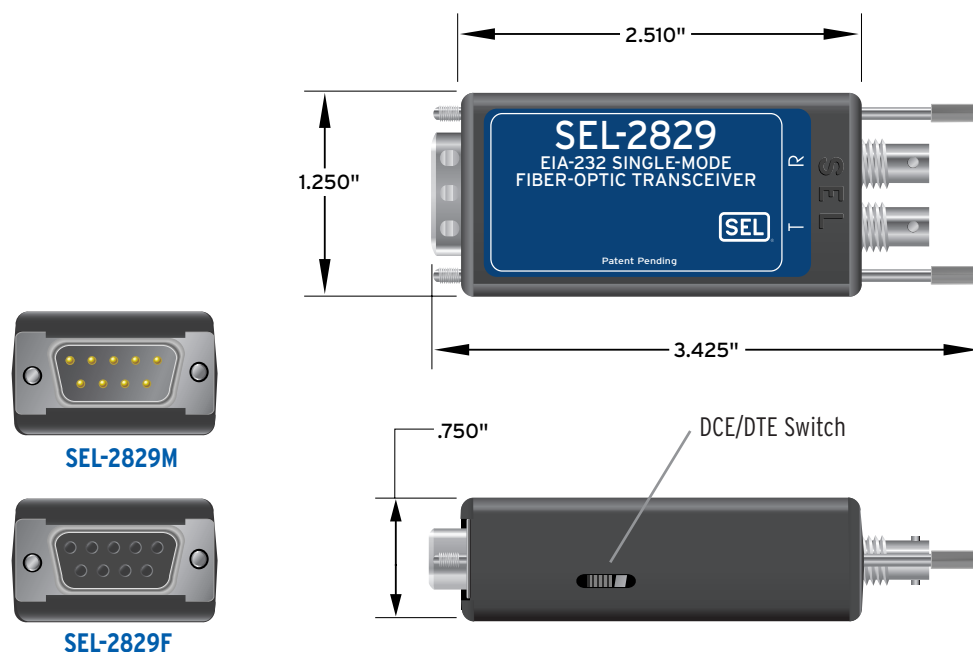
ST connectors and single-mode fiber (9.3 μ m)

Back Label With EIA-232 Pin Usage



(imprinted on back of device)

Transceiver Dimensions



SEL-2829

Fiber-Optic Transceiver

Type Tests and Standards

IEEE C37.90.2

Trial Use Standard, Withstand Capability of Relay Systems to Radiated Electromagnetic Interference From Transceivers.

Exceptions:

5.5.2(2) Performed with 200 frequency steps per octave.

5.5.3 Digital Equipment Modulation Test not performed.

5.5.4 Test signal turned off between frequency steps to simulate keying.

IEC 60068-2-1 Fifth Edition 1990

Cold, -40°C

IEC 60068-2-2 Fourth Edition 1974

Dry Heat, 85°C

IEC 60068-2-30 Second Edition 1980

Damp Heat Cyclic, 55°C, 6 cycles

IEC 60255-22-2 Second Edition 1996

Electrostatic Discharge Immunity
Level 4

IEC 60255-21-1 First Edition 1988

Vibration Endurance Class I
Vibration Response Class II

IEC 60255-21-2 First Edition 1988

Bump and Shock Withstand Class I
Shock Response Class II

IEC 60255-21-3 First Edition 1993

Quake Response Class I

Related Products

SEL-2800 Fiber-Optic Transceiver

Electrically isolated, noise-free EIA-232 communication for 500 meters at up to 40,000 bits per second, with V-system connectors for 200 µm multi-mode fiber-optic cable.

SEL-2810 Fiber-Optic Transceiver

Electrically isolated, noise-free EIA-232 communication and demodulated IRIG-B time-code transmission for 500 meters at up to 20,000 bits per second. V-system connectors for 200 µm multi-mode fiber-optic cable.

SEL-2815 Long-Distance Multi-Mode Fiber-Optic Transceiver

Electrically isolated, noise-free EIA-232 communications for 15 km at data rates up to 40,000 bits per second. Included with ST connectors for use with multi-mode fiber-optic cable.

SEL-2830 Single-Mode Fiber-Optic Transceiver

Electrically isolated, EIA-232 full-duplex communications for 80 km (50 miles) at up to 40,000 bits per second using ST connectors and single-mode fiber.

SEL-2505 Remote I/O Module, ST Option

Provides MIRRORRED BITS communications for eight logic inputs and eight contact outputs.

Fiber Compatible Products

C809Z020SSX0005

Five-meter single-mode, duplex fiber-optic jumper with ST connectors

C809Z020SSX0015

Fifteen-meter single-mode, duplex fiber-optic jumper with ST connectors

Commitment to Quality

Schweitzer Engineering Laboratories, Inc. is committed to quality. Our certification to the ISO 9001 quality standard and our ten-year product warranty are examples of this commitment. We encourage and appreciate your feedback about the use of SEL equipment, and we will use this information to continually improve our products and services.



Contact Us

SEL sales representatives are prepared to assist you. Contact your nearest sales representative, application engineer, or customer service representative at (509) 332-1890. Visit our website at www.selinc.com for more information.

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