RS-485 to Fiber Solutions
10/22/18

Mini Bit-Driver®
Stand Alone Bit-Driver®
Ruggedized Bit-Driver®

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Web Site: http://www.sitech-bitdriver.com
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RS-485 PRODUCTS
FIELD BUSES

A Field Bus is a digital, serial, two-way multi-drop communication link among controllers and remote I/Os, sensors, actuators, and internet working components. In comparison to local area network (LAN), field buses are specialized for rugged industrial environment, determinism, bus powering and so on.

Field buses are covered by IEC Standards. Some of the more popular field buses are:

- **Profibus**: IEC IS 61158 type 1/3/10. Over 50% of process industry applications use Profibus
- **Foundation Fieldbus**: IEC IS 61158 Type 1/9
- **MOD Bus**: Developed by Modicon Inc. Now backed by Schneider Electric
- **Inter Bus**: IEC IS 61158 Type 8
- **CAN Bus**: IEC under development

Electric industry association (EIA), RS485 standard bus is used in many of these field buses.
RS-485 PRODUCTS

1. Point to Point:

```
CPU/COMPUTER/PROCESS CONTROLLER

S.I.TECH 2126

RS485 2-Wire
FIBER OPTIC CABLE

S.I.TECH 2126

RS485 2-Wire

DTE

Note: For 4-Wire RS485, Use 2116
```

2. User Clusters:

```
MASTER CLUSTER CONTROLLER

S.I.TECH 2107

Fiber Cluster OPTICAL COUPLER

FIBER OPTIC CABLE

UP TO 24 PORTS

WORK STATION

S.I.TECH 2107

CLUSTER CABLE

FIBER OPTIC CABLE

UP TO 2 Km
```

3. Proprietary Networks Using Other Bus Architecture:

```
MASTER PLC

2W

FIBER OPTIC CABLE

BUS

SLAVE PLC

SLAVE PLC

SLAVE PLC

SLAVE PLC

SLAVE PLC

FIBER OPTIC CABLE

29W

S.I.TECH 2110
```

* BUS can be RS485 - 4 or 2 wire coaxial cable. Any of these can be FIBER.

4. RS-485 Multidrop:

```
COMPUTER CPU

PLC/PC/RTU

S.I.TECH 2127

Upstream

FIBER OPTIC CABLE

Up to 2 km
```

```
PLC/PC/RTU

S.I.TECH 2128
```

```
COMPUTER CPU

PLC/PC/RTU

S.I.TECH 2127
```

```
COMPUTER CPU

PLC/PC/RTU

S.I.TECH 2127
```

Note: For RS485 bus, end of line termination is required (typically 120 ohm resistor).

5. RS-485 Multiplexer:

```
HOST COMPUTER

4 or 8 Channel

4 to 1 or 8 to 1 cable

S.I.Tech F.O. MUX
2454/2458
F.O. MUX

Fiber Optic

DTE1

DTE2

DTE3

DTE4
```

Note: For RS485 bus, end of line termination is required (typically 120 ohm resistor).
RS-485

RS-485 (EIA-485) is a standard using twisted pair for extended distance communications and is used on process control, energy management, clustered computers, and security systems.

RS-485 is used as a 2 wire or 4 wire systems. In a 2 wire system, 2 wires (twisted pair) are used for both transmit and receive, thereby requiring communication in half-duplex mode. For example, data is sent from Point A to Point B and then the line is turned around (also called time out) to send data from Point B to Point A.

Data rates most commonly used range from 4800 bps all the way to 12 Mbps. As the data rate is increased data goes from Point A to Point B in less time so the line can be turned around much faster.

RS-485 is used for distributed data communication in a bus topology or “daisy chain”. Star, tree, or branch configurations are generally not recommended.

RS-485 BUS

PLC=Programmable Logic Controller

For all RS-485 applications line termination is necessary – typically 100 to 120 ohms can terminate a line. Many manufacturers provide line termination in their equipment (auto terminating).

EIA-485 specifies generators and receivers capable of operating in balanced digital multipoint systems. The parameter values specified in this Standard are similar to those in TIA/EIA-422-B. These values allow generators and receivers to be designed that can be used to meet the requirements of both standards, (EIA-422 and 485).


This Standard specifies the electrical characteristics of generators and receivers that may be employed when specified for the interchange of binary signals in multipoint interconnection of digital equipment. When implemented within the guidelines of this Standard, multiple generators and receivers may be attached to a common interconnecting cable.

An interchange system includes one or more generators connected by a balanced interconnecting cable to one or more receivers and terminating resistors.

RS485 CONNECTORS

Please refer to the RS-422 section for discussion of data connectors.
## TABLE F
### RS-485 TO FIBER BIT-DRIVERS (MODEMS)

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Package</th>
<th>Data Rate Up to Kbps</th>
<th>Async</th>
<th>Sync</th>
<th>Power Options</th>
<th>2 Wire Data Connector**</th>
<th>Multimode Fiber (SM-1300nm)</th>
<th>Singlemode Fiber Connector</th>
<th>Daisy Chain Multidrop</th>
<th>Distance ***</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>2107</td>
<td></td>
<td>1.8 M</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 F</td>
<td>ST/SM, 850</td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td>2110</td>
<td></td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 M</td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2126</td>
<td></td>
<td>38.4</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 M</td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2127</td>
<td></td>
<td>187.5</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 F</td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2129</td>
<td></td>
<td>187.5</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 F</td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
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<td></td>
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<tr>
<td>2140</td>
<td></td>
<td>230K</td>
<td></td>
<td></td>
<td></td>
<td>Terminal Block</td>
<td>ST/SM, 820</td>
<td>ST/FC</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2145</td>
<td></td>
<td>12M</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 F</td>
<td>ST/SM, 820</td>
<td>ST/FC</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2328</td>
<td></td>
<td>187.5</td>
<td></td>
<td></td>
<td></td>
<td>DB-9 F</td>
<td>ST/SM, 850</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2331</td>
<td></td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td>RJ-45</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2345</td>
<td></td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td>RJ-45</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
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<tr>
<td>2365</td>
<td></td>
<td>38.4</td>
<td></td>
<td></td>
<td></td>
<td>RJ-45</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2362</td>
<td></td>
<td>115</td>
<td></td>
<td></td>
<td></td>
<td>RJ-45</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2656</td>
<td></td>
<td>12.3</td>
<td></td>
<td></td>
<td></td>
<td>DB-25 F</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2610</td>
<td></td>
<td>9.6</td>
<td></td>
<td></td>
<td></td>
<td>ST/SM, 880</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2616</td>
<td></td>
<td>115</td>
<td></td>
<td></td>
<td></td>
<td>DB-25 F</td>
<td>ST/SM, 820</td>
<td>ST</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2852</td>
<td></td>
<td>1 M</td>
<td></td>
<td></td>
<td></td>
<td>Terminal Block</td>
<td>ST/SM, 820</td>
<td>ST/FC/SC</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>212110</td>
<td></td>
<td>256</td>
<td></td>
<td></td>
<td></td>
<td>DB-9/USB</td>
<td>-</td>
<td>-</td>
<td>7.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Kit#10 Energy Management Kit

* Power Options: See “Power Options and How to Order” sheet (p. 106) for options and ordering instructions.
** Pin outs are specified in data sheets.
*** Use one wavelength throughout system except if WDM is used

### HOW TO ORDER

<table>
<thead>
<tr>
<th>Base Model</th>
<th>Power*</th>
<th>Data Connector**</th>
<th>Distance***</th>
<th>Fiber and Connector</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>1. 110 VAC - STD</td>
<td>M or F (M/STD)</td>
<td>2, 230 VAC - V</td>
<td>ST - STD</td>
<td>0 - 500 C - STD</td>
</tr>
<tr>
<td></td>
<td>2. 230 VAC - V</td>
<td>Other - Specify</td>
<td>Other - Specify</td>
<td>Other - Specify</td>
<td>0 - 500 C - ET</td>
</tr>
<tr>
<td></td>
<td>4. &amp; 6 - See Chart</td>
<td>L, XL, or UL</td>
<td>Other - Specify</td>
<td>Other - Specify</td>
<td>0 - 500 C - ET</td>
</tr>
</tbody>
</table>

- **RS-485 to Fiber Bit-Drivers, 110 VAC, Terminal Block, 2 Km, Multimode, ST Connectors, 0 - 50 °C
- **RS-485 to Fiber Bit-Drivers, Needs S.I. Tech #2121 Power Supply, DB-9M, 2 Km, Multimode, ST Connectors, 0 - 50 °C

Specifications subject to change without notice.
RS-485 TO FIBER OPTIC BIT-DRIVERS®

2110
- Mini Asynchronous Half-Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed for Johnson Controls System – N2 Bus and Bacnet
- Available in Eurocard format as Model 2345 for use in S.I. Tech Model 3000A Card Cage
- Standard Input/Output Interface is DB-9F Female Connector
- Din Rail Option is 2110-DIN
- Multimode or Single mode

21210*
- USB to Serial RS-485
- Can be used to connect legacy RS-485 interface to new PCs with only USB ports
- Supplied with Virtual Comport Drivers
- Can be used with S.I.Tech #2110 RS-485 to Bit-Driver®

2110-DIN
- Mini Asynchronous Half-Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed for Johnson Controls System – N2 Bus and Bacnet
- Din rail version of 2110

2126
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is Switchable from 0.3 to 38.5 Kbps in 6 steps
- Input/Output Interface is RS-485 DB-9M Male Connector
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)

2127
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 187.5 Kbps
- Custom Designed to work with Omron PLC
- Input/Output Interface is RS-485 DB-9F Female Connector
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)

2128
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 187.5 Kbps
- Customized units available with different data rates
- Fiber Ports Repeat Data through the 2128 and Drop/Insert Data on the RS-485 Port (DB-9F Female Connector)
- RS-485 Port Inserts Data onto both Fiber Ports and gets Data dropped from either Fiber Port
- External Power Supply S.I. Tech Model 2121 (110 VAC) or 2164 (230 VAC)
2128/2228
- 2128 is Commercial Equipment/2228 is Mil-Spec.
- Mini Synchronous Half Duplex Optical Bit-Driver®
- Data Rate is 256 Kbps
- Fiber Ports Repeat Data through the 2128/2228 and Drop/Insert Data on the RS-485 Port (DB-9F Female Connector)
- RS-485 Port Inserts Data onto both Fiber Ports and gets Data dropped from either Fiber Port
- Host Powered (+12VDC on Pins 8 and 9 of DB-9F connector)
- Extended Temperature Range -40°C to +80°C
- Used with Military Systems

2140*
- RS485 – 2 or 4 Wire Multidrop Bit Driver
- Fiber in, Fiber out, RS485 Drop
- Up to 230 Kbps Data Rate
- Multimode or Single mode
- Repeater with RS485 Drop/ADD
- Used with Security Systems, Sensors

2145*
- RS485 – 2 Wire Profibus - DP
- Fiber in, Fiber out, RS485 Drop
- Data Rates, Switch Selectable to 12 Mbps
- Multimode, Single mode, or Plastic Fiber
- One or two fiber ports
- Used for Process Control
- Din Rail Mounting
- IFC 61168-2, EIA RS485A
- RS485 – 2 wire Modbus

2310
- Card Cage Mounted Asynchronous Half Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to Work with Johnson Controls System and with S.I. Tech Model 2110 Mini Bit-Driver®
- Eurocard Format, Fits S.I. Tech Model 3000A 19 inch Rack & 3520 Motherboard Bus
- Designed for RS485 Bus

2316*
- Up to 115.2 Kbps, Async, 2 Wire, RS485
- Card Version of S.I.Tech 2616, Eurocard Size
- Multimode or Single mode
- Designed to Work with Siemens Systems or Other PLCs
Card Cage Mounted Asynchronous Half Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to Work with Johnson Controls System and with S.I. Tech Model 2110 Mini Bit-Driver®
- Input/Output Interface is 8-pin RJ-45 Female Connector
- Eurocard Format, Fits S.I. Tech Model 3000A 19 inch Rack

Up to 115.2 Kbps, Async Operation, Switch Selectable
- Extended Temp Range -40°C to +80°C
- Ruggedized Enclosure, Panel Mounting
- Complies with IEEE C37-90-1
- IEC 801 Surge Protection
- Conformal Coated – Environmental
- Various AC/DC Power Option

“Three in One” Design RS/232/422/485 to Fiber Bit-Driver
- Max Data Rate is 115.2 Kbps, Switch Selectable
- Multimode or Single mode
- Din Rail Option

Mini Asynchronous Half Duplex Optical Bit-Driver®
- Data Rate up to 56 Kbps must be set at factory
- Designed to work with Johnson Controls System-N2 Bus or other PLC
- Standard Input/Output Interface is DB-9M Male Connector
- Extended Temperature Range (-40°C to +80°C) Version of Model 2110

Up to 115.2 Kbps, Async, 2 Wire, RS485
- Extended Temp Range -40°C to +80°C
- Multimode or Single mode
- Designed to work with Siemens System or Other PLCs

Synchronous Simplex or Half Duplex Optical Bit-Driver®
- Normal Operating Data Rate is 1 Mbps
- Designed to work with Omninet by Corvus Systems Inc and MODBUS+
- Stand Alone – 110 VAC or 230 VAC power cord
- Input/Output Interface RS-485 2-wire + Ground Terminal Block
Kit #10

- Din Rail Option
- Energy Management System Kit for Plug and Play Consist of:
  2 – 2110 Mini Bit Driver
  2 – 2121 Power Supply
  2 – 7110 Cable Assemblies
## TABLE G

### RS-485 TO FIBER OPTIC MULTIPLEXERS

<table>
<thead>
<tr>
<th>Mode No.</th>
<th>Stand Alone</th>
<th>Rack Mount</th>
<th>Max. Data Rate Kbps</th>
<th>Async</th>
<th>Sync</th>
<th>Control Signals</th>
<th>Power Option*</th>
<th>Data Connector**</th>
<th>Number of Channels</th>
<th>Point to Point</th>
<th>Multidrop</th>
<th>Distance Km</th>
<th>**Weight LB/KG</th>
<th>Multimode (820 nm)/Singlmode (1300 nm) Fiber Connector</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2454</td>
<td>√</td>
<td>Option</td>
<td>256</td>
<td>√</td>
<td></td>
<td></td>
<td>1,2</td>
<td>DB37 F</td>
<td>4</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>3/1.4</td>
<td>MM/SM ST/SMA</td>
<td>uses 1 to 4 cable 7054</td>
</tr>
<tr>
<td>2458</td>
<td>√</td>
<td>Option</td>
<td>76.8</td>
<td>√</td>
<td></td>
<td></td>
<td>1,2</td>
<td>DB37 F</td>
<td>8</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>3/1.4</td>
<td>MM/SM ST/SMA</td>
<td>uses 1 to 8 cable 7058</td>
</tr>
</tbody>
</table>

* Power Options: See "Power Options and How to Order" sheet (p. 106) for options and ordering instructions.
** Pin outs are specified on data sheets.
*** Distance: 2 km - STD, 5 km - L, 10 km - XL. 20 km - UL.
**** Other connector options for singlmode are SC and FC.

**Temperature range 0 - 50 degrees C unless shown otherwise.

### HOW TO ORDER

<table>
<thead>
<tr>
<th>Base Model Number</th>
<th>Power*</th>
<th>Data Connector**</th>
<th>Distance***</th>
<th>Fiber and Connector</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXXX</td>
<td>110V-STD 230VAC-V</td>
<td>M or F (F is STD on most models.)</td>
<td>2 Km - STD Other - Specify L, XL, or UL</td>
<td>Multimode (MM) - STD Singlemode (SM) - Specify</td>
<td>0 - 50° C - STD Other - Call S.I. Tech</td>
</tr>
</tbody>
</table>

Example: 2454 - RS-485 Async, 4 CH Fiber Multiplexer, 110VAC, DB37 F, 2Km, Multimode ST, 0-50 C

Specifications subject to change without notice.
RS-485 TO FIBER MULTIPLEXERS

2454

- Four Channel Asynchronous Half Duplex Time Division Multiplexer Optical Bit- Driver®
- Data Rate up to 256 Kbps must be set at factory
- Powered through 110 VAC line cord
- 230 VAC version available as S.I. Tech Model 2454V
- Each unit requires 4-to-1 RS-485 cable S.I. Tech #7054

2458

- Eight Channel Asynchronous Half Duplex Time Division Multiplexer Optical Bit- Driver®
- Data Rate up to 76.8 Kbps must be set at factory
- Powered through 110 VAC line cord
- 230 VAC version available as S.I. Tech Model 2458V
- Each unit requires 8-to-1 RS-485 cable S.I. Tech #7058
Optical Asynchronous Mini Bit-Driver® Point to Point

Model 2110

Features:
- 0 to 56 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0°C to +50°C operating range
- ST connector receptacle (SMA option)
- Designed to work with Johnson Controls System - N2 Bus and Bacnet (2110BAC)
- For card version use 2310 (N2 Bus) or 2345 (point to point)
- Cable assembly use 7110 (2110 to N2 Bus)
- Data speed set at the factory

RS-485 9 PIN CONNECTOR - FEMALE

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>200</td>
<td>100</td>
<td>330</td>
</tr>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* High power option available  ** Single mode option
1000 Micron is plastic fiber (uses SMA connectors) option

Termination Resistors provided in Bit-Driver

ORDERING INFORMATION

Model Numbers
- 2110 RS485 to Fiber, Multimode, ST Connector, N2 Bus
- 2110BAC RS485 to Fiber, Multimode, ST Connector, Bacnet
- 2610 RS485 to Fiber, Multimode, ST, High Temp.
- 2110-SM RS485 to Fiber, Single Mode, ST
- 2110-SMA RS485 to Fiber, Multimode, SMA Connector
- 2110-660 RS485 to Plastic Fiber, SMA Connector
- 2110-L RS485 to Fiber, Multimode, High Power (5Km), ST
- 2110-DIN RS485 to Fiber, Multimode, ST, Dinrail Unit
- 2110-SM-DIN RS485 to Fiber, Single mode, ST, Dinrail Unit

Notes:
1. Power Supply # 2121 is required for all models (110VAC to 12 VDC).
2. Power Supply #2122 is for 230VAC applications
3. For 2110 rack mounted, use version 2310 (or 2345) Card with 3000 Rack, 4000 Power Supply, and 3520 (or 3500) Motherboard.

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Optical Asynchronous Bit-Driver® Point to Point and Bus

Features:
- Asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0 °C to + 50 °C operating range
- ST connector receptacle (SMA option)
- Works with Johnson Controls System - N2 Bus and Bacnet
- For card version use 2310 (N2 Bus) or 2345 (point to point)
- Data speed set at the factory

RS - 485 TERMINAL BLOCK PIN
UTILIZED BY 2110 DIN RAIL BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D+</td>
<td>N2+</td>
</tr>
<tr>
<td>D-</td>
<td>N2-</td>
</tr>
<tr>
<td>T+</td>
<td>Termination (+)</td>
</tr>
<tr>
<td>T-</td>
<td>Termination (-)</td>
</tr>
<tr>
<td>-</td>
<td>Power Return</td>
</tr>
<tr>
<td>+</td>
<td>Power In</td>
</tr>
<tr>
<td>REF</td>
<td>N2 Reference</td>
</tr>
<tr>
<td>EARTH</td>
<td>GROUND</td>
</tr>
<tr>
<td>Tx</td>
<td>Transmit Fiber</td>
</tr>
<tr>
<td>Rx</td>
<td>Receive Fiber</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>200</td>
<td>100</td>
<td>330</td>
</tr>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* High power option available ** Single mode option

1000 Micron is plastic fiber (uses SMA connectors) option

Specifications subject to change without notice.

ORDERING INFORMATION

Model Numbers

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2110</td>
<td>RS485 to Fiber, Multimode, ST Connector, N2 Bus</td>
</tr>
<tr>
<td>2110BAC</td>
<td>RS485 to Fiber, Multimode, ST Connector, Bacnet</td>
</tr>
<tr>
<td>2610</td>
<td>RS485 to Fiber, Multimode, ST, High Temp.</td>
</tr>
<tr>
<td>2110-SM</td>
<td>RS485 to Fiber, Single Mode, ST</td>
</tr>
<tr>
<td>2110-SMA</td>
<td>RS485 to Fiber, Multimode, SMA Connector</td>
</tr>
<tr>
<td>2110-660</td>
<td>RS485 to Plastic Fiber, SMA Connector</td>
</tr>
<tr>
<td>2110-L</td>
<td>RS485 to Fiber, Multimode, High Power (5Km), ST</td>
</tr>
<tr>
<td>2110-DIN</td>
<td>RS485 to Fiber, Multimode, ST, Dinrail Unit</td>
</tr>
<tr>
<td>2110-SM-DIN</td>
<td>RS485 to Fiber, Single mode, ST, Dinrail Unit</td>
</tr>
<tr>
<td>2110-DIN-ET</td>
<td>RS485 to Fiber, Multimode, ST, Dinrail Unit, Extended Temp.</td>
</tr>
</tbody>
</table>

Notes:
1. Power Supply # 2121 is required for all models (110VAC to 12 VDC).
2. Power Supply #2164 is for 230VAC applications
3. For 2110 rack mounted, use version 2310 (or 2345) Card with 3000 Rack, 4000 Power Supply, and 3520 (or 3500) Motherboard.
4. ET-Extended temperature range -40°C to +70°C

Model 2110-BAC (Bacnet)

Optical Asynchronous Mini Bit-Driver® Point to Point

Operation Mode:
- Asynchronous, bi-directional, half duplex

Input/Output Interface:
- RS485, 9 pin type D, asynchronous at 0 to 76.8 Kbps** connects directly to terminal (RS485 cable not required)

Transmission Line Interface:
- ST connector is standard for interfacing with fiber optic cable

Transmission Distance:
- See distance chart

Optical Power into a 50 Micron Core Optical Fiber:
- 0.5 microwatt, 10 dB power budget* @ 880 nanometers - 950 nanowatts at less than 10^-9 bit error rate

Receiver Sensitivity:
- 0°C to +50°C operating range

Operating Temperature:
- 0°C to +50°C

Metal Enclosure:
- 1.75 x 3 x 0.625 in (4.5 x 7.5 x 1.6 cm)

Weight:
- 0.25 lb (100 grams)

Input Power:
- External with power supply (S.I. Tech #2121 - 110 VAC to 12 Volt DC)

230V Version:
- Use S.I.Tech 2164 power supply

Features:
- 0 to 76.8 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0°C to +50°C operating range
- ST connector receptacle
- Designed to work with 2110-BAC (Bacnet) @ 38.4 Kbps or 2110-BAC(T) @ 76.8 Kbps
- For card version use 2310-BAC
- Cable assembly use 7110
- Data speed set at the factory

RS - 485 9 PIN CONNECTOR - FEMALE
PINS UTILIZED BY 2110 MINI BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
<td>D+</td>
</tr>
<tr>
<td>4</td>
<td>Data Ground</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Termination (+)</td>
<td>T+</td>
</tr>
<tr>
<td>8</td>
<td>Termination (-)</td>
<td>T-</td>
</tr>
<tr>
<td>9</td>
<td>Data (-)</td>
<td>D-</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>8 SM**</td>
<td>1.0</td>
<td>10,000</td>
<td>33,000</td>
</tr>
</tbody>
</table>

* High power option available  ** Single mode option

Termination Resistors provided in Bit-Driver

- COMMON
- To Input Circuitry

ORDERING INFORMATION

Model Numbers
- 2110-BAC
- 2110-BAC(T)
- 2110-BAC-SM
- 2110-BAC(T)-SM
- 2110-DIN-BAC
- 2110-DIN-BAC(T)
- 2110-DIN-BAC(SM)
- 2110-DIN-BAC(T)-SM

Notes:
1. Power Supply # 2121 is required for all models (110VAC to 12 VDC).
2. Power Supply #2164 is for 230VAC applications


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Model 2126

Optical Synchronous Mini Bit-Driver® Point to Point

Features:
- 0 to 38.4 Kbps synchronous half duplex operation
- 6600 ft. (2Km) maximum distance capability
- 0 °C to + 50 °C operating range
- ST connector receptacle (SMA option)
- Switch selectable speeds

RS - 485 DB-9M MALE CONNECTOR
PINS UTILIZED BY 2126 MINI BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td>3</td>
<td>Data -</td>
</tr>
<tr>
<td>5</td>
<td>Ground</td>
</tr>
<tr>
<td>9</td>
<td>Data +</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
</tbody>
</table>

* High power option available

Specifications subject to change without notice.

©2005 S.I. Tech, Inc.
Model 2127

Optical Mini Bit-Driver®

Operation Mode: Synchronous half duplex
Input/Output Interface: RS-485, 2 wire port operating at 187.5 Kbps
Transmission Line Interface: ST connector is standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 50 Micron Core Optical Fiber: 4 microwatts, 13 dB power budget @ 850 nanometers
Receiver Sensitivity: 200 nanowatts at less than 10^-9 bit error rate, 10 microwatts max
Operating Temperature: 0 °C to 50 °C
Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x 1.6 cm)
Panel or DIN rail mounting option
Weight: 0.25 lb (100 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110 V AC to 12 Volt DC)
230V Version: Use S.I.Tech 2122 power supply

Features:
- Custom designed to work with Omron PLC
- RS-485 to Fiber Bit-Driver

RS-485 DB-9F FEMALE CONNECTOR PINS UTILIZED BY 2127 MINI BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GROUND</td>
</tr>
<tr>
<td>5</td>
<td>GROUND</td>
</tr>
<tr>
<td>6</td>
<td>+12 VDC (Option)*</td>
</tr>
<tr>
<td>8</td>
<td>DATA +</td>
</tr>
<tr>
<td>9</td>
<td>DATA -</td>
</tr>
</tbody>
</table>

*Needs to be factory configured

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
</tbody>
</table>

* High power option available

Specifications subject to change without notice.

©2005 S.I. Tech, Inc.
Optical Mini Multidrop Bit-Driven®

Operation Mode: Asynchronous half duplex
Input/Output Interface: RS-485, 2 wire port operating up to 200 Kbps or DB-9 Connector
Transmission Line Interface: ST connectors are standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 62.5 Micron Core Optical Fiber: 10 microwatts, 13 dB power budget @ 850 nanometers (1300 nm option)
Receiver Sensitivity: 500 nanowatts at less than 10⁻⁹ bit error rate, 10 microwatts max.
Operating Temperature: 0 °C to 50 °C (-40 to +70 °C option-MM Fiber)
Metal Enclosure: 5.5 x 2.3 x 1.0 in (with flange)
Panel or DIN rail mounting option
Weight: 0.4 lbs (182 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110 VAC to 12 VDC)
230 Volt Version: Use S.I. Tech 2164 power supply

Features:
- RS-485 Multidrop
- Various speed options up to 200 Kbps
- Flange Mounting
- Multimode or single mode
- Asynchronous, simplex, half, full duplex

Fiber ports repeat data through the 2128 and drop/insert data on the RS-485 port. The RS-485 port inserts data onto both fiber ports and gets data dropped from either fiber port.

TYPICAL APPLICATION


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Model 2140
Optical Mini Bit-Driver®

Operation Mode:
Input/Output Interface:
Transmission Line Interface:
Optical Power into a 62.5 Micron Core Optical Fiber:
Receiver Sensitivity:
Operating Temperature:
Relative Humidity:
Metal Enclosure:
Weight:
Input Power:
230 Volt Version:

Features:
• RS-422/485 Multipoint operation with up to 32 nodes
• Various speeds - 110 bps to 230 Kbps, 4 Wire (Speed set at the factory)
• Flange Mounting
• Multimode or single mode options
• Repeater with 4-wire RS-422/485 Add/Drop

Fiber ports repeat data through the 2140 and drop/insert data on the RS-422/485 port. The RS-422/485 port inserts data onto both fiber ports and drops data from both fiber ports.

RS-422/485 CONNECTOR

ORDERING INFORMATION


TYPICAL APPLICATION

© 2013 S.I. Tech, Inc.
Model 2145

Profibus - DP Fiber Optic Bit-Driver

Features:
- Meets PROFIBUS-DP specification. Tested & approved by PROFIBUS Lab
- Modbus - RS485
- Multimode or single mode, plastic or glass fiber
- 2 port optical repeater, optical T-connector, optical to electrical converter
- 9600 bps to 12 Mbps - switch selectable
- DIN rail mounting
- Status indicators: power, TxD, RxD, invalid switch setting
- Conformal coated boards

The Model 2145 Bit-Driven used in a PROFIBUS-DP application is a two optic port repeater with single TIA/EIA-485-A electrical port. The 2145 operates at rate 9600 baud to 12 Mbps in linear bus topology. The 2145 can be used as an optical repeater between the fiber optic segments, an optical to electrical converter between an fiber optic segment and electrical station(s), or T-connector/repeater between two fiber optic segments and electrical station(s). The 2145 is transparent and does not evaluate the PROFIBUS data exchange.

Using fiber optics over the physical layer, the 2145 provides longer segment distances, electromagnetic noise immunity and ground potential difference independence in the linear bus topology. The 2145 optics can be optionally equipped with optics of different characteristics.

The 2145 retimes the received optical signal and can link up to 32 fiber optic segments in series. The electrical port supports up to 31 stations.

The 2145 Termination switch can select an internal cable type-A termination. External terminations can derive power from the sub-D connector between pins 6 and 5.

The 2145 unit attaches to EN50022 (35mm DIN) mounting rail. Power is applied through screw terminals and data rate selection made through internal DIP switches.

Specifications subject to change without notice.

<table>
<thead>
<tr>
<th>Model</th>
<th>Wavelength (nm)</th>
<th>Fiber Diameter (Micron)</th>
<th>Fiber Type</th>
<th>Connector</th>
<th>TR PWR (+dBm)</th>
<th>REC SEN (-dBm)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters</th>
<th>Distance Feet</th>
<th>OPT Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2145-0</td>
<td>660/850</td>
<td>200</td>
<td>Plastic</td>
<td>BFOC2.5(ST)</td>
<td>10</td>
<td>22</td>
<td>10/7</td>
<td>700/1000</td>
<td>2000/3000</td>
<td>2 PL</td>
</tr>
<tr>
<td>2145-00</td>
<td>660</td>
<td>1000</td>
<td>Plastic</td>
<td>BFOC2.5(ST)</td>
<td>7</td>
<td>72</td>
<td>0.5</td>
<td>100/200</td>
<td>300/600</td>
<td>2 PL</td>
</tr>
<tr>
<td>2145-MM</td>
<td>850</td>
<td>50 or 62.5</td>
<td>Multimode</td>
<td>BFOC2.5(ST)</td>
<td>12</td>
<td>24</td>
<td>3.0</td>
<td>3000/6000</td>
<td>10000/20000</td>
<td>1 MM</td>
</tr>
<tr>
<td>2145 or</td>
<td>850</td>
<td>50 or 62.5</td>
<td>Multimode</td>
<td>BFOC2.5(ST)</td>
<td>12</td>
<td>24</td>
<td>3.0</td>
<td>3000/6000</td>
<td>10000/20000</td>
<td>1 MM</td>
</tr>
<tr>
<td>2145-MM-MM</td>
<td>850/1300</td>
<td>50 or 62.5</td>
<td>MM/SM</td>
<td>BFOC2.5(ST)</td>
<td>12/15</td>
<td>24/27</td>
<td>3.0/1.0</td>
<td>3000/10000</td>
<td>10000/20000</td>
<td>1 MM</td>
</tr>
<tr>
<td>2145-MM-SM</td>
<td>850</td>
<td>9</td>
<td>SM/SM</td>
<td>BFOC2.5(ST)</td>
<td>15</td>
<td>27</td>
<td>0.35</td>
<td>10000/20000</td>
<td>33000/66000</td>
<td>2 SM</td>
</tr>
<tr>
<td>2145-SM</td>
<td>1300</td>
<td>9</td>
<td>Single Mode</td>
<td>BFOC2.5(ST)</td>
<td>15</td>
<td>27</td>
<td>0.35</td>
<td>10000/20000</td>
<td>33000/66000</td>
<td>1 SM</td>
</tr>
</tbody>
</table>

Note: Plastic fiber can be used for short distance applications.

TYPICAL APPLICATION

Master PLC

2145

Station

2145

Station

Level Sensors

Alarm Detection

Station

Station

Station

Station

Station

Station

Bar Code Printer

Motor Control

Scale

Fiber

RS-485 Bus

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Optical Mini Bit-Driver®

Operation Mode: Half duplex
Input/Output Interface: RS-485, 2 wire port operating up to 1.0Mbps
Transmission Line Interface: ST connector is standard for interfacing with fiber optic duplex cable (SMA option)

Optical Power into a 62.5 Micron Core Optical Fiber: 30 microwatts, 13 dB power budget @ 850 nanometers
Receiver Sensitivity: 1.0 microwatts at less than $10^{-9}$ bit error rate
Operating Temperature: 0°C to 50°C
Metal Enclosure: Panel or DIN rail mounting option
Weight: 0.25 lb (100 grams)
Input Power: 9 to 32VDC (S.I. Tech #2121 power supply)
230V Version: Use S.I.Tech 2164 power supply

Features:
- RS-485 to Fiber Bit-Driver
- Works with Honeywell PLCs
- Access control system
- High Speed RS-485

### TERMINALS UTILIZED BY 2146 BIT-DRIVER®

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Terminals Left to Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D+</td>
</tr>
<tr>
<td>2</td>
<td>D-</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
</tr>
<tr>
<td>4</td>
<td>PWR-</td>
</tr>
<tr>
<td>5</td>
<td>PWR+</td>
</tr>
</tbody>
</table>

### OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>3.5</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>(10 SM)</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available
** SM - Single mode option (1310 nm)

Specifications subject to change without notice.

Typical Application Diagram

Model 2147

Profibus - DP Fiber Optic Ring Bit-Driver®

Operation Mode: RS485 - 2 wire
Profibus - DP

Input/Output Interface: EIA RS485A 2 wire
9600bps to 12Mbps
IEC 61158-2, Async, NRZ, 11 Bits
DB9 female

Transmission Line Interface: ST Connectors-standard (SMA option)

Optical Power (TR): See table 1

Receiver Sensitivity: See table 1

Operating Temperature: -25°C to +70°C
(-20°C to +60°C for SM)

Metal Enclosure: DIN Rail Mounting
Size: 4.2”X4.8”X1.7” (10.7X12.2X4.3 cm)

Input Power: 24VDC, 3 Watts, Terminal block

Redundant Input

Electrical Isolation: 1500V

Conducted Emissions: EN55022 Class B

Mechanical: IP 40

### Features:
- Meets PROFIBUS-DP specification. Tested & approved by PROFIBUS Lab
- Multimode and single mode
- Plastic or glass fiber
- 2 port optical repeater, optical T-connector, optical to electrical converter
- 9600 bps to 12 Mbps - Auto Negotiation - visual indicators
- DIN rail mounting
- Status indicators: Activity and Error Condition on each port
- Redundant ring
- Data speed display
- Auto negotiation

The Model 2147 Bit-Driver used in a PROFIBUS-DP application is a two fiber optic port repeater with single TIA/EIA-485-A electrical port. The 2147 operates at rate 9600 baud to 12 Mbaud in linear bus topology. The 2147 can be used as an optical repeater between the fiber optic segments, an optical to electrical converter between a fiber optic segment and electrical station(s), or T-connector/repeater between two fiber optic segments and electrical station(s). The 2147 is transparent and does not evaluate the PROFIBUS data exchange. Model 2147 can be configured to operate in redundant ring topology.

Using fiber optics over the physical layer, the 2147 provides longer segment distances, electromagnetic noise immunity, and ground potential difference independence in the linear bus topology. The 2147 can be optionally equipped with optics of different characteristics.

The 2147 retimes the received optical signal and can link up to 32 fiber optic segments in series. The electrical port supports up to 31 stations.

The 2147 Termination switch can select an internal cable type-A termination. External terminations can derive power from the sub-D connector between pins 6 and 5.

The 2147 unit attaches to ENS5022 (35mm DIN) mounting rail. Redundant power is applied through screw terminals and data rate selection made automatically with visual indicator of speed display.

### TABLE 1

<table>
<thead>
<tr>
<th>Model</th>
<th>Wavelength (nm)</th>
<th>Fiber Diameter (Micron)</th>
<th>Fiber Type</th>
<th>Connector</th>
<th>TR PWR (-dBm)</th>
<th>REC SEN (-dBm)</th>
<th>Attenuation (dB/Km)</th>
<th>Distance Metters</th>
<th>Distance Feet</th>
<th>OPT Ports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2147-0</td>
<td>660/850</td>
<td>200</td>
<td>Plastic</td>
<td>BFOC2.5 (StB)</td>
<td>10</td>
<td>22</td>
<td>10/17</td>
<td>700/1000</td>
<td>2000/3000</td>
<td>2 PL</td>
</tr>
<tr>
<td>2147-MM</td>
<td>660</td>
<td>1000</td>
<td>Plastic</td>
<td>BFOC2.5 (St)</td>
<td>7</td>
<td>20</td>
<td>200</td>
<td>10</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>2147-MM-MM</td>
<td>850</td>
<td>50 or 62.5</td>
<td>Multimode</td>
<td>BFOC2.5 (St)</td>
<td>12</td>
<td>24</td>
<td>3.0</td>
<td>3000</td>
<td>10000</td>
<td>1 MM</td>
</tr>
<tr>
<td>2147-MM-SM</td>
<td>2 MM</td>
<td>1300</td>
<td>Single Mode</td>
<td>BFOC2.5 (St)</td>
<td>15</td>
<td>27</td>
<td>0.35</td>
<td>10000</td>
<td>33000</td>
<td>1 SM</td>
</tr>
<tr>
<td>2147-SM</td>
<td>9</td>
<td>700/1000</td>
<td>3000/10000</td>
<td>10000/33000</td>
<td>1 MM, 1 SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Plastic fiber can be used for short distance applications.

Specifications subject to change without notice.

### RS - 485 DB9 FEMALE CONNECTOR PINOUT

<table>
<thead>
<tr>
<th>Sub-D</th>
<th>Signal Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shield</td>
<td>Protective Ground</td>
</tr>
<tr>
<td>2</td>
<td>Rx/D/Tx-D-P</td>
<td>Data-P (B-Line)</td>
</tr>
<tr>
<td>3</td>
<td>DGND</td>
<td>Data Ground</td>
</tr>
<tr>
<td>4</td>
<td>VP</td>
<td>Voltage Plus (+5VDC)</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Rx/D/Tx-D-N</td>
<td>Data-N (A-Line)</td>
</tr>
<tr>
<td>7</td>
<td>Body</td>
<td>Protective Ground</td>
</tr>
</tbody>
</table>

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Model 2228

Optical Mini Bit-Driver®

Operation Mode: Asynchronous half or full duplex
Input/Output Interface: RS-485, 2 wire port operating up to 256 Kbps (Factory set)
Transmission Line Interface: ST connectors are standard for interfacing with fiber optic duplex cable (SMA option)
Optical Power into a 62.5 Micron Core Optical Fiber: 10 microwatts, 13 dB power budget* @ 850 nanometers (1300nm option)
Receiver Sensitivity: 500 nanowatts at less than 10^-9 bit error rate. 50 microwatts max.
Operating Temperature: -40 °C to +85 °C (-20 °C to +60 °C SM)
Metal Enclosure: 4.80 x 2.25 x 1.0 in (12.2 x 5.71 x 2.54 cm) Panel or DIN rail mounting option
Weight: 0.25 lb (100 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110 VAC to 12 VDC)

230 Volt Version: Use S.I.Tech 2164 power supply

Features:
- Wide temperature range Multi-drop RS-485 to fiber Mini Bit-Driver.
- Multimode is standard, Single mode optional.

Fiber ports repeat data through the 2228 and drop/insert data on the RS-485 port. The RS-485 port inserts data onto both fiber ports and gets data dropped from either fiber port.

**RS-485 Connector**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>9</td>
<td>Data (-)</td>
</tr>
</tbody>
</table>

TYPICAL APPLICATION

- **Model Number**: 2228
  - Description: Multimode to Multimode, ST Connectors
- **Model Number**: 2228-MM-SM
  - Description: Multimode to Single Mode, ST Connectors
- **Model Number**: 2228-SM-SM
  - Description: Single Mode to Single Mode, ST Connectors

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Model 2562

Optical Asynchronous Ruggedized Mini Bit-Driver®

Operation Mode: Asynchronous, half duplex
Input/Output Interface: RS-485, DB25F connector
Transmission Line Interface: Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, SC and FC option for SM)
Transmission Distance: See Chart
Optical Power into a 62.5 Micron Core Optical Fiber: 30 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)
Receiver Sensitivity: 3 microwatts at less than 10^-9 bit error rate
Operating Temperature: -40 °C to +80 °C for Multimode
-20 °C to +60 °C for Single mode
Humidity: 0 to 90% Non Condensing
Metal Enclosure: 7.25 X 2.28 X 1.3 in
(18.4 X 5.8 X 3.3 cm)
Weight: 0.9 lb. (400 grams)
Input Power: 85 V to 265 VAC or DC (+24 VDC and -48 VDC Option)
Card Version: S.I.Tech #2362 with Series 3000 Rack

Features:
- Up to 115 Kbps asynchronous operation on fiber optic cable, half duplex operation
- -40 °C to + 80 °C operating range**
- Metal ST connector receptacle (SMA option)
- LED indicators for power, transmit, and receive data
- Female DB25 connector
- Complies with IEEE C37.90.1
- IEC 801 Surge Protection
- Panel Mounting Brackets, two mounting locations
- Conformal coating
- See distance chart

RS - 485 CONNECTOR PINS UTILIZED BY 2562 MINI BIT - DRIVER (FEMALE)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Protective Ground</td>
<td>Chassis GND</td>
</tr>
<tr>
<td>7</td>
<td>Signal Ground</td>
<td>Sig. GND</td>
</tr>
<tr>
<td>14</td>
<td>Data +</td>
<td>D+</td>
</tr>
<tr>
<td>15</td>
<td>Data -</td>
<td>D-</td>
</tr>
</tbody>
</table>

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance* Meters</th>
<th>Distance* Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM**</td>
<td>1.0</td>
<td>10000</td>
<td>33000</td>
</tr>
</tbody>
</table>

* High power option available. SM - Single mode (1300nm) option
** SM - Temperature Rating: -20 °C to +60 °C

Specifications subject to change without notice.

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Model 2563

Optical Asynchronous (Three In One) Mini Bit-Driver

Features:

• Concurrent, fully-independent RS232, RS422, and RS485 communication channel over a one duplex fiber optic cable (data is multiplexed over fiber link)
• Up to 115kbps asynchronous operation
• Full duplex RS232 and RS422 - Optional tri-state control for bus RS422 systems
• Half duplex RS485 - Rotary switch sets the RS485 bit rate
• Metal ST connector receptacle (SMA option)
• Female DB25 connector RS232 wired as DCE device
• LED indicators for power, optical link status, transmit and receive data
• Optical link status pin
• Multimode or single mode
• DIN rail mounting option

S.I.Tech 2563 is a unique Bit-Driver allowing simultaneous communication using RS232, RS422, and RS485. Each electrical interface is totally independent and share a combined fiber link. This way equipment with different interfaces can be connected over the same fiber i.e. in a manufacturing plant.

Operation Mode: Asynchronous, simplex or full duplex
Input/Output Interface: Fully independent RS232/RS422/RS485, asynchronous concurrent. DB25 connector
Transmission Line Interface: Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, SC and FC option for SM)
Transmission Distance: See Distance Chart
Optical Power into a 62.5 Micron Core Optical Fiber: 20 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)
Receiver Sensitivity: 2 microwatts at less than 10 ^3 bit error rate
Operating Temperature: 0 °C to 50 °C (Extended Temp. Option -20 °C to 70 °C)
Metal Enclosure: 3.6” X 2.3” X 1.2” (9.1 X 5.84 X 3.0 cm) Bracket Optional
Weight: 0.4 lb. (185 grams)
Input Power: 9 to 12VDC, 200mA

OPERATING DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance* Meters</th>
<th>Distance* Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM</td>
<td>1.0</td>
<td>5000</td>
<td>16000</td>
</tr>
</tbody>
</table>

* High power option available. SM - Single Mode option

Optical unit connection: Connect the optical transmission line to the T and R receptacles. Note which cable channel goes to T or R by noting cable imprint. On the other end, reverse the connection.

Model 2610

Optical Asynchronous Mini Bit-Driver® Point to Point

Operation Mode: Asynchronous, bi-directional, half duplex
Input/Output Interface: RS-485, 9 pin type D, asynchronous at 0 to 115.0 Kbps*** connects directly to terminal (RS 485 cable not required)
Transmission Line Interface: ST connector is standard for interfacing with fiber optic cable (SMA option)
Transmission Distance: See distance chart
Optical Power into a 50 Micron Core Optical Fiber: 0.5 microwatt, 10 dB power budget* @ 880 nanometers
Receiver Sensitivity: 50 nanowatts at less than 10⁻⁹ bit error rate
Operating Temperature: -40 °C to +80 °C (-20 °C to +60 °C SM) operating range
Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x1.6 cm) Panel or DIN rail mounting options
Weight: 0.25 lb (100 grams)
Input Power: External with power supply (S.I. Tech #2121 - 110VAC to 12 Volt DC)
230V Version: Use S.I.Tech 2122 power supply

*** Data rate must be set at factory

Features:
- 0 to 115.0 Kbps asynchronous, RS-485 half duplex operation
- 6600 ft. (2Km) maximum distance capability
- -40 °C to +80 °C (-20 °C to +60 °C SM) operating range
- Multimode is standard, Single mode optional
- ST connector receptacle (SMA option)
- Designed to work with Johnson Controls System - N2 Bus or other PLC
- High temperature version of 2110
- For BACNET - order 2610-BAC

Specifications subject to change without notice.


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Optical Asynchronous Mini Bit-Driver® Point to Point

Operation Mode: Asynchronous, bi-directional, half duplex

Input/Output Interface: RS-485, 9 pin type D, asynchronous at 0 to 115.2 Kbps*** connects directly to terminal (RS 485 cable not required)

Transmission Line Interface: ST connector is standard for interfacing with fiber optic cable (SMA option)

Transmission Distance: See distance chart

Optical Power into a 50 Micron Core Optical Fiber: 10 microwatts, 10 dB power budget* @ 850 nanometers (1300nm option)

Receiver Sensitivity: 1 microwatt at less than 10⁻⁹ bit error rate

Operating Temperature: -40 °C to +80 °C (-20 °C to +60 °C SM)

Metal Enclosure: 1.75 x 3 x 0.625 in (4.5 x 7.5 x 1.6 cm) Panel or DIN rail mounting options

Weight: 0.25 lb (100 grams)

Input Power: External with power supply (S.I. Tech #2121 - 110VAC to 12 Volt DC)

230V Version: Use S.I.Tech 2122 power supply

*** Data rate must be set at factory


OPERAting DISTANCE FOR FIBER OPTIC CABLE

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/km</th>
<th>Distance Meters*</th>
<th>Distance Feet*</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM**</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* High power option available
** SM - Single mode (1300nm) option

Termination Resistors provided in Bit-Driver

To Input Circuitry

ORDERING INFORMATION

Model Numbers
2616     RS485 to Multimode Fiber, ST
2616-SM   RS485 to Single Mode Fiber, ST
2616-DIN  Multimode, ST, Dinrail Unit
2616-SM-DIN Single Mode, ST, Dinrail Unit

RS - 485 9 PIN CONNECTOR - FEMALE
PINS UTILIZED BY 2616 MINI BIT - DRIVER®

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>2</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Data (+)</td>
<td>D +</td>
</tr>
<tr>
<td>5</td>
<td>Signal Ground</td>
<td>SG</td>
</tr>
<tr>
<td>6</td>
<td>NC</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Termination (+)</td>
<td>T +</td>
</tr>
<tr>
<td>8</td>
<td>Termination (-)</td>
<td>T -</td>
</tr>
<tr>
<td>9</td>
<td>Data (-)</td>
<td>D -</td>
</tr>
</tbody>
</table>

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Model 2424/2454 is a 4 channel communication system providing 4 Bit-Driver links using one optical cable interface.

The 2424 provides 4 full duplex RS422 channels for any data rate on any channel(s) up to 256 Kbps.

The 2454 provides 4 half duplex RS485 channels. The data rate must be set at the factory for data rate up to 256 Kbps.

### PIN ASSIGNMENT FOR THE DB37 CONNECTOR

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>CHANNEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX+</td>
<td>1</td>
</tr>
<tr>
<td>TX-</td>
<td>2</td>
</tr>
<tr>
<td>RX+</td>
<td>3</td>
</tr>
<tr>
<td>RX-</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function</th>
<th>Channel Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data+</td>
<td>1</td>
</tr>
<tr>
<td>Data-</td>
<td>2</td>
</tr>
</tbody>
</table>

Signal Ground: 1, 2, 3, 20, 21

Note: Order 4-to-1 RS422/RS485 Cable #7024 or 7054

### Operating Distance for Fiber Optic Cable

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance (Meters)</th>
<th>Distance (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM*</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* Single mode (1300nm) option

(High power option available for longer distance)

### TYPICAL APPLICATION

![TYPICAL APPLICATION Diagram](image-url)


©2005 S.I. Tech, Inc.
Model 2428/2458 is an 8 channel communication system providing 8 Bit-Driver links using one optical cable interface.

The 2428 provides 8 full duplex RS422 channels for any data rate on any channel(s) up to 76.8 Kbps.

The 2458 provides 8 half duplex RS485 channels. The data rate must be set at the factory for data rate up to 76.8 Kbps.

**Operating Distance for Fiber Optic Cable**

<table>
<thead>
<tr>
<th>Fiber Size (Microns)</th>
<th>Attenuation dB/Km</th>
<th>Distance (Meters)</th>
<th>Distance (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>62.5</td>
<td>4.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>100</td>
<td>5.0</td>
<td>2000</td>
<td>6600</td>
</tr>
<tr>
<td>10 SM*</td>
<td>1.0</td>
<td>7000</td>
<td>23000</td>
</tr>
</tbody>
</table>

* Single mode (1300nm) option

(High power option available for longer distance)
Model 2566
Optical Asynchronous Multiplexer

**Features:**
- 2 Channel RS-485 Multiplexer
- Up to 115.2 Kbps asynchronous operation, each channel
- Half duplex RS-485 - 2 Wire
- Metal ST connector receptacle (SMA option)
- LED indicators for power, optical link status, transmit and receive data
- Multimode or single mode
- DIN rail or panel mounting option

S.I.Tech 2566 is a unique Bit-Driver. The two channel RS-485 electrical interfaces are totally independent and share combined fiber link.

**Operation Mode:** Asynchronous, simplex or half duplex

**Input/Output Interface:**
- 2 CH RS-485 Multiplexer DB25 connector

**Transmission Line Interface:**
- Metal ST connector is standard for interfacing with fiber optic duplex cable (SMA option, FC option for SM)
- See Distance Chart

**Transmission Distance:**
- Optical Power into a 62.5 Micron Core Optical Fiber: 20 microwatts, 10 dB power budget @ 820 nanometers (1300 nm Option)
- Receiver Sensitivity: 2 microwatts at less than 10^-9 bit error rate
- Operating Temperature: -40 °C to 85 °C (-20 °C to 60 °C Single Mode)
- Metal Enclosure: 3.6" X 2.3" X 1.2" (9.1 X 5.84 X 3.0 cm)
- Weight: 0.4 lb. (185 grams)
- Input Power: 9 to 12VDC, 200mA

**TYPICAL APPLICATION**

![Typical Application Diagram](image-url)

**DB25 Female Connector Pinout**

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 7</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>2</td>
<td>D1+</td>
</tr>
<tr>
<td>3</td>
<td>D1-</td>
</tr>
<tr>
<td>16</td>
<td>Term1+</td>
</tr>
<tr>
<td>17</td>
<td>Term1-</td>
</tr>
<tr>
<td>14</td>
<td>D2+</td>
</tr>
<tr>
<td>15</td>
<td>D2-</td>
</tr>
<tr>
<td>6</td>
<td>Term2+</td>
</tr>
<tr>
<td>20</td>
<td>Term2-</td>
</tr>
</tbody>
</table>

**RS-485 Data Rate**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1200 bps</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2400 bps</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>4800 bps</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9600 bps</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>19.2 Kbps</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>38.4 Kbps</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>76.8 Kbps</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>115.2 Kbps</td>
<td></td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.

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