

RS-485 to RS-485 Optical Isolator with Fail-Safe Protection CE Model 485OFS



Protect Your System From:

- Shorted Nodes
- Open Connections
- Damaged Transceivers
- Power Loss on a Node
- Software Lock-ups
- Ground Loops
- Power Supply Voltage Surges
- Transient Voltage Spikes

Description:

The 485OFS prevents a single damaged or locked-up RS-485 device from taking down the whole network. It protects your RS-485 network from most typical failures. Any device without valid data is automatically removed from the network. The 485OFS fully isolates data signals and ground. A typical setup using the 485OFS is shown in Figure 1.

The 485OFS works with both two wire half duplex and four wire full duplex systems. Driver enable control is automatic with B&B's Send Data Control circuit. The 485OFS uses terminal blocks on each side of the device. It supports Transmit Data (A) and (B), Receive Data (A) and (B), Protective Ground, and Signal Ground.

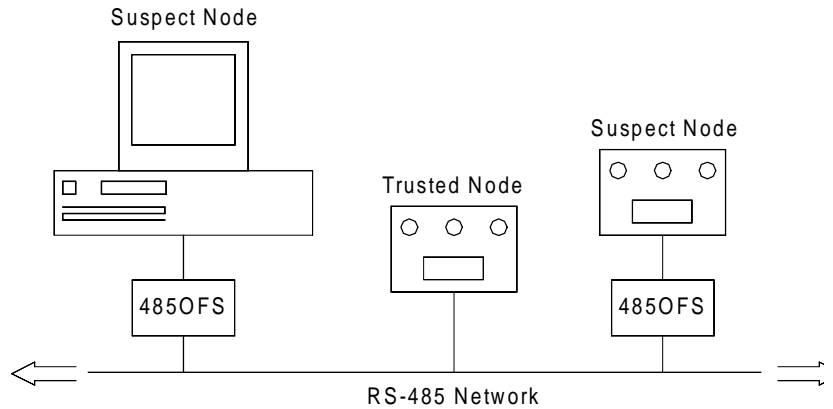


Figure 1. Typical Setup

Connection:

To connect the 485OFS to a four wire system, connect the outputs of the device to the inputs of the 485OFS and vice-versa as shown in Figure 2. To connect the 485OFS to a two wire system, the transmitter and receiver on each side must be tied together. Refer to Figure 3 for connection to a two wire system.

Proper operation of any RS-485 system requires the presence of a signal return path. The 485OFS isolates the signal grounds on either side of the unit from each other, so both sides must be tied to their respective signal ground lines. The RS-485 Standard recommends that a separate internal conductor be used for this instead of the shield. To protect the RS-485 network from transient suppression generated at the node, the protective ground (PG) terminal must be tied to a good frame (chassis, green wire, or earth) ground. The Protective Ground on the network side of the 485OFS should not be tied to earth ground. The RS-485 network signal ground should be tied to earth ground at one point. Refer to B&B's RS-422/485 Application Note for more information on network design and grounding.

No wire type or maximum run length is listed in the RS-485 Standard. However, the RS-422 Standard, which is very similar, recommends number 24AWG twisted pair telephone cable with a shunt capacitance of 16 picofarads per foot and no more than 4000 feet of distance.

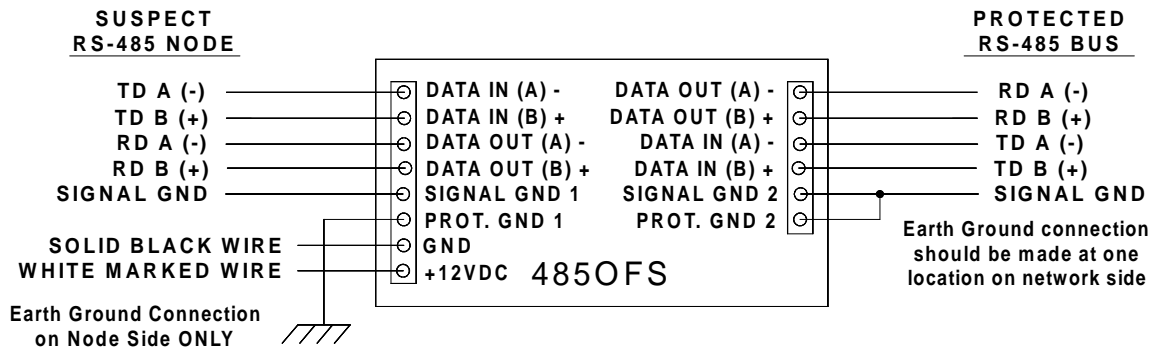


Figure 2. Four Wire Connections

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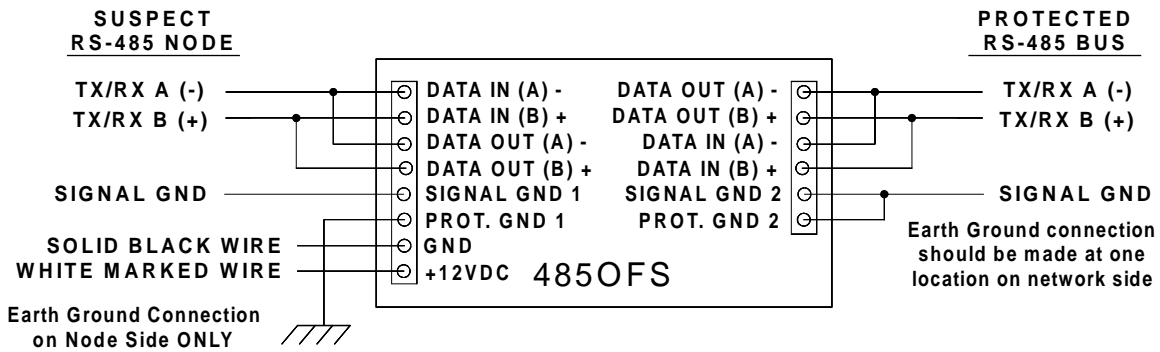


Figure 3. Two Wire Connections

Operation:

When no data is being transmitted through the 485OFS, the receivers are enabled on both sides of the device. As data is received on one side of the 485OFS, the opposite driver is enabled and the data is passed through. If the 485OFS does not receive a data transition for at least one character time, the driver is disabled. This timeout period is factory preset for one millisecond to accommodate a baud rate of 9,600 bits per second. The timeout period can be changed to any value between 0.26 and 4.16 milliseconds by removing the cover and moving the jumpers JP2 and JP4 inside the 485OFS.

The preset jumper settings available on the 485OFS should accommodate almost all systems, but a different timeout can be achieved by putting JP2 and JP4 in position E and changing the values of the capacitors C6 and C9 and resistors R17 and R25. Spaces for through-hole replacement of these components are also provided. They are labeled C15, C16, R26, and R27. The jumper positions for various baud rates, as well as the resistor and capacitor values for time-out periods beyond this range are given in Table 1. See Figure 4 and Figure 5 for the location of the timing components.

Jumpers JP1 and JP3 determine whether the receivers will be disabled when transmitting (half-duplex) or always enabled (full-duplex). As a general rule, JP1 and JP3 should be in the half-duplex position for two-wire operation and in the full-duplex position for four-wire systems. See Figure 4 for the location of jumpers JP1-JP4 on the PC board.

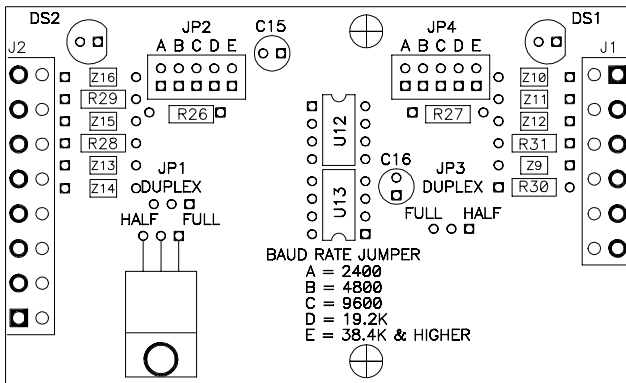


Figure 4. PCBD Top View

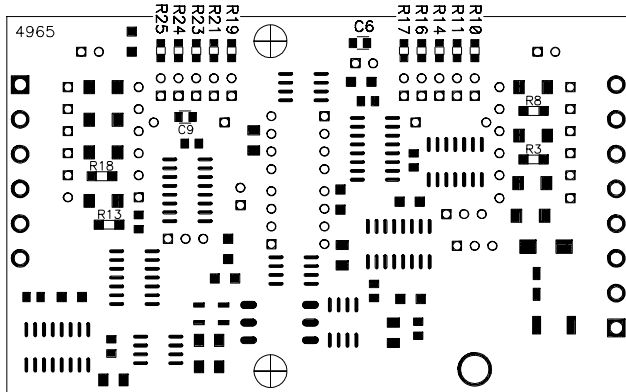


Figure 5. PCBD Bottom View

Table 1.				
Approximate Timeout Values				
Baud Rate	Time (ms)	Resistor R17 & R25 (Ohm)	Capacitor C6 & C9 (µF)	Jumper Position JP2 & JP4
300	36.3	330K	0.1	-
600	17.6	160K	0.1	-
1200	9.0	820K	0.01	-
2400	4.73	430K	0.01	A
4800	2.42	220K	0.01	B
9600	1.43	130K	0.01	C
19.2K	0.62	56K	0.01	D
38.4K	0.30	27K	0.01	E
57.6K	0.18	16K	0.01	-
115.2K	0.090	8.2K	0.01	-
230.4K	0.047	4.3K	0.01	-
460.8K	0.024	2.2K	0.01	-

Note: Baud rates greater than 38.4 kbps will not require a resistor change unless turn-around time is less than 0.30 ms in a half-duplex system.

Timeout = 1.1 x R x C
 Where R is in Ohms and C is in Farads

All timeouts +/- 20%

Specifications:

Isolation: 2.000 volts RMS for 1 min. optical isolation of data lines and ground

Surge Suppression: 6.5V working peak voltage, bi-directional over voltage suppressor
600W peak power dissipation
3,000 pF maximum capacitance

Data Rates: Up to 460.8 kbps

Temperature Rating: 0°C to +70°C

Power Requirements: 9-14 VDC @ 60mA (idle state),
170mA (Full-duplex data with 62 Ohm load)

Dimensions: 3.8 x 2.4 x 1.0 in (9.7 x 6.1 x 2.5 cm)

FCC Approved Class A

DECLARATION OF CONFORMITY

Manufacturer's Name: B&B Electronics Manufacturing Company
 Manufacturer's Address: P.O. Box 1040
 707 Dayton Road
 Ottawa, IL 61350 USA

Model Number: 485OFS
 Description: RS-485 Optical Isolator/Repeater
 Type: Light industrial ITE equipment
 Application of Council Directive: 89/336/EEC
 Standards: EN 50082-1 (IEC 801-2, IEC 801-3, IEC 801-4)
 EN 50081-1 (EN 55022)



Michael J. Fahrion, Director of Engineering

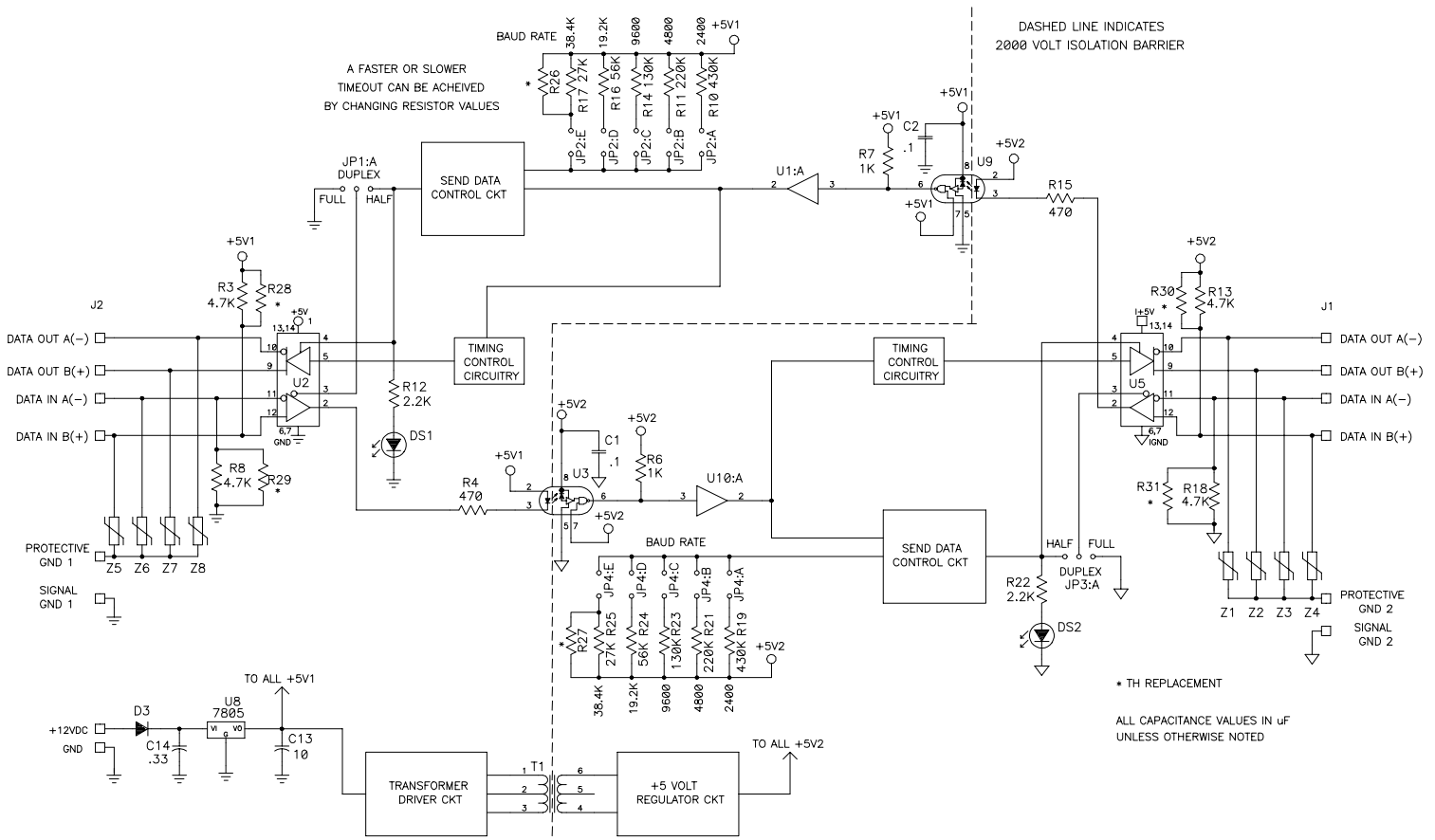


FIGURE 6. Circuit Diagram

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