DCP35

DIN Rail Dual Port Signal-Powered RS-232 Line Drivers

Description

The DCP35 series of products is designed to allow RS-232 devices to be inter-connected over distances sufficient to cover any industrial or institutional complex of buildings. These line drivers feature a DIN rail mountable enclosure for application to a junction box, a panel, a relay rack, the sides of computer equipment, or anywhere a DIN rail can be mounted.

The DCP35 series does not require a power supply for operation. The use of low power circuits and a sensitive optically isolated receiver allows the devices to derive all necessary power from the RS-232 data and control signals. They are designed for full-duplex, asynchronous operation over two, DC-continuous, non-loaded, twisted-wire pairs. Two-wire simplex operation may be accomplished over one twisted- wire pair. The line driver circuits and, consequently, the host device are protected from electrical transients due to lightning strikes or operation of heavy industrial equipment.

Each device features a convenient DCE (Data Communication Equipment) to DTE (Data Terminal Equipment) switch which reverses pins 2 and 3 of the RS-232 connector. For installation and system troubleshooting each unit has diagnostic Light Emitting Diodes (LEDs) on the transmit and receive lines.

The DCP35 is available in a single or dual channel package. The RS-232 connector may be ordered as a male or female 9-pin connector. Field connection is made through pluggable solderless screw terminals.

Specifications

Model	DCP35
Baud Rate Range	0-19.2K bps (Baud)
Baud Rate	19.2K 9.6K 4.8K 2.4K 1.2K-0
Distance (miles)	0.5 2.0 3.0 5.0 7.0
Distance (km)	0.8 3.2 4.8 8.1 11.3
Common Mode Isolation	Surge: 500VDC, 1 min. Continuous: 300Vrms
Inter-Device Isolation	Surge: 500VDC, 1 min. Continuous: 1500Vrms
Differential Mode Surge Protection (3 devices)	ANSI/IEEE C37.90.1
Modes	Asynchronous 4-wire full-duplex, 2-wire simplex
Channel Lines(1)	TD, RD
Control Lines(1)	RTS, CTS, DTR, DSR, RLSD(DCD)
Null Modem Switch	1 (Reverses RS-232 pins 2 and 3)
Power	RS-232 data and control signals
RS-232 Data	±5V to ±15V, 3.0mA to 10.0mA
RS-232 Control Signals	±6V to ±15V, 3.0mA to 10.0mA
Environmental:	
Operating Temperature Range	0°C to +70°C
Storage Temperature Range	-10°C to +85°C
Relative Humidity	0-95% non-condensing
Dimensions	4.2" x 3.3" x 0.89" (107mm x 84mm x 22.5mm)
Weight	4.2 oz (119g)
MTTF(2)	>150,000 hrs

NOTES:
(1) TD = Transmit Data, RD = Receive Data, RTS = Request To Send, CTS = Clear To Send, DTR = Data Terminal Ready, DSR = Data Set Ready, RLSD = Received Line Signal Detect (DCD = Data Carrier Detect).
(2) Ground-benign environmental conditions (no salt atmosphere, <50°C ambient temperature).

▶ Features

- Signal-powered: No Power Source Required
- Optical Isolation: Breaks Ground Loops
- Heavy Duty Surge Protectors: Prevents Lightning Damage
- LED Diagnostic Indicators: Simplifies Installation and System Troubleshooting
- 19.2K bps (baud) to 0.5 Mile (0.8km), 9.6K bps to 2.0 Miles (3.2km), 1.2K bps to 7.0 Miles (11.3km)
- Four-Wire Full Duplex, Two-Wire Simplex
- Pluggable Solderless Screw Terminal Field Connections
- Null Modem Switch
- Single or Dual Channel Package
- CE Compliant

Interface

Pin 7 (RTS) internally connected to pin 8 (CTS).
Pins 6 (DSR), 1 (RLSD), and 4 (DTR) are internally connected.
Either pin 1, pin 4, pin 6, pin 7, or pin 8 must be asserted (high) by the host equipment for operation.
Pins 3 (TD) and 2 (RD) are switch-reversible.
Pin 5 is signal ground.
Field connections are indicated on the unit label.
The DCP35 logic diagram is shown in Figure 1.

RS-232 Pin Descriptions			Field Pin Descriptions	
			Screw Terms	
Pin 1 RLSD	[8]	Receive Line Signal Detect	Pin 1 RD+	Receive Data +
Pin 2 RD	[3]	Receive Data	Pin 2 RD-	Receive Data -
Pin 3 TD	[2]	Transmit Data	Pin 3 TD+	Transmit Data +
Pin 4 DTR	[20]	Data Terminal Ready	Pin 4 TD-	Transmit Data -
Pin 5 SG	[7]	Signal Ground		
Pin 6 DSR	[6]	Data Set Ready		
Pin 7 RTS	[4]	Request To Send		
Pin 8 CTS	[5]	Clear To Send		

Pin numbers given are for the 9-pin connector with the 25-pin equivalent in [ ].

Power Requirements

Model DCP35 is powered by the RS-232 data and control signals from its host computer or terminal device. It receives power from Data Terminal Ready, pin 4 or Request To Send, pin 7, and Transmitted Data, pin 3. Transmitted data may be on pin 2 when the DCE/DTE switch is in the DTE position. For proper operation, minimum required signal voltage level is ±6V at 3.0ma to 10.0ma.

When possible, power should be obtained from the control lines. A recommended operating method for computer software drivers is as follows.

1. Disable Request To Send (RTS) and do not detect Clear To Send (CTS).

2. Enable Data Terminal Ready (DTR). Data Set Ready (DSR) and Receive Line Signal Detect (RLSD) may now be detected if desired.

Some software drivers will normally enable RTS and detect CTS. For those systems with software drivers for which RTS/CTS may not conveniently be operated as described in step 1, the unit will function normally. However, transmission distance will be reduced with high capacitance cables when heavy full-duplex data traffic is expected.

Cable Capacitance Effects On Distances

Specified distances are for the wire sizes 18-24AWG (0.82-0.20mm^2) with a maximum capacitance of 25pF/ft (82pF/m). For higher capacitance cables, decrease distance specifications for 2400 bps (baud) and above by a proportionate amount. For example, shielded cable with 50pF/ft (164pF/m) would reduce the distances by 50%. For host-powered units, distances for 1200 bps (baud) and below are reduced proportionately. Recommended wire gauges are #18 to #24 (0.82-0.20mm^2).

For data rates of 1200 bps (baud) and below, distances are limited by DC voltage drop. For 2400 bps (baud) and above, distances are limited by pulse distortion. The use of low-capacitance cable can extend the distances shown. Belden 9182 and 9184 are, respectively, single and dual twisted-pair cables that are especially designed for high-speed data communications applications. With these cables the distances can be extended by 50%. However, the DC-resistance-limited distance given under 1200 bps (baud) may not be exceeded.

Cable capacitance for individually shielded wire pairs is usually given by manufacturers as capacitance between wires and capacitance from each wire to the shield. The effective transmission line capacitance is approximately the interwire capacitance plus one-half of the wire-to-shield capacitance.

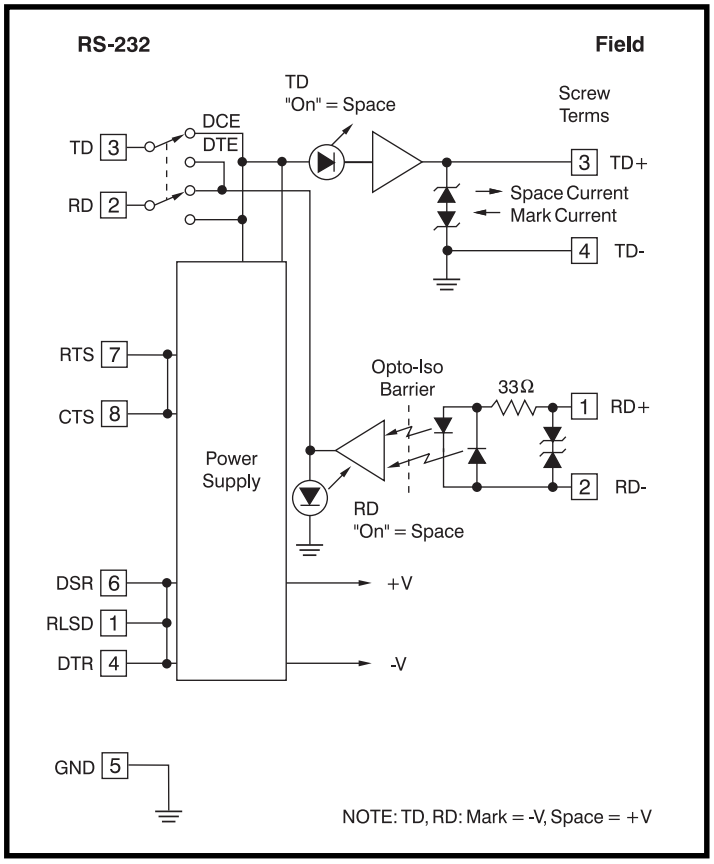

Figure 1: DCP35 Block Diagram (only 1 channel shown)

Installation

In most cases an RS-232 cable will be used to connect to the RS-232, 9-pin connector of the DCP35. Standoff kits are provided for connection to cables.

In some cases the DCP35 may be attached to its mating 9-pin connector on the terminal or host computer.

The DCE/DTE switch must be set to be complementary to the terminal or computer port (DCE connects to DTE and DTE to DCE). For example, a terminal connector will most likely be DTE-wired; thus DCP35 must be set to DCE to work with the DTE-wired connector. Since the DCP35 is a data communication device, its normal switch setting will be DCE. The DTE position is provided as a convenience when it must be connected to DCE equipment, such as multiplexers, repeaters, or modems.

In the event that the wiring of the host port is not known, the LED indicators will indicate the proper setting. The LED indicators come on during the occurrence of "SPACE" conditions on the transmit and receive lines. The "MARK" condition is the standby condition when the DCE/DTE switch is properly set on both ends of the correctly wired communications cable. Cable connections are shown in Figure 2. The LEDs will most often be off, coming on momentarily during the passage of a burst of data.

If the correct setting of the DCE/DTE switch is not known, change the setting to the position that causes the transmit (TD) LED to come on as described above. The repeat key on some terminals is convenient for sending continuous data, causing the TD LED to come on.

A self-test of the DCP35 may be accomplished by connecting TD+ to RD+ and TD- to RD- on the same unit; then a terminal or computer may transmit data to itself as a test. Both the TD and RD LEDs should be off when data is not being transmitted and come on during data transmission. This test verifies that the DCP unit is working properly.

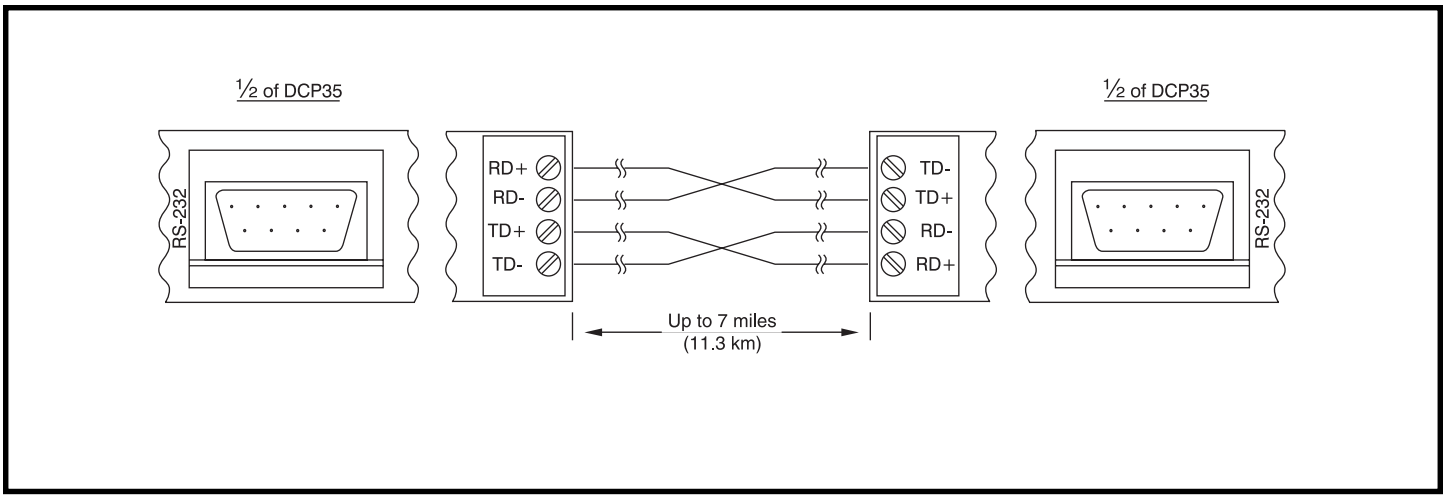

Figure 2: DCP35 Field Connections

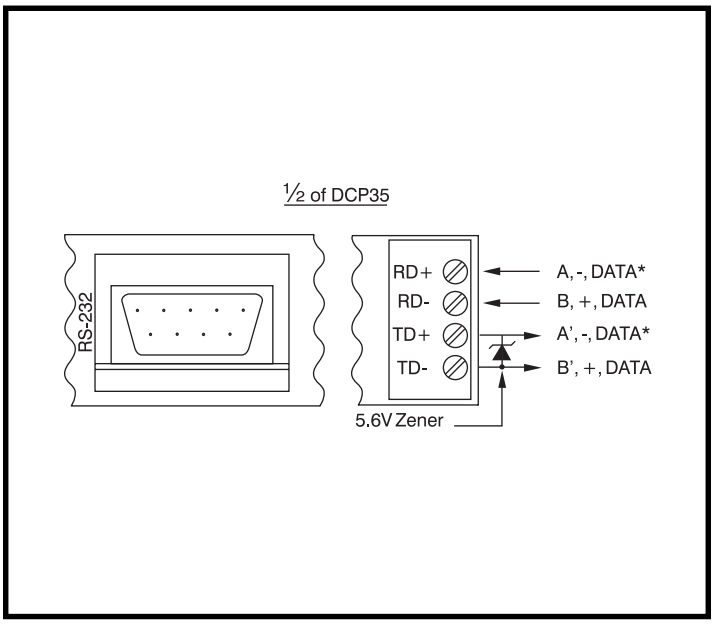

Figure 3: RS-232/RS-422 Conversion

Application Note - RS-232 to RS-422 Conversion

The DCP35 may easily be used as a converter for the data channels of RS-232 and RS-422 interfaces. To make the DCP35 output RS-422-compatible, connect a 5.6V zener diode cathode to TD+ and anode to TD-. This may easily be accomplished on the screw terminals. The TD+ output is then connected to the RS-422 external device A' input and the TD- output to the B' input. The outputs of the RS-422 external device are connected B output to RD- and A output to RD+. If a terminating resistor is used, it should be 150Ω or greater.

Ordering Information

Model	9-Pin Connector	Termination
DCP35-P	1 ch Male	Screw terminals
DCP35-S	1 ch Female	Screw terminals
DCP35-PP	2 ch, Male	Screw terminals
DCP35-SS	2 ch, Female	Screw terminals
DCP35-SP	2 ch, Female/Male	Screw terminals

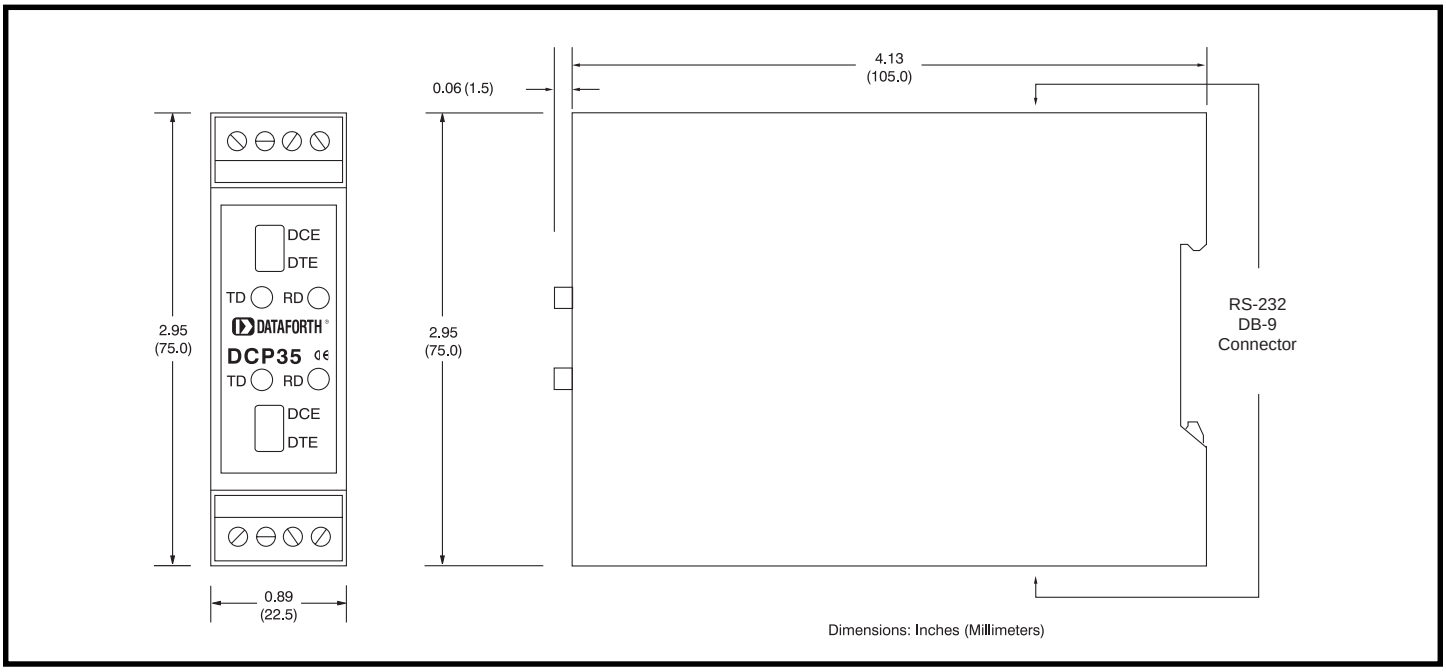

Figure 4: DCP35 Dimensions