Let's communicate

Asynchronous RS-232/485 Converter with Automatic Transmission Control and Galvanic Isolation of the Interface

ELO E069

Characteristics

Galvanic isolation of interfaces
Automatic control
Maximum data rate 115.2 kbps
RxD, TxD transfer
6V DC supply necessary

Introduction

RS-232 interface with asymmetric signals is designed for two terminal equipments connection (DTE). Maximum load capacity can be 2500 pF (about 50m twisted pair). The load impedance is to be 3-7 kilo-ohm that enables to induce disturbing pulses into the cables even from relatively soft supplies. Terminal equipments have to have the same potentials of the neutral. For this reason, RS-232 interface range is limited to 15m distance. RS-485 interface signals transmission allows increase communication range, communication partners´ number and transmission interference immunity.

Use of the converter

The converter increases transmission immunity against electrical disturbance and isolates both interfaces RS-232/RS-485. Insulation strength is 3 kV. As for permissible over-voltage, the converter can be used in the environments where lightning over-voltage is not necessary to be considered. To lead the cable outside buildings, it is necessary to provide additional over-voltage protection on the input points.
The converter allows transmission rate up to 115 200 bps. This maximum attainable rate decreases due to the line length and/or its impedance growth. Recommended maximum line length is 1200 m at the rate of 9600 bps.

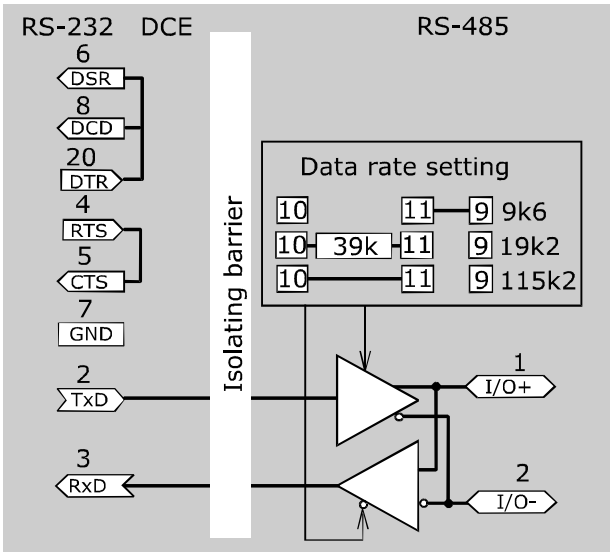
Operation principles

RS-485 interface is used to communication in one pair of the cable. For this reason, the transmission has to be half-duplex that means switching off RS-485 transmitter when receiving to allow transmitting to other communication partners and switching on during its own transmitting only.
There are two methods how to operate the transmitter:

1) The terminal equipment (DTE) changes RTS signal from the "OFF" state (negative polarity) to the "ON" state (positive polarity). When transmitting is finished it changes RTS signal back to "OFF".
2) The converter interprets the TxD signal. If there is the TxD in the idle mode the converter keeps the transmitter in the off-state. The DTE is just listening to the RS-485 link traffic. The converter activates the link transmitter **automatically** at the moment when the DTE starts transmitting and so TxD switches from the idle mode to the start-bit polarity (from the negative to positive polarity). The transmitter is ON for the time **τ** that is needed to transmit one byte (plus 20% reserve).

The transmitter is switched off automatically if TxD stays in the positive polarity for the time **τ.** The time interval is related to the transmission rate and has to be set before the converter is installed in the application. Among data of the same polarity as the start-bit is, the converter does not distinguish the start-bit from the other bits. Consequently such cases can occur in operation when the last bit before the stop-bit is of that polarity and the **τ** interval starts just from this bit. The converter keeps its transmitter ON for the time **τ** after DTE stopped data transmitting. Other communication partners on the RS-485 link have to respect this time. They have to wait for at least time **τ** from the last byte recorded on the RS-485 bus before they start transmitting.

Block diagram



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Specifications

Electrical parameters

Interface	RS-232/RS-485
Transmitted signals	TxD and RxD
Control signals	local interconnectors RTS-CTS DTR-DSR-DCD
RS-232 connector	DB25F, DCE
Transmission mode	half-duplex
Power supply	external DC supply 6V/200mA
Supply connector	SCJ 2.5mm or EIAJ 2.35mm
Isolation voltage between interfaces	3 kV
Permissible over-voltage on the line	the line must not be exposed to the atmospheric discharge influences
Required link impedance	100Ω
Signals take off:	
TxD, (DTR, RTS) summarily	max. 10mA typically 5mA

Other

Range without repeaters	1200m two-wired line
Maximum data rate	115 200 bps
Minimum data rate	4 800 bps
Dimension: width x length x height	57 x 83 x 24 mm
Weight	80 g
Stocking temperature	- 10 ^{o} to +55 ^{o} C
Working temperature	+ 0^{o} to +50^{o} C
Humidity	0 – 85% (non-condensing)