TECHNICAL BRIEF

IEEE 1284 compliant printer/scanner interfacing

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Philips
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The well known parallel interfacing for printers has been upgraded with the new standard IEEE 1284 which describes several protocols: ECP, EEP, bi-directional and Centronics compatible. Two electrical interfaces, Level One and Level Two, are also described in the 1284 specification. Level One electrical interfacing is the historical implementation of the uni-directional parallel port. However, Level Two electrical interfacing is recommended for the newer high speed bi-directional protocols. Hardware implementation of the Level Two electrical interface allows all these protocols to operate at peak performance level, yet is backward compatible with the older Level One interface. Level One interfaces using symmetrical voltages whereas Level Two interfaces using symmetrical impedances and balanced currents.

The newer protocol standards broaden the traditional applications of the parallel interface beyond standard printers to scanners, CD-ROM players, hard disks and feature rich bi-directional printers. The more sophisticated protocols are also much faster--over two megabytes/second.

A typical interface between a driver and receiver is shown in Figure 1. Zo = 50 ohms and Ro = Rs ≃ 90% Zo, but Rin >> Zo. (Ro is the driver impedance as seen by the cable. Zo is the input impedance of the cable. Rd is the B/Y side output resistance, Rs is an added series resistance and Rin is the input impedance of the receiver.) These impedance relationships cause half the source voltage to be injected into the cable which generates essentially double the voltage feeding the receiver due to reflection from the selected mismatch. This causes the input voltage at the receiver to be close to the value of the source voltage. A corresponding transceiver interface is shown in Figure 2.

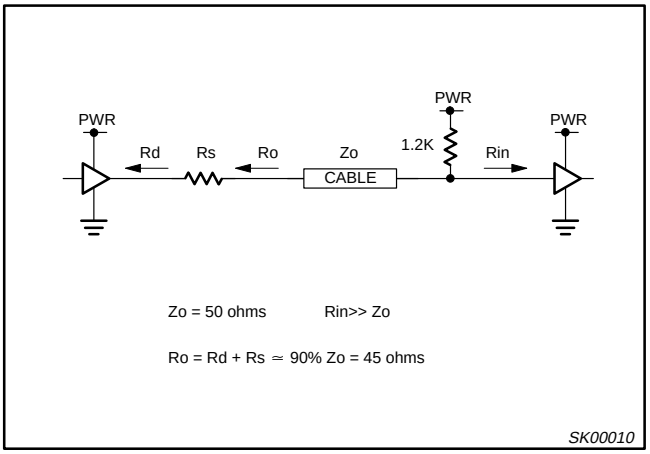

Figure 1. Driver/Receiver

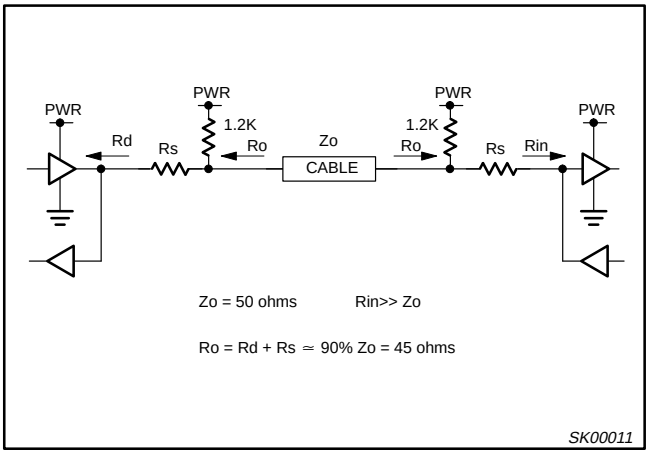

Figure 2. Transceiver

The Philips 74HCT1284 and 74LVC1284 Parallel interface transceiver/buffers are ideal components to implement a Level Two electrical interface. The HCT1284 uses a Vcc of 5 volts with a typical Rd of 15 ohms, requiring an external Rs of about 30 ohms; the second uses a Vcc of 3.3 volts with a typical Rd of 45 ohms, which is adequate without an external Rs. An Ro of about 90% of Zo is needed for proper system performance. Each interface integrated circuit (IC) as shown in Figure 3. incorporates four data transceivers with data direction and high drive enable pins as well as three control/status drivers. Each IC has TTL compatible inputs and operates asynchronously with low noise. Also overvoltage protection has been designed in the B side of the IC's. The LVC1284 was designed with 3.3V systems in mind. This component can be used to allow 3.3V hosts or peripherals to interface either 5.0V or 3.3V agents on the other side of the cable.

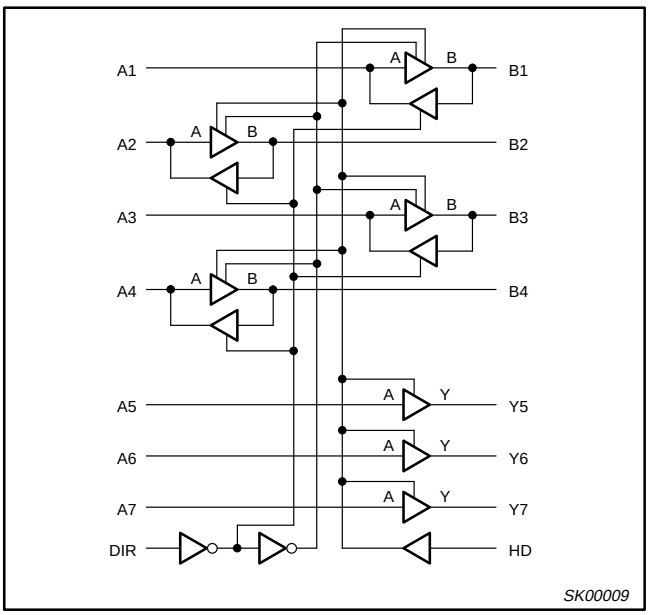

Figure 3. Logic Diagram of 74HCT1284 and LVC1284

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Figure 4. shows an IEEE 1284 Interface System utilizing 74HCT1284's. This diagram shows two IC's on the host side and two IC's on the peripheral side with bidirectional data transfer between the computer host and its peripheral. In this electrical implementation, the control signals required by the IEEE 1284 are generated by the host and sent to the peripheral and the status signals generated by the peripheral are sent back to the host. However, the control signals and status signals could have opposite source and destination depending on the protocol implemented. Also receivers for control and status are needed.

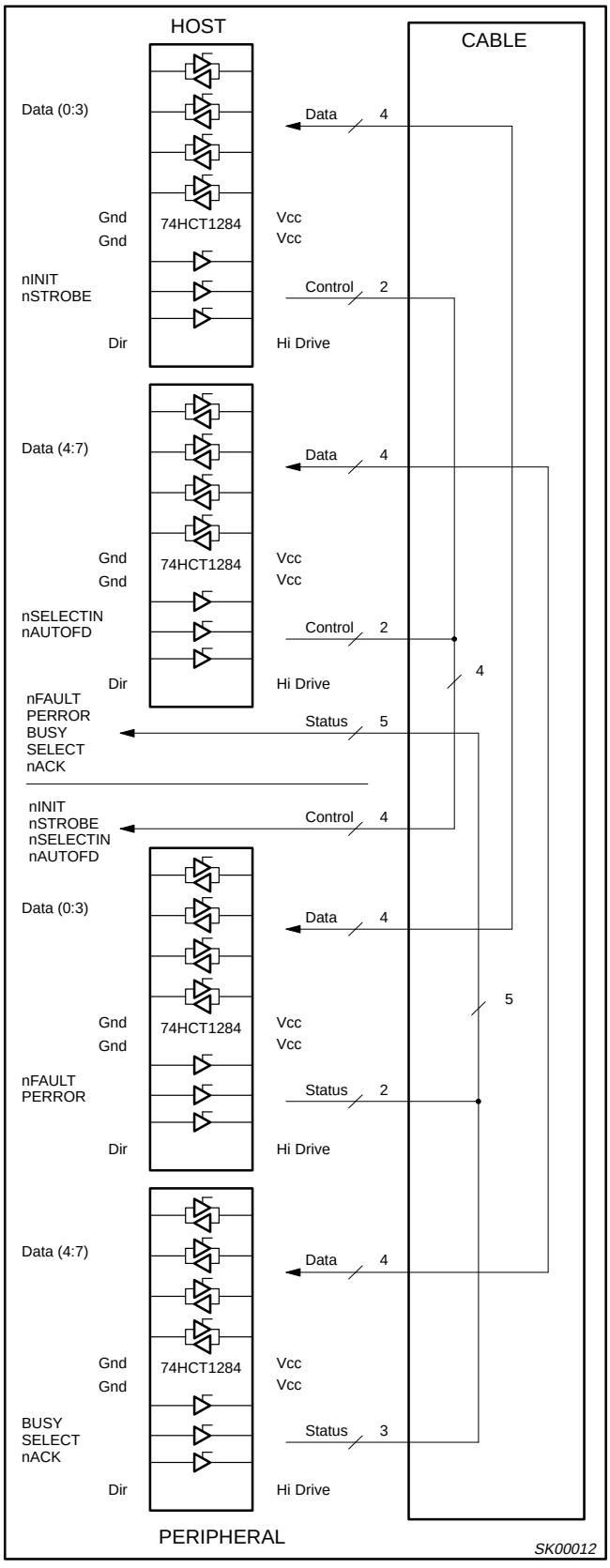

Figure 4. IEEE 1284 Interface System

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DEFINITIONS

Data Sheet Identification	Product Status	Definition
Objective Specification	**Formative or in Design**	This data sheet contains the design target or goal specifications for product development. Specifications may change in any manner without notice.
Preliminary Specification	**Preproduction Product**	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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