

Inter-Operation of the DS14C335 with +5V UARTs

National Semiconductor
 Application Note 876
 John Goldie
 Joe Vo
 January 1993



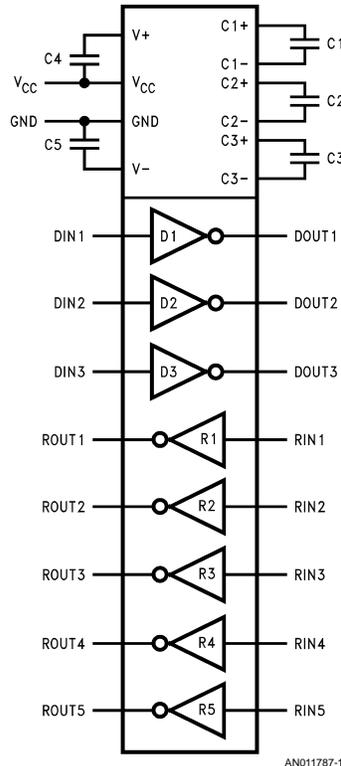
This application brief describes the inter-operation between the DS14C335 (+3.3V supply TIA/EIA-232 3 x 5 Driver/Receiver) and a +5V UART. The DS14C335, illustrated in *Figure 1*, is ideally suited for notebook and laptop computer applications which either employ one uniform +3.3V supply for all internal components or mixed +3.3V and +5V power supplies. In mixed supply applications, the DS14C335 does NOT require a +5V to +3.3V translator device between it and the UART. This application brief describes how this is accomplished.

Figure 2 illustrates a typical application where the DS14C335 provides the interface between the +5V UART

and the RS-232 port. The drivers provide translation from TTL/CMOS voltage levels on the driver input pins to RS-232 compliant driver output voltage levels ($>|5V|$), while the receivers accept standard RS-232 input levels and translate them back to TTL/CMOS compatible output voltage levels.

Because this application specifies a +5V UART, care must be taken to consider the characteristics of three pins on the DS14C335. They are the:

- D_{IN} Driver Input,
- SD Shutdown,
- R_{OUT} Receiver Output



AN011787-1
FIGURE 1. DS14C335 Functional Diagram

Inter-Operation of the DS14C335 with +5V UARTs

AN-876

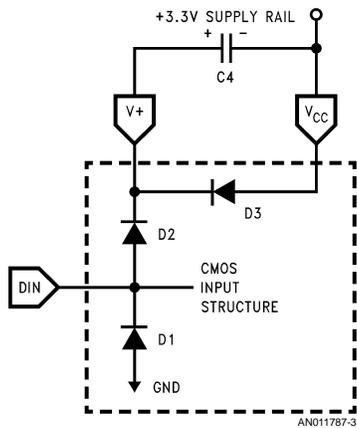


FIGURE 3. Input Protection Circuitry

This unique input structure allows the driver input pins and shutdown pin to accept any standard TTL/CMOS levels regardless of the DS14C335 mode (active or shutdown) or the fact that the DS14C335 is powered from a +3.3V power supply. The input pins (D_{IN} and SD) present standard loading to the driving logic with input voltages ranging from 0V to +5.5V, in magnitude.

The last pin of concern is the receiver output (R_{OUT}) pin. The R_{OUT} pin must have the drive capability to meet standard TTL/CMOS requirements. The $R_{OUT} V_{OH}$ is specified to be greater than 2.4V at 1 mA. This drive capability should meet all standard TTL/CMOS requirements.

SUMMARY

The DS14C335's unique input structure allows the driver input (D_{IN}) and shutdown (SD) pins to present standard steady state input loading to the driving logic. Valid input voltages can range from -0.3V to greater than +5.5V, thereby enabling the device to be driven by a +5V UART in applications that employ mixed power supplies. The high drive capability of the receiver output meets the requirements of +5V logic levels, or CMOS compliant JEDEC +3.3V levels. These features make the DS14C335 the optimal single chip solution for RS-232 serial ports in +3.3V/+5V or pure +3.3V power supply laptop and notebook computer applications.

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
Americas
Tel: 1-800-272-9959
Fax: 1-800-737-7018
Email: support@nsc.com

www.national.com

National Semiconductor Europe
Fax: +49 (0) 1 80-530 85 86
Email: europe.support@nsc.com
Deutsch Tel: +49 (0) 1 80-530 85 85
English Tel: +49 (0) 1 80-532 78 32
Français Tel: +49 (0) 1 80-532 93 58
Italiano Tel: +49 (0) 1 80-534 16 80

National Semiconductor Asia Pacific Customer Response Group
Tel: 65-2544466
Fax: 65-2504466
Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
Tel: 81-3-5620-6175
Fax: 81-3-5620-6179