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**SN65HVD230Q, SN65HVD231Q, SN65HVD232Q**  
SGZV001, February 2002

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### **3.3-V CAN TRANSCEIVERS**

#### **HIGHLIGHTS**

The SN65HVD230Q, SN65HVD231Q and SN65HVD232Q controller area network (CAN) transceivers are designed for use with the Texas Instruments TMS320Lx240x 3.3-V DSPs and Microcontrollers with CAN controllers or equivalent devices. They are intended for use in automotive applications employing the CAN serial communication physical layer in accordance with the ISO 11898 standard. Each CAN transceiver is designed to provide differential transmit capability to the bus and differential receive capability to a CAN controller at speeds up to 1 Mbps.

Designed for operation in extremely harsh environments, these devices feature cross-wire protection, loss-of-ground and over-voltage protection, over-temperature protection, as well as wide common-mode range.

The transceiver interfaces the single-ended CAN controller with the differential CAN bus. It operates over a  $-2\text{V}$  to  $7\text{V}$  common-mode range on the bus, and it can withstand common-mode transients of  $\pm 25\text{V}$ .

On the SN65HVD230Q and SN65HVD231Q, pin eight provides three different modes of operation: high-speed, slope control and low-power modes. The high-speed mode of operation is selected by connecting pin eight to ground, allowing the transmitter output transistors to switch on and off as fast as possible with no limitation on the rise and fall slopes. The rise and fall slopes can be adjusted by connecting a resistor to ground at pin eight, since the slope is proportional to the pin's output current. This slope control is implemented with external resistor values of  $10\text{ k}\Omega$ , to achieve a  $15\text{-V}/\mu\text{s}$  slew rate, to  $100\text{ k}\Omega$ , to achieve a  $2\text{-V}/\mu\text{s}$  slew rate.

The circuit of the SN65HVD230Q enters a low-current standby mode during which the driver is switched off and the receiver remains active if a high logic level is applied to pin eight. The controller reverses this low-current standby mode when a dominant state (bus differential voltage  $> 900\text{ mV}$  typical) occurs on the bus.

The unique difference between the SN65HVD230Q and the SN65HVD231Q is that both the driver and the receiver are switched off in the SN65HVD231Q when a high logic level is applied to pin eight. It remains in this sleep mode until the circuit is reactivated by a low logic level on pin eight.

The  $V_{\text{ref}}$  pin five on the SN65HVD230Q and SN65HVD231Q is available as a  $V_{\text{CC}}/2$  voltage reference.

The SN65HVD232Q is a basic CAN transceiver with no added options; pins five and eight are NC (no connection).

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## KEY FEATURES/BENEFITS

- Operates With a 3.3-V Supply
- Low Power Replacement for the PCA82C250 Footprint
- Bus/Pin ESD Protection Exceeds 16 kV HBM
- High Input Impedance Allows for 120 Nodes on a Bus
- Controlled Driver Output Transition Times for Improved Signal Quality on the SN65HVD230Q and SN65HVD231Q
- Unpowered Node Does Not Disturb the Bus
- Compatible With the Requirements of the ISO 11898 Standard
- Low-Current SN65HVD230Q Standby Mode 370  $\mu$ A Typical
- Low-Current SN65HVD231Q Sleep Mode 40 mA Typical
- Designed for Signaling Rates up to 1 Megabit/Second (Mbps)
- Thermal Shutdown Protection
- Open-Circuit Fail-Safe Design

Glitch-Free Power-Up and Power-Down Protection for Hot-Plugging Applications

## DIE SIZE

The current die has a size of: 78 mils x 120 mils, subject to change.

## TECHNOLOGY

LinBiCMOS™ (LinBiCMOS is a trademark of Texas Instruments.)

## PACKAGING

Package Option: 8-pin Plastic Small-Outline Package (D)

## PROCESS/PERFORMANCE OPTIONS

### Available Devices

Device	
SN65HVD230QD	SN65HVD230QDR
SN65HVD231QD	SN65HVD231QDR
SN65HVD232QD	SN65HVD232QDR

## PRODUCT INFORMATION CENTER

<http://www.ti.com/sc/docs/pic/home.htm>

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