

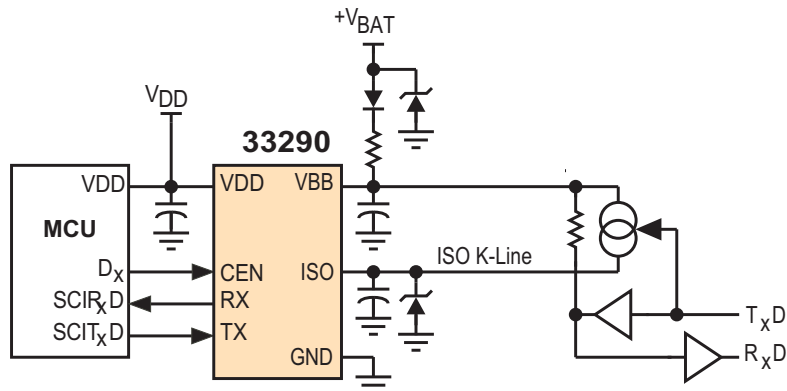
## ISO K Line Serial Link Interface

The 33290 is a serial link bus interface device designed to provide bi-directional half-duplex communication interfacing in automotive diagnostic applications. It is designed to interface between the vehicle's on-board microcontroller and systems off-board the vehicle via the special ISO K line. The 33290 is designed to meet the Diagnostic Systems ISO9141 specification. The device's K line bus driver's output is fully protected against bus shorts and overtemperature conditions.

The 33290 derives its robustness to temperature and voltage extremes by being built on a SMARTMOS process, incorporating CMOS logic, bipolar/MOS analog circuitry, and DMOS power FETs. Although the 33290 was principally designed for automotive applications, it is suited for other serial communication applications. It is parametrically specified over an ambient temperature range of  $-40^{\circ}\text{C} \leq T_A \leq 125^{\circ}\text{C}$  and  $8.0\text{ V} \leq V_{\text{BB}} \leq 18\text{ V}$  supply. The economical SO-8 surface-mount plastic package makes the 33290 very cost effective.

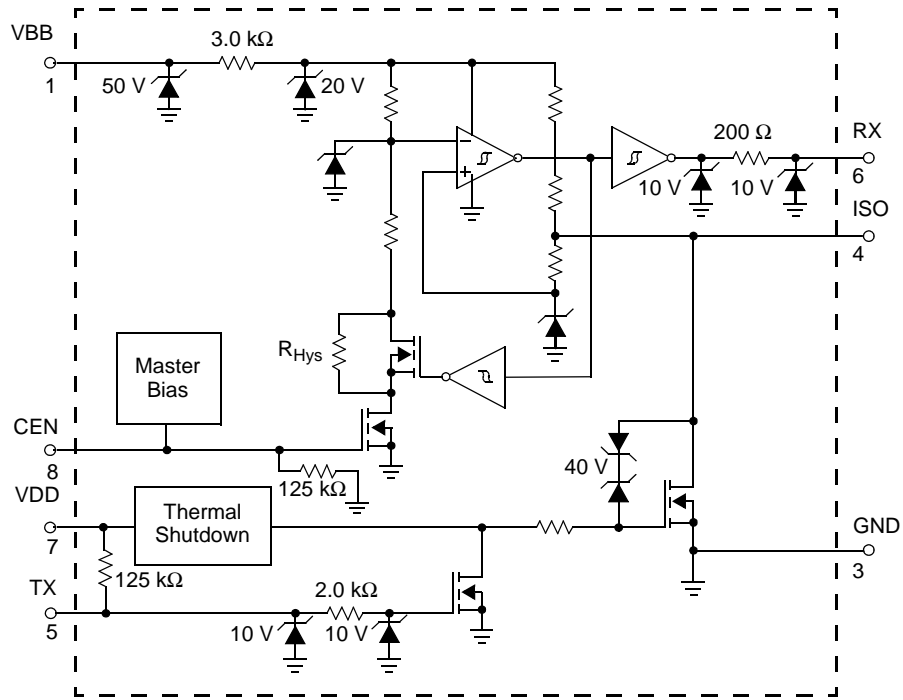
### Features

- Operates Over Wide Supply Voltage of 8.0 to 18V
- Operating Temperature of -40 to 125°C
- Interfaces Directly to Standard CMOS Microprocessors
- ISO K Line Pin Protected Against Shorts to Ground
- Thermal Shutdown with Hysteresis
- ISO K Line Pin Capable of High Currents
- ISO K Line Can Be Driven with up to 10 nF of Parasitic Capacitance
- 8.0 kV ESD Protection Attainable with Few Additional Components
- Standby Mode: No  $V_{\text{Bat}}$  Current Drain with  $V_{\text{DD}}$  at 5.0 V
- Low Current Drain During Operation with  $V_{\text{DD}}$  at 5.0 V
- Pb-Free Packaging Designated by Suffix Code EF



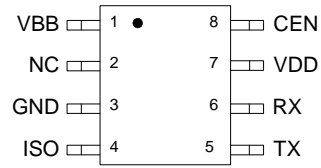
**33290 Simplified Application Diagram**

## INTERNAL BLOCK DIAGRAM



33290 Simplified Block Diagram

## PIN CONNECTIONS



### 33290 Pin Connections

**Table 1. 33290 Pin Definitions**

Pin Number	Pin Name	Definition
1	VBB	Battery power through external resistor and diode.
2	NC	Not to be connected. <sup>(1)</sup>
3	GND	Common signal and power return.
4	ISO	Bus connection.
5	TX	Logic level input for data to be transmitted on the bus.
6	RX	Logic output of data received on the bus.
7	VDD	Logic power source input.
8	CEN	Chip enable. Logic "1" for active state. Logic "0" for sleep state.

**Notes**

1. NC pins should not have any connections made to them. NC pins are not guaranteed to be open circuits.

## ELECTRICAL CHARACTERISTICS

## MAXIMUM RATINGS

Table 2. Maximum Ratings

All voltages are with respect to ground unless otherwise noted. Exceeding these ratings may cause a malfunction or permanent damage to the device.

Rating	Symbol	Value	Unit
VDD DC Supply Voltage	$V_{DD}$	-0.3 to 7.0	V
VBB Load Dump Peak Voltage	$V_{BB(LD)}$	45	V
ISO Pin Load Dump Peak Voltage <sup>(2)</sup>	$V_{ISO}$	40	V
ISO Short Circuit Current Limit	$I_{ISO(LIM)}$	1.0	A
ESD Voltage <sup>(3)</sup>			V
Human Body Model <sup>(4)</sup>	$V_{ESD1}$	±2000	
Machine Model <sup>(4)</sup>	$V_{ESD2}$	±200	
ISO Clamp Energy <sup>(5)</sup>	$E_{clamp}$	10	mJ
Storage Temperature	$T_{stg}$	-55 to +150	°C
Operating Case Temperature	$T_C$	-40 to +125	°C
Operating Junction Temperature	$T_J$	-40 to +150	°C
Power Dissipation $T_A = 25^\circ\text{C}$	$P_D$	0.8	W
Peak Package Reflow Temperature During Reflow <sup>(6), (7)</sup>	$T_{PPRT}$	Note 7.	°C
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	150	°C/W

## Notes

- Device will survive double battery jump start conditions in typical applications for 10 minutes duration, but is not guaranteed to remain within specified parametric limits during this duration.
- ESD data available upon request.
- ESD1 testing is performed in accordance with the Human Body Model ( $C_{ZAP} = 100 \text{ pF}$ ,  $R_{ZAP} = 1500 \Omega$ ), ESD2 testing is performed in accordance with the Machine Model ( $C_{ZAP} = 200 \text{ pF}$ ,  $R_{ZAP} = 0 \Omega$ ).
- Nonrepetitive clamping capability at 25°C.
- Pin soldering temperature limit is for 10 seconds maximum duration. Not designed for immersion soldering. Exceeding these limits may cause malfunction or permanent damage to the device.

## STATIC ELECTRICAL CHARACTERISTICS

**Table 3. Static Electrical Characteristics**

Characteristics noted under conditions of  $4.75\text{ V} \leq V_{DD} \leq 5.25\text{ V}$ ,  $8.0\text{ V} \leq V_{BB} \leq 18\text{ V}$ ,  $-40^\circ\text{C} \leq T_C \leq 125^\circ\text{C}$ , unless otherwise noted.

Characteristic	Symbol	Min	Typ	Max	Unit
<b>POWER AND CONTROL</b>					
$V_{DD}$ Sleep State Current $T_X = 0.8 V_{DD}$ , $CEN = 0.3 V_{DD}$	$I_{DD(SS)}$	–	–	0.1	mA
$V_{DD}$ Quiescent Operating Current $T_X = 0.2 V_{DD}$ , $CEN = 0.7 V_{DD}$	$I_{DD(Q)}$	–	–	1.0	mA
$V_{BB}$ Sleep State Current $V_{BB} = 16\text{ V}$ , $T_X = 0.8 V_{DD}$ , $CEN = 0.3 V_{DD}$	$I_{BB(SS)}$	–	–	50	$\mu\text{A}$
$V_{BB}$ Quiescent Operating Current $T_X = 0.2 V_{DD}$ , $CEN = 0.7 V_{DD}$	$I_{BB(Q)}$	–	–	1.0	mA
Chip Enable Input High-Voltage Threshold <sup>(8)</sup>	$V_{IH(CEN)}$	$0.7 V_{DD}$	–	–	V
Input Low-Voltage Threshold <sup>(9)</sup>	$V_{IL(CEN)}$	–	–	$0.3 V_{DD}$	V
Chip Enable Pull-Down Current <sup>(10)</sup>	$I_{PD(CEN)}$	2.0	–	40	$\mu\text{A}$
$T_X$ Input Low-Voltage Threshold $R_{ISO} = 510\ \Omega$ <sup>(11)</sup>	$V_{IL(TX)}$	–	–	$0.3 \times V_{DD}$	V
$T_X$ Input High-Voltage Threshold $R_{ISO} = 510\ \Omega$ <sup>(12)</sup>	$V_{IH(TX)}$	$0.7 \times V_{DD}$	–	–	V
$T_X$ Pull-Up Current <sup>(13)</sup>	$I_{PU(TX)}$	-40	–	-2.0	$\mu\text{A}$
$R_X$ Output Low-Voltage Threshold $R_{ISO} = 510\ \Omega$ , $T_X = 0.2 V_{DD}$ , $R_X$ Sinking 1.0 mA	$V_{OL(RX)}$	–	–	$0.2 V_{DD}$	V
$R_X$ Output High-Voltage Threshold $R_{ISO} = 510\ \Omega$ , $T_X = 0.8 V_{DD}$ , $R_X$ Sourcing 250 $\mu\text{A}$	$V_{OH(RX)}$	$0.8 V_{DD}$	–	–	V
Thermal Shutdown <sup>(14)</sup>	$T_{LIM}$	150	170	–	$^\circ\text{C}$

**Notes**

8. When IBB transitions to  $>100\ \mu\text{A}$ .
9. When IBB transitions to  $<100\ \mu\text{A}$ .
10. Enable pin has an internal current pull-down. Pull-down current is measured with CEN pin at  $0.3 V_{DD}$ .
11. Measured by ramping  $T_X$  down from  $0.7 V_{DD}$  and noting  $T_X$  value at which ISO falls below  $0.2 V_{BB}$ .
12. Measured by ramping  $T_X$  up from  $0.3 V_{DD}$  and noting the value at which ISO rises above  $0.9 V_{BB}$ .
13.  $T_X$  pin has internal current pull-up. Pull-up current is measured with  $T_X$  pin at  $0.7 V_{DD}$ .
14. Thermal Shutdown performance ( $T_{LIM}$ ) is guaranteed by design but not production tested.

**Table 3. Static Electrical Characteristics (Continued)**

Characteristics noted under conditions of  $4.75\text{ V} \leq V_{DD} \leq 5.25\text{ V}$ ,  $8.0\text{ V} \leq V_{BB} \leq 18\text{ V}$ ,  $-40^\circ\text{C} \leq T_C \leq 125^\circ\text{C}$ , unless otherwise noted.

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ISO I/O</b>					
Input Low Voltage Threshold $R_{ISO} = 0\ \Omega$ , $T_X = 0.8\ V_{DD}$ <sup>(15)</sup>	$V_{IL(ISO)}$	–	–	$0.4 \times V_{BB}$	V
Input High Voltage Threshold $R_{ISO} = 0\ \Omega$ , $T_X = 0.8\ V_{DD}$ <sup>(16)</sup>	$V_{IH(ISO)}$	$0.7 \times V_{BB}$	–	–	V
Input Hysteresis <sup>(17)</sup>	$V_{Hys(ISO)}$	$0.05 \times V_{BB}$	–	$0.1 \times V_{BB}$	V
Internal Pull-Up Current $R_{ISO} = \infty\ \Omega$ , $T_X = 0.8\ V_{DD}$ , $V_{ISO} = 9.0\text{ V}$ , $V_{BB} = 18\text{ V}$	$I_{PU(ISO)}$	-5.0	–	-140	$\mu\text{A}$
Short Circuit Current Limit <sup>(18)</sup> $R_{ISO} = 0\ \Omega$ , $T_X = 0.4\ V_{DD}$ , $V_{ISO} = V_{BB}$	$I_{SC(ISO)}$	50	–	1000	mA
Output Low Voltage $R_{ISO} = 510\ \Omega$ , $T_X = 0.2\ V_{DD}$	$V_{OL(ISO)}$	–	–	$0.1 \times V_{BB}$	V
Output High Voltage $R_{ISO} = \infty\ \Omega$ , $T_X = 0.8\ V_{DD}$	$V_{OH(ISO)}$	$0.95 \times V_{BB}$	–	–	V

**Notes**

15. ISO ramped from  $0.8\ V_{BB}$  to  $0.4\ V_{BB}$ , Monitor  $R_X$ , Value of ISO voltage at which  $R_X$  transitions to  $0.3\ V_{DD}$ .
16. ISO ramped from  $0.4\ V_{BB}$  to  $0.8\ V_{BB}$ , Monitor  $R_X$ , Value of ISO voltage at which  $R_X$  transitions to  $0.7\ V_{DD}$ .
17. Input Hysteresis,  $V_{Hys(ISO)} = V_{IH(ISO)} - V_{IL(ISO)}$ .
18. ISO has internal current limiting.

**DYNAMIC ELECTRICAL CHARACTERISTICS****Table 4. Dynamic Electrical Characteristics**

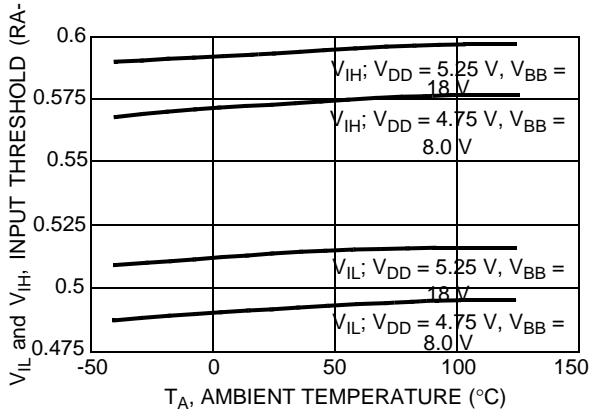
Characteristics noted under conditions of  $4.75\text{ V} \leq V_{DD} \leq 5.25\text{ V}$ ,  $8.0\text{ V} \leq V_{BB} \leq 18\text{ V}$ ,  $-40^{\circ}\text{C} \leq T_C \leq 125^{\circ}\text{C}$ , unless otherwise noted.

Characteristic	Symbol	Min	Typ	Max	Unit
Fall Time <sup>(19)</sup> R <sub>ISO</sub> = 510 Ω to V <sub>BB</sub> , C <sub>ISO</sub> = 10 nF to Ground	t <sub>fall(ISO)</sub>	–	–	2.0	μs
ISO Propagation Delay <sup>(20)</sup> High to Low: R <sub>ISO</sub> = 510 Ω, C <sub>ISO</sub> = 500 pF <sup>(21)</sup> Low to High: R <sub>ISO</sub> = 510 Ω, C <sub>ISO</sub> = 500 pF <sup>(22)</sup>	t <sub>PD(ISO)</sub>	– –	– –	2.0 2.0	μs

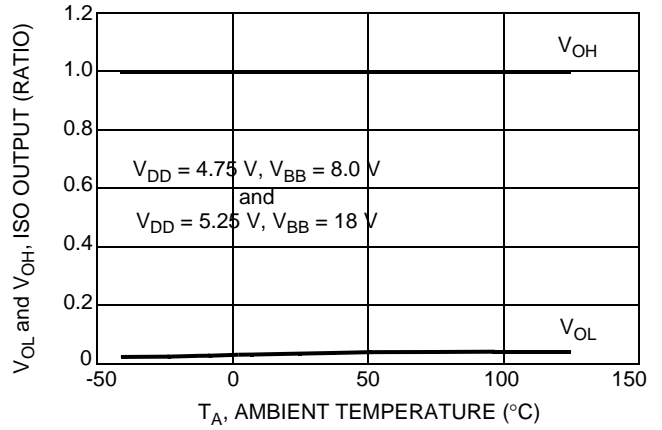
**Notes**

19. Time required ISO voltage to transition from 0.8 V<sub>BB</sub> to 0.2 V<sub>BB</sub>.
20. Changes in the value of C<sub>ISO</sub> affect the rise and fall time but have minimal effect on Propagation Delay.
21. Step T<sub>X</sub> voltage from 0.2 V<sub>DD</sub> to 0.8 V<sub>DD</sub>. Time measured from V<sub>IH(ISO)</sub> until V<sub>ISO</sub> reaches 0.3 V<sub>BB</sub>.
22. Step T<sub>X</sub> voltage from 0.8 V<sub>DD</sub> to 0.2 V<sub>DD</sub>. Time measured from V<sub>IL(ISO)</sub> until V<sub>ISO</sub> reaches 0.7 V<sub>BB</sub>.

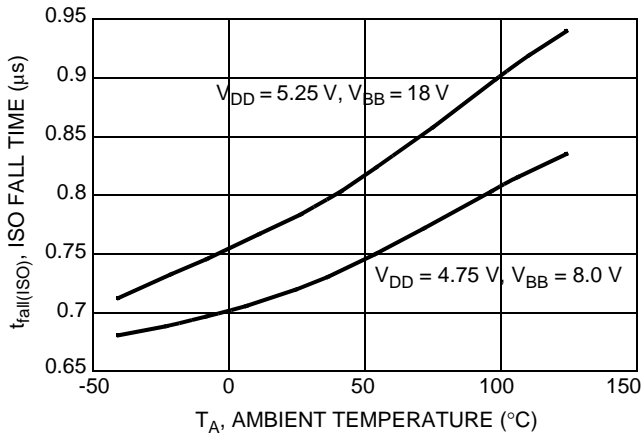
## ELECTRICAL PERFORMANCE CURVES



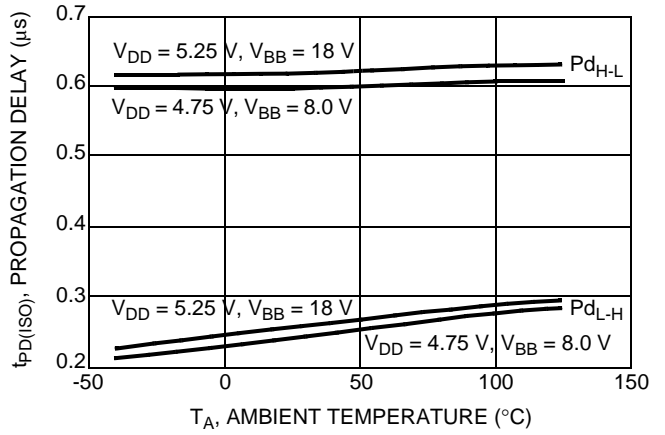
ISO Input Threshold/ $V_{BB}$  vs. Temperature



ISO Fall Time vs. Temperature



ISO Output/ $V_{BB}$  vs. Temperature



ISO Propagation Delay vs. Temperature

以上信息仅供参考. 如需帮助联系客服人员. 谢谢 XINLUDA