

Single-Ended Bus Transceiver

Features

- Single-Ended Transceiver
- Survives Shorts and Transients on Automotive Bus
- Wide Power Supply Voltage Range
- ISO 9141 Compatible
- Open Drain Fault Output

Benefits

- Single-Wire Multiplexer Interface
- ISO Diagnosis Bus

Applications

- Automobiles
- Trucks
- Tractors

Description

The Si9241EY is a monolithic bus transceiver designed to provide bidirectional serial communication in automotive diagnostic applications.

The device incorporates protection against overvoltages and short circuits to GND or V_B . The transceiver pin is protected and can be driven beyond the V_B voltage.

A fault output provides an active low in case of a short circuit or an open load. In the event of an over temperature condition, the output is immediately switched off and a fault indicated. This condition can only be reset once the over temperature condition is removed, and \overline{CS} is toggled high.

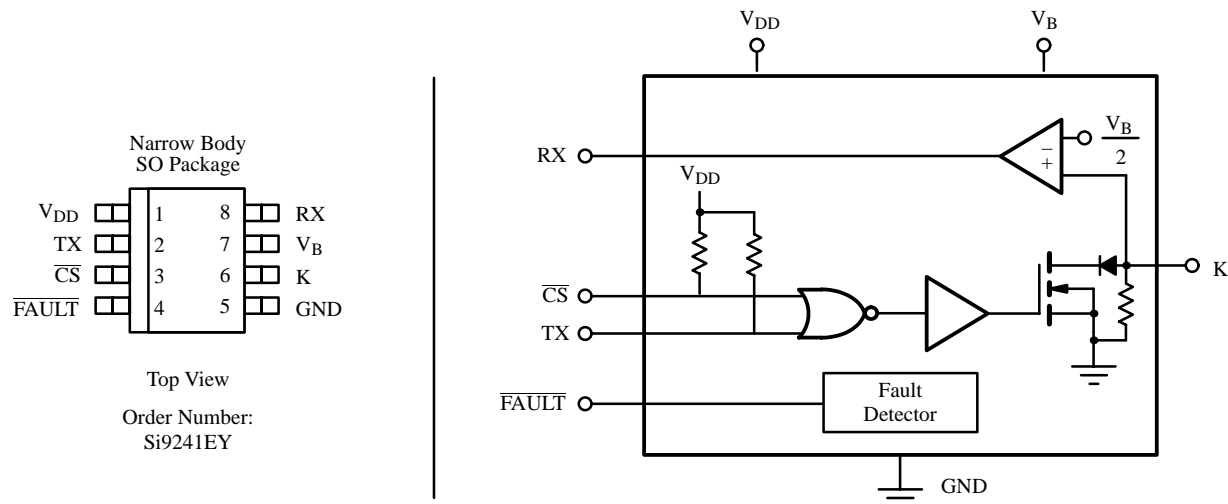
For bi-directional communication, \overline{CS} must be High for “receive” and Low for “transmit”. If \overline{CS} is Low, while IC is receiving data, an incorrect fault signal will occur. To inhibit the open load and short detect, tie \overline{CS} and T_X together.

The Si9241EY is built on the Siliconix BiC/DMOS process. An epitaxial layer prevents latchup.

The RX output is capable of driving CMOS or $1 \times$ LSTTL load.

The Si9241EY is available in a space efficient 8-pin SO package. It operates reliably over the automotive temperature range (-40 to 125°C).

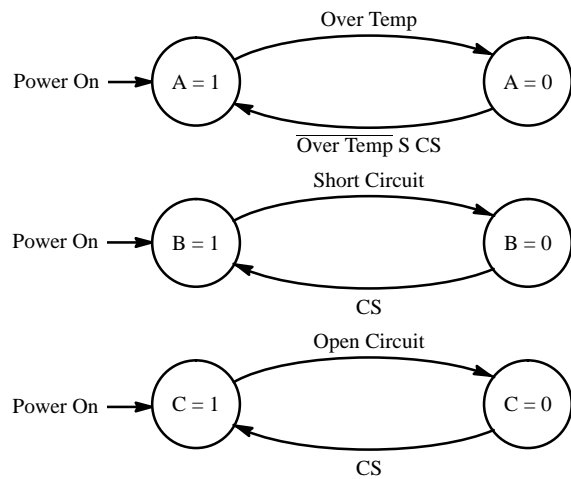
Pin Configuration and Functional Block Diagram



Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70013. Application Note AN602 may also be obtained via FaxBack, request document #70573.

Si9241EY

Output Table and State Diagrams



Inputs		State Variable			Output Table			Comments
\overline{CS}	TX	A	B	C	RX	K	\overline{FAULT}	
0	0	1	1	1	0	0	1	Over Temp Short Circuit Open Circuit
0	1	1	1	1	1	1	1	
X	X	0	1	1	K	HiZ	0	
0	X	1	0	1	K	HiZ	0	
0	X	1	1	0	K	HiZ	0	
1	X	1	1	1	0	0	1	Receive Mode
1	X	1	1	1	1	1	1	

X = "1" or "0"
HiZ = High Impedance State

Note: Over Temp is a condition and not meant to be a logic signal.

Absolute Maximum Ratings

Voltage Referenced to Ground

Voltage On V_{BAT} 45 V

Voltage K -16 V to ($V_B + 1$) V

Voltage or Max. Current On Any Pin

(Except V_{BAT} , K) -0.3 V to $V_{DD} + 0.3$ V or 10 mA

Voltage on V_{DD} 7 V

Short Circuit Duration (to V_{BAT} or GND) Continuous

Operating Temperature (T_A) -40 to 125°C

Junction and Storage Temperature -55 to 150°C

Thermal Resistance Θ_{JA} 125°C/W

Specifications

Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_{DD} = 4.5$ to 5.5 V, $V_{BAT} = 7.25$ to 35 V	Temp ^a	Limits E Suffix: -40 to 125°C			Unit
				Min ^b	Typ ^c	Max ^b	
Transmitter and Logic Levels							
\overline{CS} , TX Input Low Voltage	V_{ILT}		Full			1.5	V
\overline{CS} , TX Input High Voltage	V_{IHT}		Full	3.5			
K Output Low Voltage	V_{OLK}	$R_L = 510 \Omega$, $C_L = 10$ nF $V_{BAT} = 35$ V, $V_{DD} = 4.5$ V	Full			4.9	V
			Full			$0.2 V_{BAT}$	
K Output High Voltage	V_{OHK}	$R_L = 510 \Omega$, $C_L = 10$ nF See Test Circuit	Full	$0.91 V_{BAT}$			V
K Rise, Fall Times	t_r , t_f		Full			9.6	
K Output Sink Resistance	R_{si}	$\overline{CS} = 0$ V, TX = 0 V	Full			110	Ω
K Output Capacitance ^d	C_O	$\overline{CS} = 0$ V	Full			20	pF
TX Input Capacitance ^d	C_{INT}		Full			10	
\overline{CS} , TX Input Current	I_{INT}	$V_{DD} = 5.5$ V, $V_{INT} = 1.5$ V, 3.5 V	Full	-60		-4	μ A

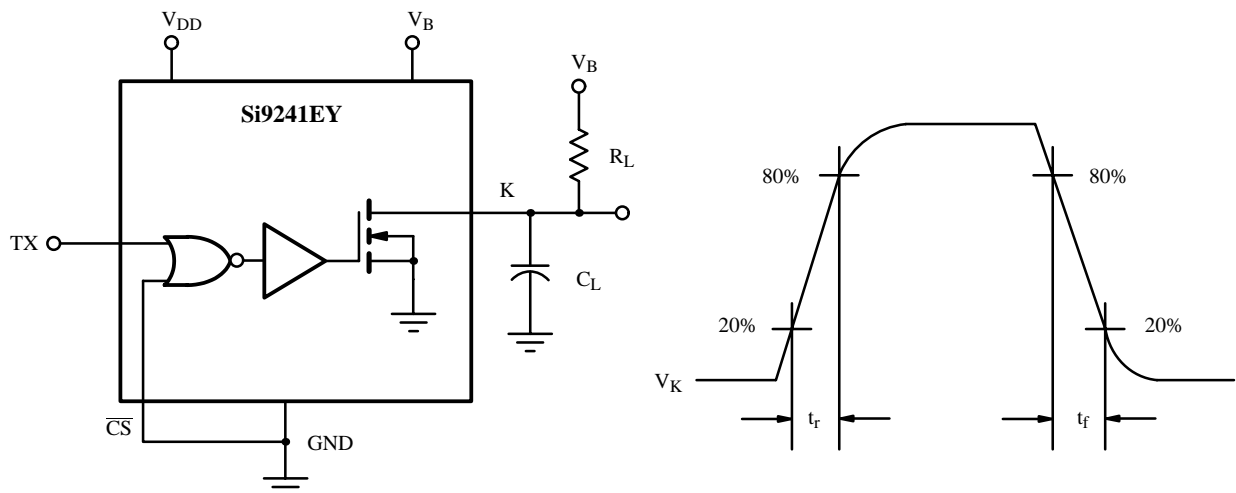
Specifications

Parameter	Symbol	Test Conditions Unless Otherwise Specified $V_{DD} = 4.5$ to 5.5 V, $V_B = 7.25$ to 35 V	Temp ^a	Limits E Suffix: -40 to 125°C			Unit	
				Min ^b	Typ ^c	Max ^b		
Receiver								
K Input Low Voltage	V_{ILK}		Full		$0.4 V_{BAT}$	$0.33 V_{BAT}$	V	
K Input High Voltage	V_{IHK}		Full	$0.7 V_{BAT}$	$0.6 V_{BAT}$			
K Input Hysteresis ^d	V_{HYS}		Full	$0.1 V_{BAT}$				
RX Output Low Voltage	V_{OLR}	$\overline{CS} = 4$ V				0.4	V	
RX High Voltage	V_{OHR}			Full	4			
K Input Currents	I_{IHK}			Full	1.5			20
Supplies								
Bat Supply Current	I_{BAT}	\overline{CS} , TX = 1.5 V, K Open	Full		2.7	5.0	mA	
Logic Supply Current	I_{DD}		Full		1	3.0		
Miscellaneous								
Baud Rate	BR	$R_L = 510 \Omega$, $C_L = 10$ nF	Full	10.4			kBaud	
Fault Output Low Voltage	V_{OLF}	$\overline{CS} = T_X = 0$ V, $K = V_B$, $I_{OLF} = 1$ mA	Full			0.4	V	
\overline{CS} Minimum Pulse Width ^{d, e}	t_{cs}		Full	1			μs	

Notes

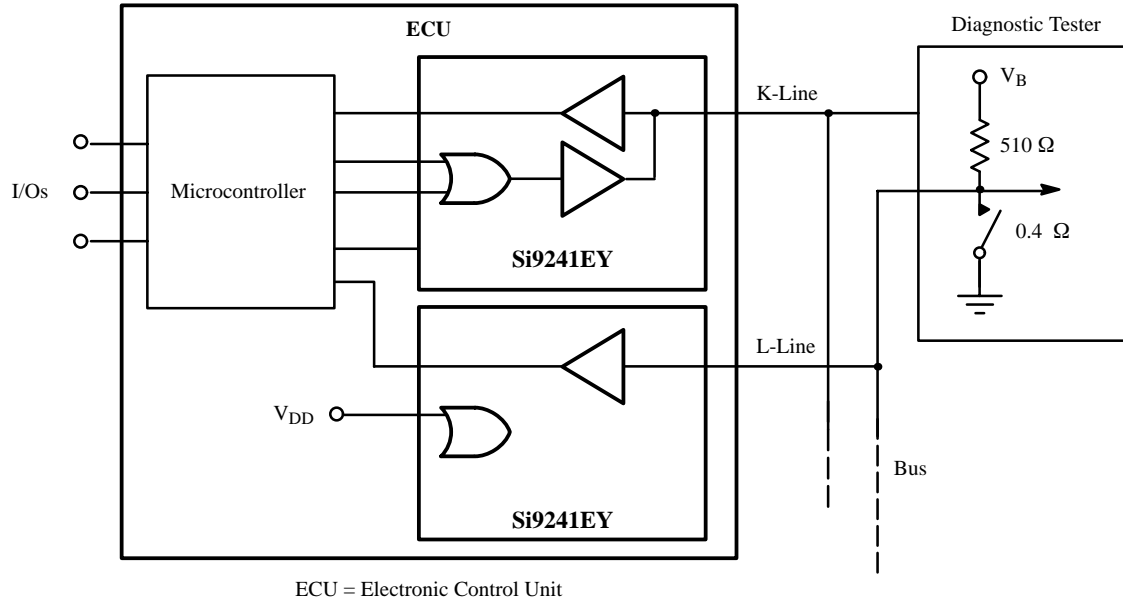
- Room = 25°C , Cold and Hot = as determined by the operating temperature suffix.
- The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
- Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
- Guaranteed by design, not subject to production test.
- Minimum pulse width to reset a fault condition.

Test Circuit (Transmit Only)



Si9241EY

Application Circuit



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Datasheets for electronics components.