Single-Ended Bus Transceiver

Features

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

Description

The Si9243EY 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_{BAT} voltage.

The Si9243EY contains temperature and short circuit fault detection circuits. In the transmit mode, load shorts and opens are generally detected by the processor monitoring RXK and TX. When the two mirror each other there is no fault, but the Si9243EY will turn off the K output in the event of over temperature or short circuit to V_{BAT} to protect the IC. The fault will be reset when TX toggles “high.”

TX is set “high” for receive only.

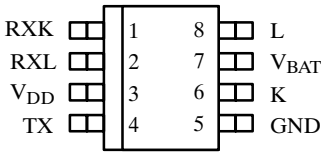
The RX output is capable of driving CMOS or 1 × LSTTL load.

The Si9243EY is built on the Siliconix BiC/DMOS process. This process supports bipolar transistors, CMOS, and DMOS. An epitaxial layer prevents latchup.

The Si9243EY is available in a 8-pin SO package and operates over the automotive temperature range (–40 to 125°C).

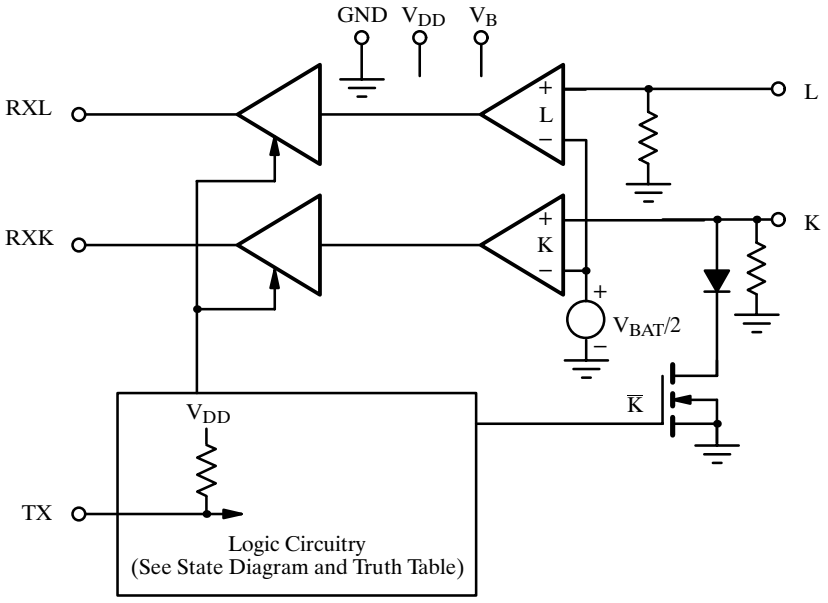
Pin Configuration and Functional Block Diagram

Narrow Body
SO Package



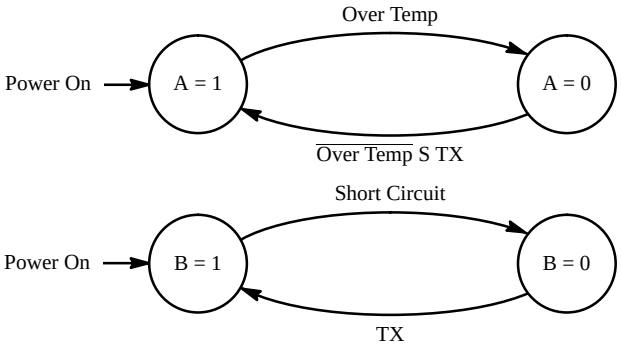
Top View

Order Number:
Si9243EY



Updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #70017. Application Note AN602 may also be obtained via FaxBack, request document #70573.

Output Table and State Diagrams



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

Inputs	State Variable		Output Table				
TX	A	B	K	RXK	L	RXL	Comments
0	1	1	0	0	0	0	
1	1	1	1	1	1	1	
0	1	1	0	0	1	1	
1	1	1	1	1	0	0	
X	0	1	HiZ	K	L	L	Over Temp
0	1	0	HiZ	1	L	L	Short Circuit
1	1	1	1	1	1	1	Receive Mode
1	1	1	0	0	0	0	

X = “1” or “0”
HiZ = High Impedance State

Absolute Maximum Ratings

Voltage Referenced to Ground
Voltage On V_{BAT} . . . . . 45 V
Voltage K , L . . . . . –16 V to V_{BAT} + 1 V
Voltage On Any Pin (Except V_{BAT}, K, L)
or Max. Current . . . . . –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

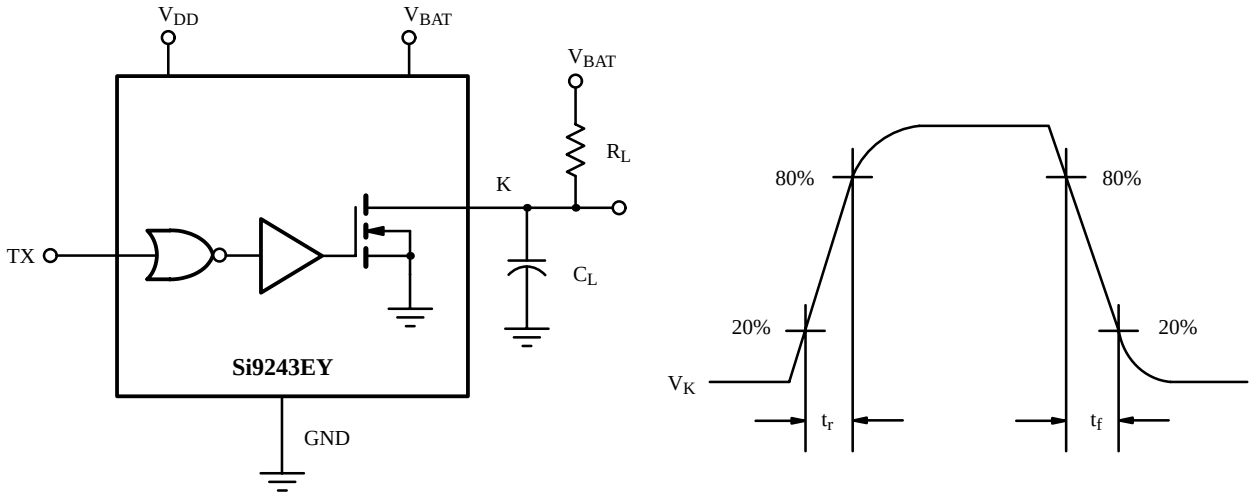
Parameter	Symbol	Test Conditions Unless Otherwise Specified V_{DD} = 4.5 to 5.5 V, V_{BAT} = 7.25 to 35 V	Temp[a]	Limits E Suffix: –40 to 125°C Min[b]	Typ[c]	Max[b]	Unit
Transmitter and Logic Levels							
TX Input Low Voltage	V_{ILT}		Full			1.5	V
TX Input High Voltage	V_{IHT}		Full	3.5			
K Output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

Specifications

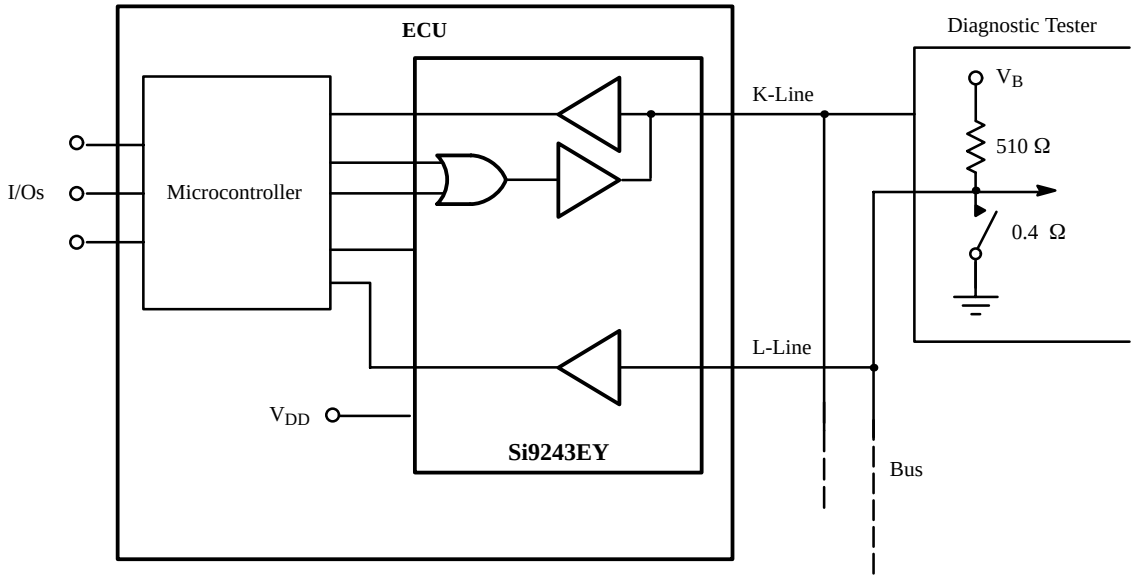
Parameter	Symbol	Test Conditions Unless Otherwise Specified V_{DD} = 4.5 to 5.5 V, V_B = 7.25 to 35 V		Temp[a]	Limits E Suffix: –40 to 125°C Min[b]	Typ[c]	Max[b]	Unit
Receiver								
L and K Input Low Voltage	V_{ILK}			Full		0.4 V_{BAT}	0.33 V_{BAT}	V
L and K Input High Voltage	V_{IHK}			Full	0.7 V_{BAT}	0.6 V_{BAT}		
L and K Input Hysteresis[d]	V_{HYS}			Full	0.1 V_{BAT}			
RXL and RXK Output Low Voltage	V_{OLR}	TX = 4 V	V_{ILK}, V_{ILL} = 0.33 V_{BAT} I_{OLR} = 1 mA	Full			0.4	
RXL and RXK High Voltage	V_{OHR}		V_{IHK}, V_{IHL} = 0.70 V_{BAT} I_{OHR} = –40 µA	Full	4			
L and K Input Currents	I_{IHK}		V_{IHK} = V_B	Full	1.5		20	µA
Supplies								
Bat Supply Current	I_{BAT}	TX = 1.5 V, K, L Open		Full		2.7	5.0	mA
Logic Supply Current	I_{DD}	TX = 1.5 V, K, L Open		Full		1	3.0	
Miscellaneous								
Baud Rate	BR	R_L = 510 Ω, C_L = 10 nF		Full	10.4			kBaud
TX Minimum Pulse Width[d, e]	t_{TX}			Full	1			µs

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

Test Circuit



Application Circuit



ECU = Electronic Control Unit