Automotive Electronics

Product Information
CAN Bus Transceiver – CF163

BOSCH
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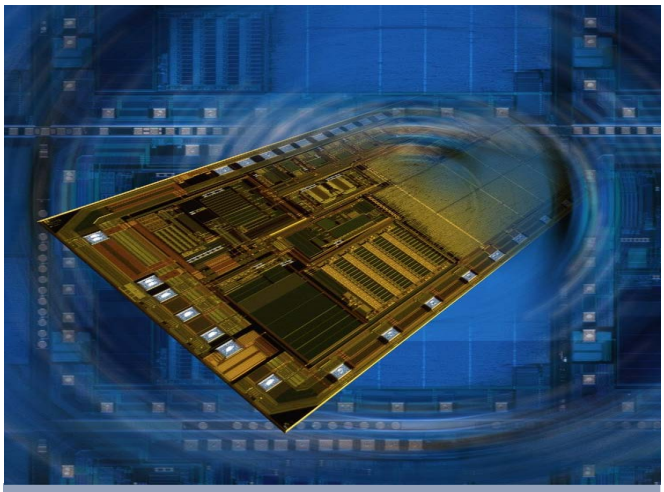


CAN Bus Transceiver

Customer benefits:

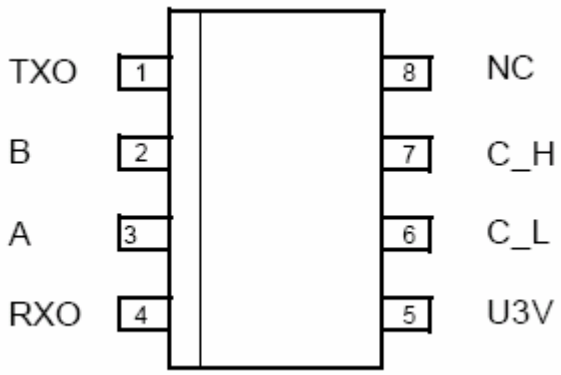
- Excellent system know-how
- Smart concepts for system safety
- Secured supply
- Long- term availability of manufacturing processes and products
- QS9000 and ISO/TS16949 certified

Features

- The CF163 is based on ISO/DIS 11898
- Transmitter
  - Generation of differential output signals
  - Overtemperature-shutdown
  - Slope control to reduce RFI and EMI
  - Input TX0 is compatible with 3.3V - CAN Controller
- Receiver
  - Differential input with high interference suppression
  - Common mode input voltage range (VCOM) from 5 V to 12 V
  - Output RX0 is compatible with 3.3V - CAN Controller
- Package: SOIC 8

The CF163 is a bidirectional transceiver for signal conditioning and processing in connection with a CAN controller. Data rates of up to 1 MBaud are supported using either shielded or non-shielded pair of lines.

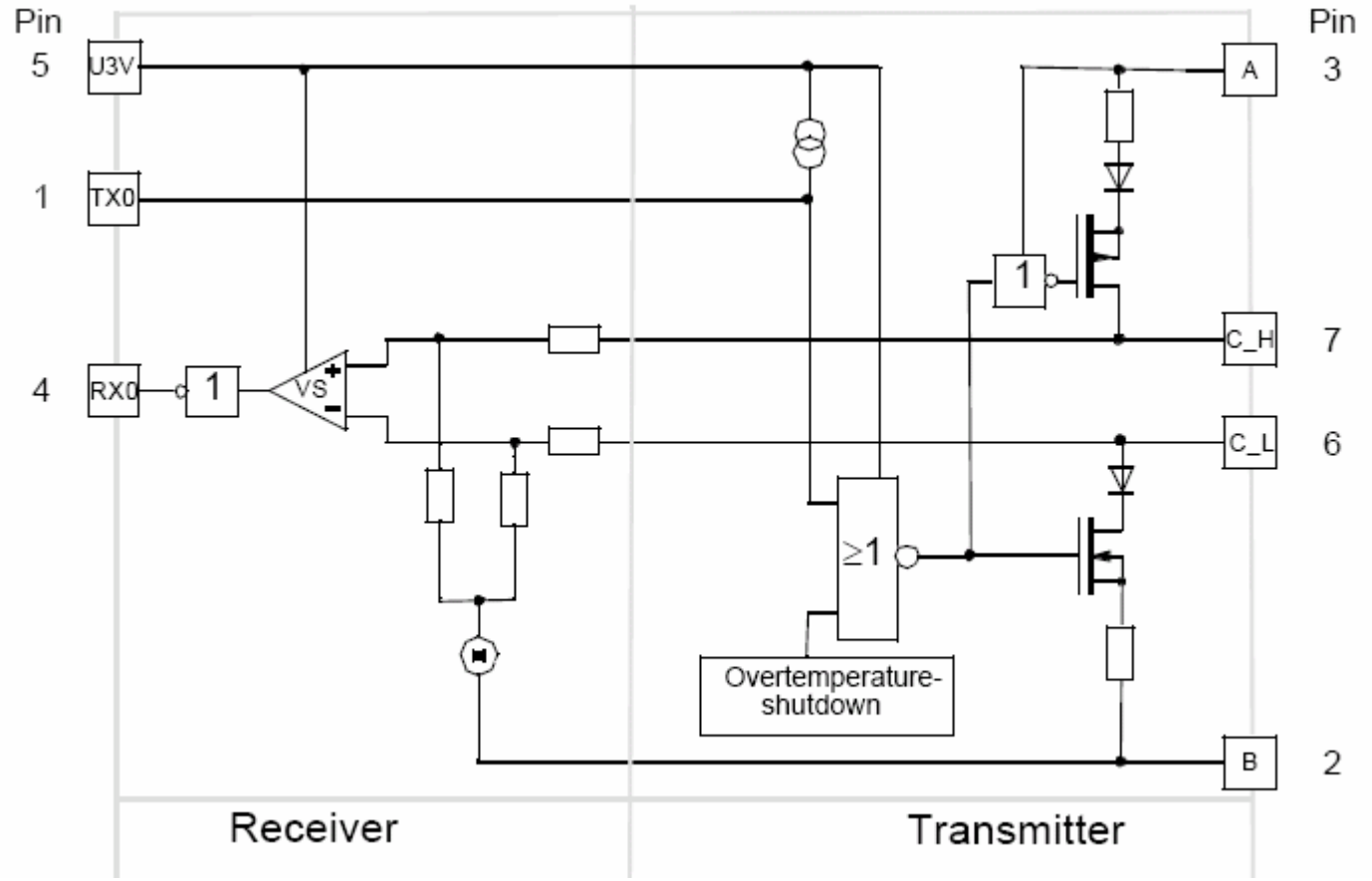
PIN configuration



Pin description

Pin	Name	Description
1	TXO	Transmitter input
2	B	Ground
3	A	Supply voltage
4	RXO	Receive output
5	U3V	3.3V- supply input
6	C_L	Low side bus input
7	C_H	High side bus input
8	NC	Not connected

Block Diagram



Maximum ratings

All voltages, except bus voltage, are defined with respect to pin B. Positive currents flow into the IC.

Rating	Condition	Symbol	Min.	Max.	Unit
Supply voltage (A)		V_A	-0.3	5.5	V
Supply voltage (U3V)		V_{U3V}	-0.3	3.6	V
Bus voltage (C_H,C_L)		V_{C_H}, V_{C_L}	-5	36	V
DC voltage at TXO		V_{TXO}	-0.3V	V_{U3V} +0.3V	
Output current at RXO		I_{RXO}	-0,3	1	mA
Storage temperature		T_{ST}	-40	150	°C
Operating temperature		T_{OP}	-40	125	°C
Junction temperature (normal mode)		T_J	-40	150	°C
Junction temperature (short circuit mode)	For less than a total of 5h over the entire lifetime	T_J		190	°C

Characteristics

All voltages, except bus voltage, are defined with respect to pin B. Positive currents flow into the IC.
General conditions: -40°C < T_{OP} < 125°C ; 4.5 V < V_A < 5.5 V ; 3.0 V < V_{U3V} < 3.6 V
Comment: Dominant: $V_{TXO} = V_B$; Recessive: $V_{TXO} = V_{U3V}$

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V_A	4.5	5	5.5	V
Supply voltage		V_{U3V}	3.0	3.3	3.6	V
Supply current	Dominant, R_A	I_A		50	80	mA
Supply current	Recessive	I_A		6	17	mA
Supply current	Recessive, dominant	I_{U3V}			0.5	mA

Transmitter section

R_A: 60 Ω between C_H and C_L; V_{Diff}= $V_{C\_H-C\_L}$

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
TXO Input capacitance	$V_B < V_{TXO} < V_{U3V}$	C_{TXO}		5		pF
TXO High level input voltage		$V_{TXO/\ U3V}$	0.7		1	
TXO Low level input voltage		$V_{TXO/\ U3V}$	0		0.3	
TXO input current source	$0 < V_{TXO} < 0.7x\ V_{U3V}$	$-I_{TXO}$	20	50	170	µA
Bus voltage recessive	Recessive	V_{C_H}, V_{C_L}	0.4VA	0.5VA	0.6VA	
Leakage current recessive	0 < VC_L < 5V 0< VC_H < 5V	I_{C_H}, I_{C_L}	-0.3		0.3	mA
Input resistance	Recessive	$R_{IN(C\_H,C\_L)}$		20		kΩ
Differential input resistance	Recessive	$R_{Diff(C\_H,C\_L)}$		40		kΩ
Differential output voltage dominant	Dominant, R_A 4.75V < V_A < 5.5V	$V_{Diff=\ C\_H-C\_L}$	1.5		3	V
Differential output voltage recessive	Recessive	$V_{Diff=\ C\_H-C\_L}$	-500	0	50	mV
Supply current in case of short circuit		I_A		140		mA
Thermal resistance		$Rth_{j\text{-}ambient}$		200		K/W
Overtemperature- shutdown		T_j		180	190	°C

Receiver section

R_A: 60 Ω between C_H and C_L; $V_{Diff=C\_H-C\_L}$

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
RXO High level output voltage	V_{Diff} < 0,4V I_{RXO} = -0.3mA	$V_{RXO/\ U3V}$	0.9V_A		1	
RXO Low level output voltage	V_{Diff} > 1V I_{RXO} = 1mA	V_{RXO}			0.5	V
Input signal threshold	-2V < V_{C_H} < 7V -2V < V_{C_L} < 7V	V_{Diff}	0.1V_A		0.18V_A	
Differential input hysteresis	$V_{HYS}=V_{Diff.high} - V_{DIFF.low}$	V_{HYS}		200		mV

Dynamic characteristics

General conditions:
C_A: 47 pF between C_H and C_L, V_A= 5V, t_r < 5ns
C_{RXO}: 20 pF between RXO and B, R_A: 60 Ω between C_H and C_L

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
Signal delay TXO to C_H,C_L		t_T		50		ns
Differential output slew rate		SR		40		V/µs
Signal delay C_H,C_L to R_{XO}		t_R			150	ns
Signal delay TXO to RXO		t_{TR}		150	280	ns

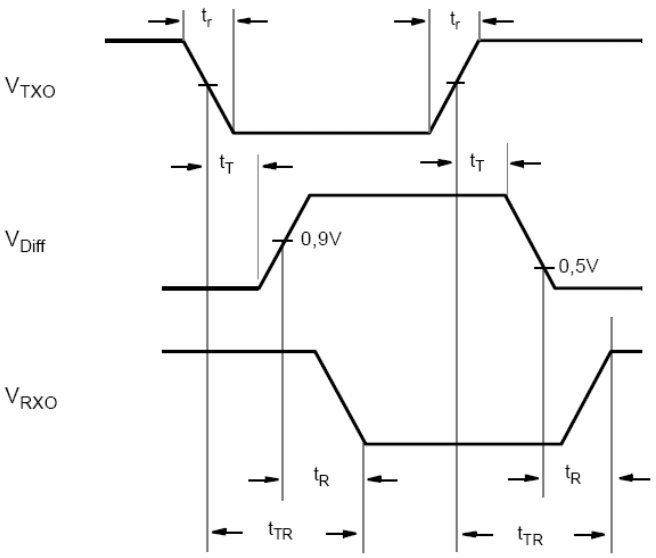
Functional description

The CF163 is used as an interface between a 3.3V-CAN controller and the physical bus. The device provides transmitting capability to the 3.3V-CAN controller.

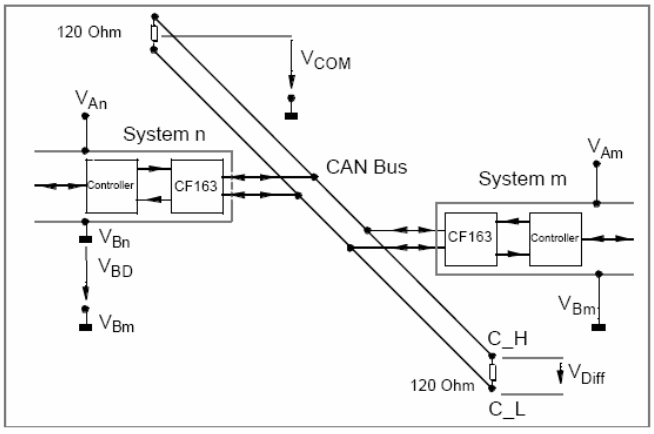
Functional table

TXO	C_H	C_L	Bus State	RXO
L	H	L	Dominant	L
H or floating	Floating VA/2	Floating VA/2	Recessive	H

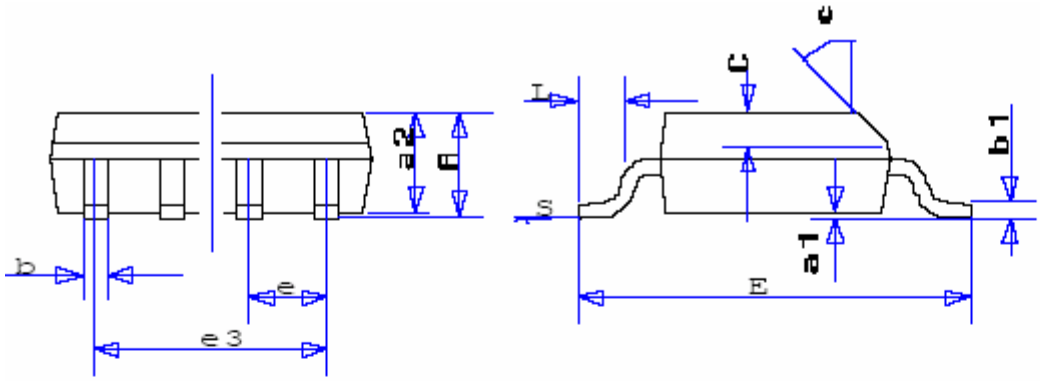
Timing diagram

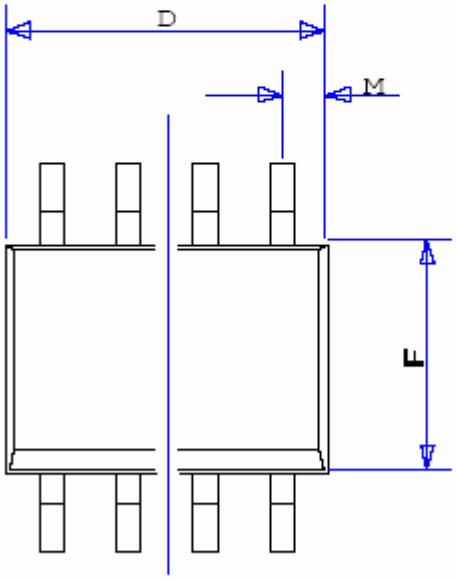


Application note



Package: SOIC 8 - Narrow





Ref.	Data Book mm		
	Typ	Min	Max
A			1.75
a1		0.10	0.25
a2			1.65
b		0.35	0.48
b1		0.19	0.25
C	0.50		
c1	45°		
D	see variations		
E		5.8	6.2
e	1.27		
e3	see variations		
F		3.8	4.0
L		0.4	1.27
M			0.6
S			8°

Variations D/ mm

N	Typ	Min	Max
8		4.8	5.0

Variations e3/mm

N	Typ	Min	Max
8	3.81		

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