



## Technical Data

**CF160**

# CAN BUS TRANSCEIVER

The CF160 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.

## FEATURES

The CF160 is based on ISO/DIS 11898.

### Transmitter

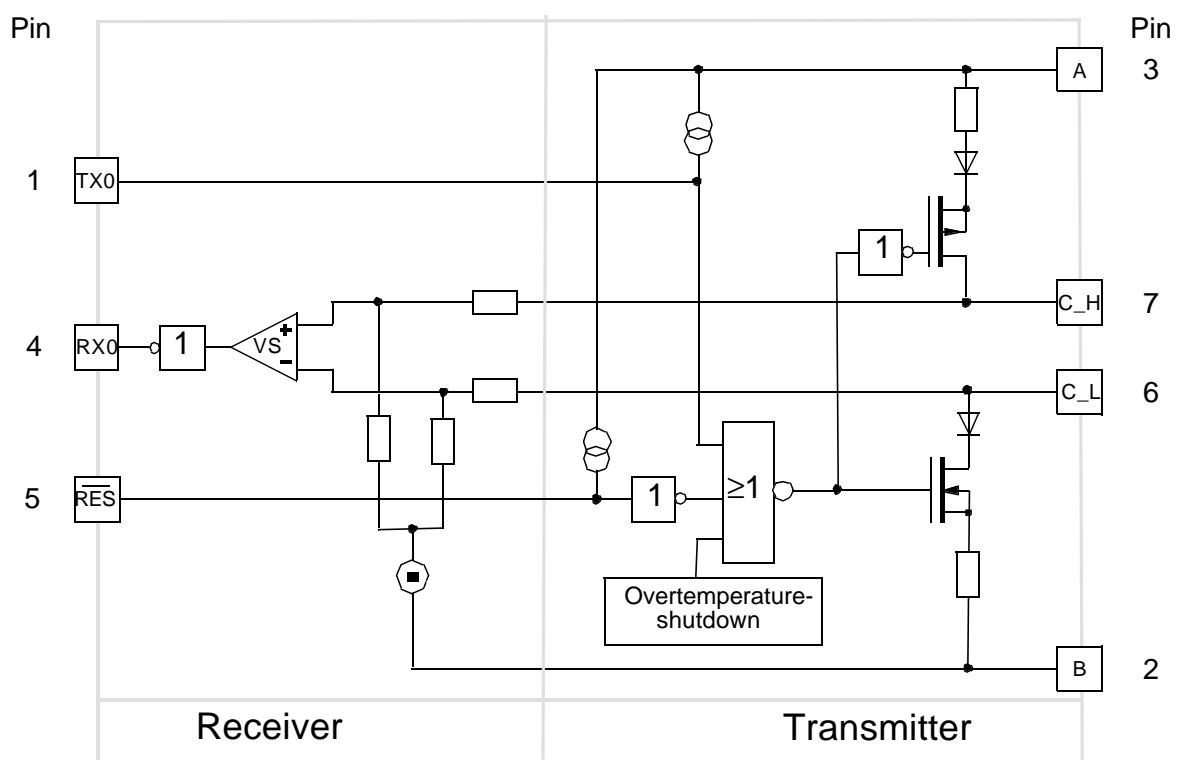
- Generation of differential output signals
- Overtemperature-shutdown
- Slope control to reduce RFI and EMI
- $\overline{\text{RES}}$ -Input to switch off transmitter in case of error

### Receiver

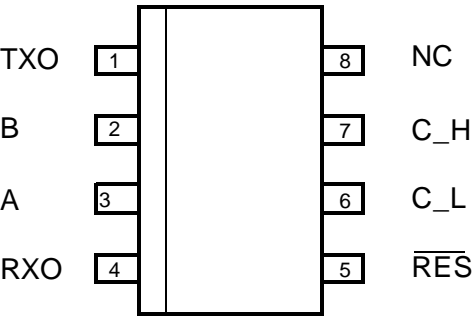
- Differential input with high interference suppression
- Common mode input voltage range ( $V_{\text{COM}}$ ) from -5 V to 12 V

Package: SOIC 8

## BLOCK DIAGRAM



PINNING



PIN DESCRIPTION

Pin	Name	Description
1	TXO	Transmitter input
2	B	Ground
3	A	Supply voltage
4	RXO	Receive output
5	RES	Reset input (active low)
6	C_L	Low side bus output
7	C_H	High side bus output
8	NC	not connected

## 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
Bus voltage (C_H, C_L)		$V_{C\_H}, V_{C\_L}$	-5	36	V
DC voltage at TXO, $\overline{RES}$		$V_{TX0}, \overline{V_{RES}}$	$V_B - 0.3V$	$V_A + 0.3V$	
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:

$$-40^{\circ}\text{C} < T_{OP} < 125^{\circ}\text{C}$$

$$4.5\text{ V} < V_A < 5.5\text{ V}$$

Comment:

$$\text{Dominant: } V_{TX0} = V_B$$

$$\text{Recessive: } V_{TX0} = V_A$$

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		$V_A$	4.5	5	5.5	V
Supply current	Dominant, $R_A$	$I_A$		50	80	mA
Supply current	Recessive	$I_A$		6	17	mA

## TRANSMITTER SECTION

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

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
TXO Input capacitance	$V_B < V_{TXO} < V_A$	$C_{TXO}$		5		pF
TXO High level input voltage		$V_{TXO}$	$0.7V_A$		$V_A$	
TXO Low level input voltage		$V_{TXO}$	0		$0.3V_A$	
TXO input current source	$0 < V_{TXO} < 0.7V_A$	$-I_{TXO}$	20	50	170	$\mu A$
$\overline{RES}$ High level input voltage		$V_{\overline{RES}}$	$0.7V_A$		$V_A$	
$\overline{RES}$ Low level input voltage		$V_{\overline{RES}}$	0		$0.25V_A$	
$\overline{RES}$ input current source	$V_B < V_{\overline{RES}} < 0.7V_A$	$-I_{\overline{RES}}$	20	60	170	$\mu A$
Bus voltage recessive	Recessive	$V_{C\_H}$ $V_{C\_L}$	$0.4V_A$	$0.5V_A$	$0.6V_A$	
Leakage current recessive	$0V < V_{C\_L} < 5V$ $0V < V_{C\_H} < 5V$	$I_{C\_H}$ $I_{C\_L}$	-0.3		0.3	mA
Input resistance	Recessive	$R_{IN(C\_H,C\_L)}$		20		k $\Omega$
Differential input resistance	Recessive	$R_{Diff(C\_H,C\_L)}$		40		k $\Omega$
Differential output voltage Dominant	Dominant, $R_A$ $4.75V < V_A < 5.5V$	$V_{Diff=}$ $V_{C\_H}-V_{C\_L}$	1.5		3	V
Differential output voltage Recessive	Recessive	$V_{Diff=}$ $V_{C\_H}-V_{C\_L}$	-500	0	50	mV
Supply current in case of short circuit		$I_A$		140		mA
Thermal resistance		$R_{th}_{j-ambient}$		200		K/W
Overtemperature-shutdown		$T_j$		180	190	$^{\circ}C$

## RECEIVER SECTION

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

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
RXO High level output voltage	$V_{Diff} < 0,4V$ $I_{RXO} = -0.3mA$ $-2V < V_{C_H} < 7V$ $-2V < V_{C_L} < 7V$	$V_{RXO}$	$0.9V_A$		$V_A$	V
RXO Low level output voltage	$V_{Diff} > 1V$ $I_{RXO} = 1mA$ $-2V < V_{C_H} < 7V$ $-2V < V_{C_L} < 7V$	$V_{RXO}$			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  $\Omega$  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/ $\mu s$
Signal delay C_H, C_L to $R_{XO}$		$t_R$			150	ns
Signal delay TXO to RXO		$t_{TR}$		150	280	ns

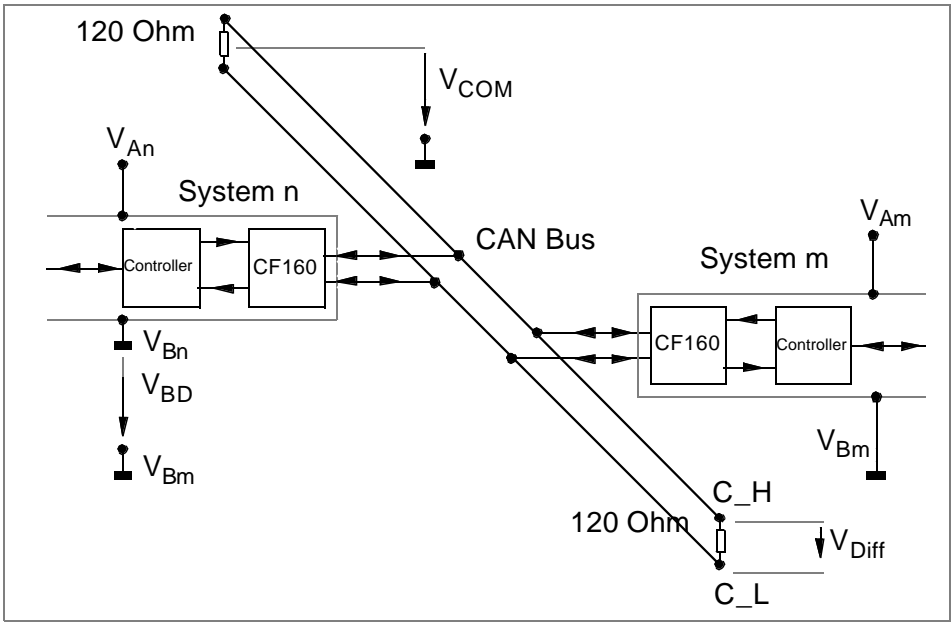
FUNCTIONAL DESCRIPTION

The CF160 is used as an interface between a CAN controller and the physical bus. The device provides transmitting capability to the CAN controller.

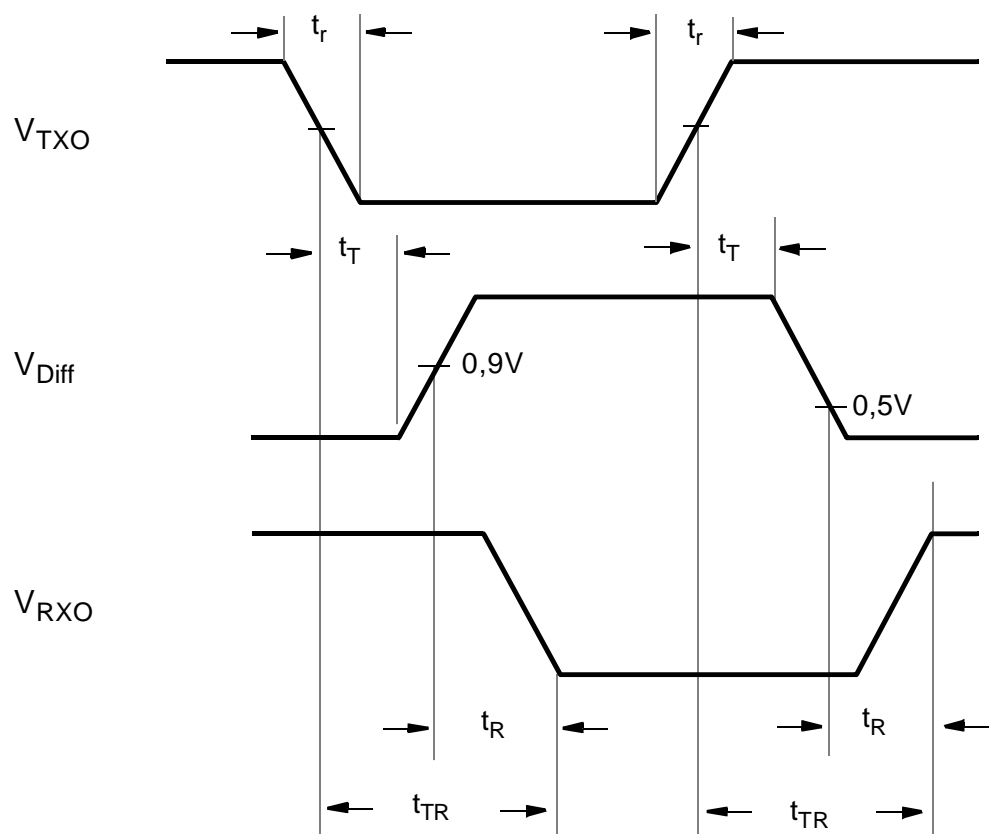
FUNCTIONAL TABLE

TXO	RES	C_H	C_L	Bus State	RXO
L	H or Floating	H	L	Dominant	L
H or Floating	H or Floating	Floating $V_A/2$	Floating $V_A/2$	Recessive	H
L	L	Floating $V_A/2$	Floating $V_A/2$	Recessive	H
H or Floating	L	Floating $V_A/2$	Floating $V_A/2$	Recessive	H

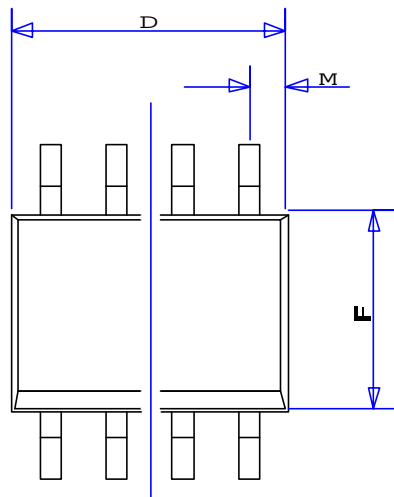
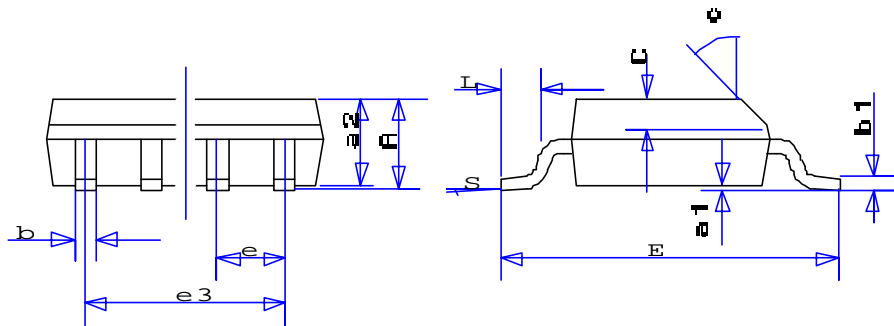
APPLICATION NOTE



## TIMING DIAGRAM



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	
	Typ	Min	Max
N		4.8	5.0

Variations	e3/	mm	
	Typ	Min	Max
N		3.81	

In the interest of product improvement, Bosch reserves the right to change specifications without notice

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