



## Technical Data

### CF150C

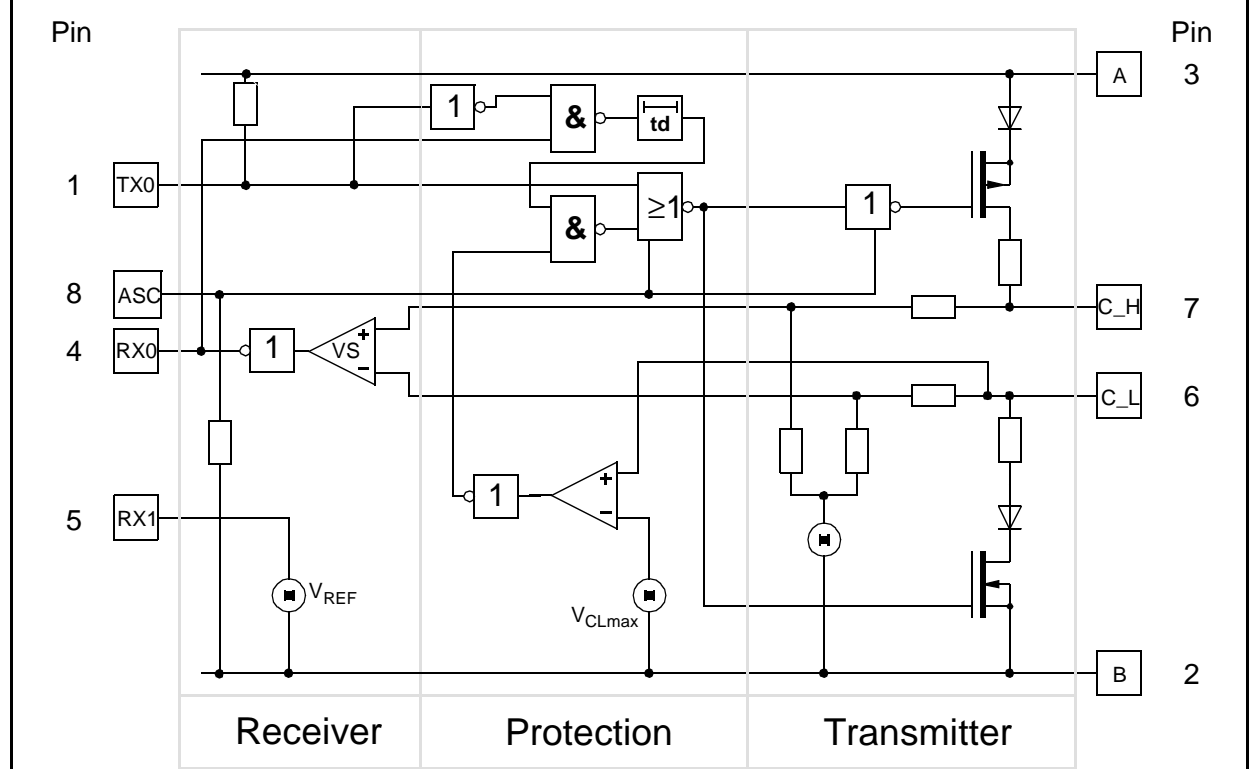
## CAN BUS TRANSCEIVER

The CF150 is a bidirectional transceiver for signal conditioning and processing in connection with a CAN controller. Data rates of up to 500 kBaud are supported using either shielded or non-shielded pair of lines.

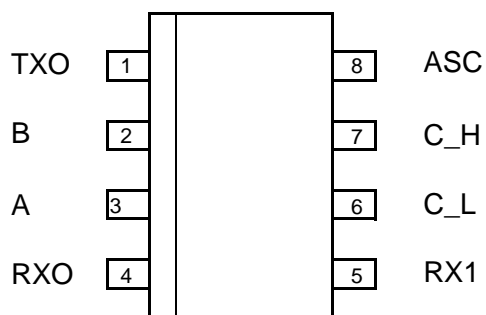
### FEATURES

- CF 150 meets ISO/DIS 11898 up to 500 kBaud
- Transmitter
  - Generation of differential output signals
  - Short circuit protected from -5 V to +36 V, detection & shutdown
  - Slope control to reduce RFI and EMI
  - Two states adjustable slope control ( $\leq 500$  kBaud /  $\leq 125$  kBaud)
- Receiver
  - Differential input with high interference suppression
  - Common mode input voltage range ( $V_{COM}$ ) 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	RX1	Reference voltage
6	C_L	Low side bus output
7	C_H	High side bus output
8	ASC	Adjustable slope control

## 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	7	V
Bus voltage (C_H,C_L)	$0V < V_A < 5,5V$	$V_{C\_H}, V_{C\_L}$	-5	36	V
Off state leakage current at C_H, C_L	$0V < V_A < 5,5V$ $-5V < V_{C\_H} < 36V$ $-5V < V_{C\_L} < 36V$	$I_{C\_H}, I_{C\_L}$	-1	4	mA
DC voltage at TXO, ASC	$0V < V_A < 5,5V$	$V_X$	$V_B - 0,3V$	$V_A + 0,3V$	
Output current at RXO	$0V < V_A < 5,5V$	$I_{RXO}$	-0,3	1	mA
Storage temperature		$T_{ST}$	-40	150	°C
Operating temperature		$T_{OP}$	-40	110	°xC
Junction temperature		$T_J$	-40	150	°C

## CHARACTERISTICS

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

General conditions:

$-40^{\circ}C < T_{OP} < 110^{\circ}C$   
 $4,5 V < V_A < 5,5 V$

Comment:

Dominant:  $V_{TXO} = V_B$   
Recessive:  $V_{TXO} = V_A$

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		$V_A$	4,5	5	5,5	V
Supply current	Dominant	$I_A$	0	12	80	mA
Supply current	Recessive	$I_A$	0	12	20	mA

## TRANSMITTER SECTION

$R_A$ : 60  $\Omega$  between C\_H and C\_L

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
TXO Input capacitance	$V_B < V_{TXO} < V_A$	$C_{TXO}$		25		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 High level input current	$V_{TXO} = V_A$	$I_{TXO}$	-2	0	2	$\mu A$
TXO Low level input current	$V_{TXO} = V_B$	$I_{TXO}$	-275		-30	$\mu A$
ASC Input capacitance	$V_B < V_{ASC} < V_A$	$C_{ASC}$		25		pF
ASC Input voltage for high speed		$V_{ASC}$	0		0.1V A	
ASC Input voltage for low speed		$V_{ASC}$	0.9V A		$V_A$	
ASC Input current	$V_{ASC} = V_A$	$I_{ASC}$	30		275	$\mu A$
	$V_{ASC} = V_B$	$I_{ASC}$	-2	0	2	$\mu A$
Bus voltage recessive	Recessive	$V_{C\_H}$ $V_{C\_L}$	0.4V A	0.5V A	0.6V A	
Leakage current recessive	$-2V < V_{C\_L} < 7V$ $-2V < V_{C\_H} < 7V$	$I_{C\_H}$ $I_{C\_L}$	-0.7		0.7	mA
Leakage current recessive	$1V < V_{C\_L} < 4V$ $1V < V_{C\_H} < 4V$	$I_{C\_H}$ $I_{C\_L}$	-0.3		0.3	mA
Input resistance	Recessive	$R_{IN(C\_H,C\_L)}$		18.5		k $\Omega$
Differential input resistance	Recessive	$R_{Diff(C\_H,C\_L)}$		37		k $\Omega$
Differential output voltage	Dominant, $R_A$	$V_{Diff=}$ $V_{C\_H}-V_{C\_L}$	1.5		3	V
Differential output voltage	Recessive	$V_{Diff=}$ $V_{C\_H}-V_{C\_L}$	-500	0	50	mV
Short circuit detection time C_H to C_L C_H to B	short circuit resistance < 1 $\Omega$	$t_d$	1	5	10	$\mu s$
Supply current in case of short circuit, C_H to C_L, C_H to B (time = $t_d$ )		$I_A$		150		mA
Overvoltage protection threshold on C_L		$V_{C\_Lmax}$	7	8	10	V

## RECEIVER SECTION

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
RXO High level output voltage	$V_{Diff} < 0,5V$ $I_{RXO} = -0,3mA$ $-2V < V_{C\_H} < 7V$ $-2V < V_{C\_L} < 7V$	$V_{RXO}$	$0,9V_A$		$V_A$	V
RXO Low level output voltage	$V_{Diff} > 0,9V$ $I_{RXO} = 1mA$ $-2V < V_{C\_H} < 7V$ $-2V < V_{C\_L} < 7V$	$V_{RXO}$			0,5	V
Input signal threshold	$-2V < V_{C\_H} < 7V$ $-2V < V_{C\_L} < 7V$	$V_{S=}$ $V_{C\_H}, V_{C\_L}$	500	700	900	mV
Differential input hysteresis		$V_{HYS}$		100		mV

## REFERENCE OUTPUT

Rating	Conditions	Symbol	Min.	Typ.	Max.	Unit
Reference voltage	$I_{RX1} = 0$	$V_{RX1}$	$0,45V_A$	$0,5V_A$	$0,55V_A$	V
Output resistance		$R_{RX1}$	2		20	k $\Omega$

## 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 $C\_H, C\_L$		$t_{OT}$			50	ns
Differential output slew rate (Transmitter)	$V_{ASC} = V_B$	SR	20		50	V/ $\mu s$
	$V_{ASC} = V_A$	SR	5		20	V/ $\mu s$
Signal delay $C\_H, C\_L$ to $R_{XO}$	$V_{ASC} = V_B$	$t_{OR}$			150	ns
Signal delay TXO to RXO	$V_{ASC} = V_B$	$t_{OTR}$			300	ns

FUNCTIONAL DESCRIPTION

The CF150 is used as an interface between a CAN controller and the physical bus. The device provides transmitting capability to the CAN controller.

The transmitter outputs C\_H and C\_L are protected against short circuits. In case of short circuit (C\_H to C\_L, C\_H to B) the protection circuit recognizes this fault condition and the transmitter output stages are disabled with a delay of max. 10 μs to prevent destruction of the IC and high consumption of supply current I\_A. If V\_C\_L > V\_C\_Lmax the transmitter output stages would be disabled immediately.

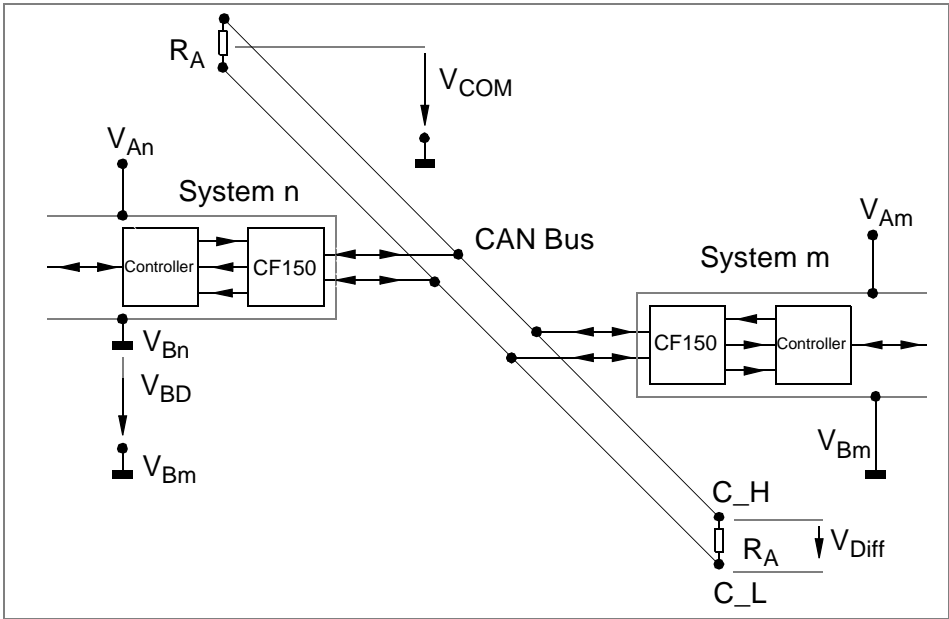
Pin ASC makes it possible to select two different modes of operation: High speed (≤500kBaud) and low speed (≤125kBaud).

The ASC pin is tied to V\_B for normal operation at ≤500kBaud. For slower speed operation at ≤125kBaud the rise and fall slope of the bus output can be decreased to reduce EMI by connecting the ASC pin to V\_A .

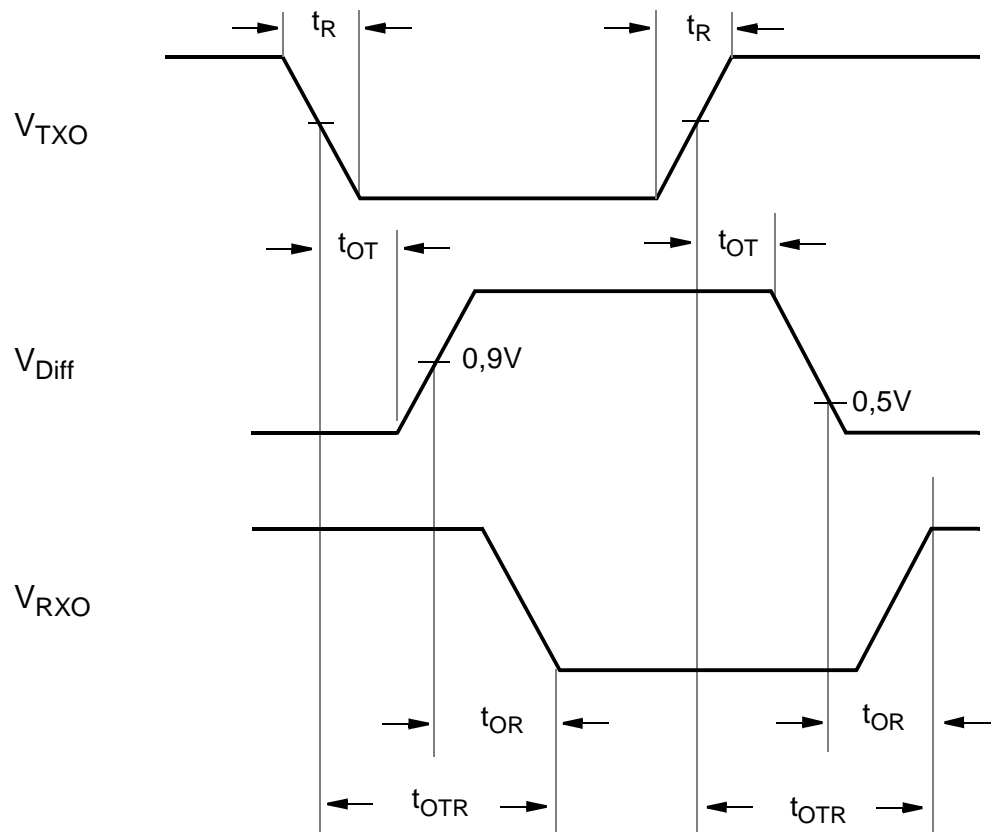
FUNCTIONAL TABLE

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

APPLICATION NOTE

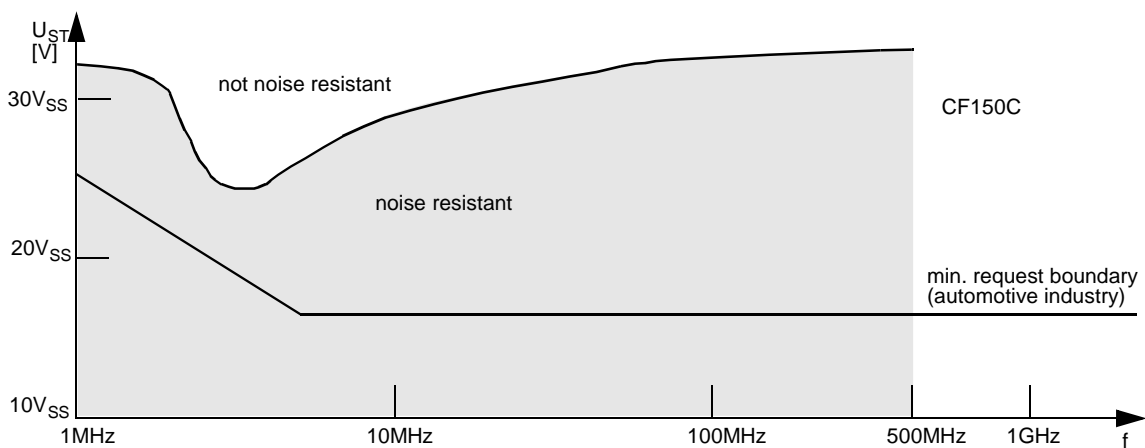
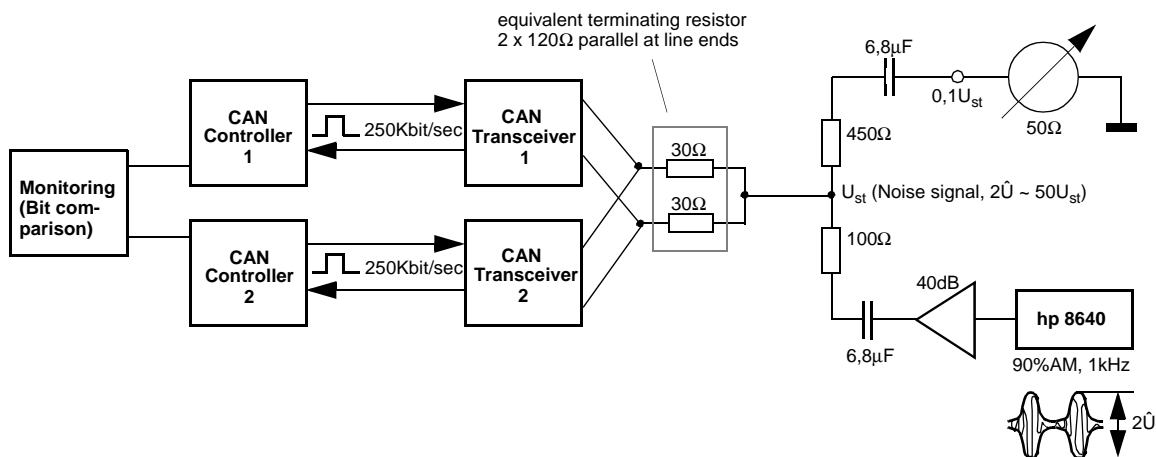


## TIMING DIAGRAM



## APPENDIX

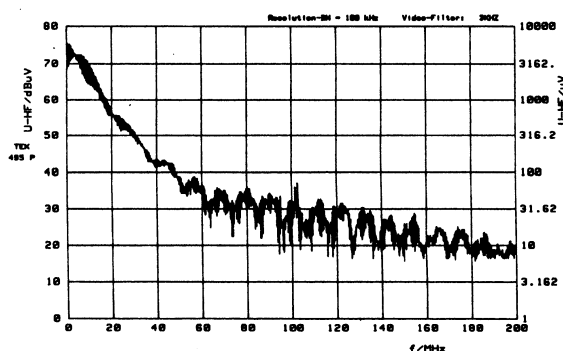
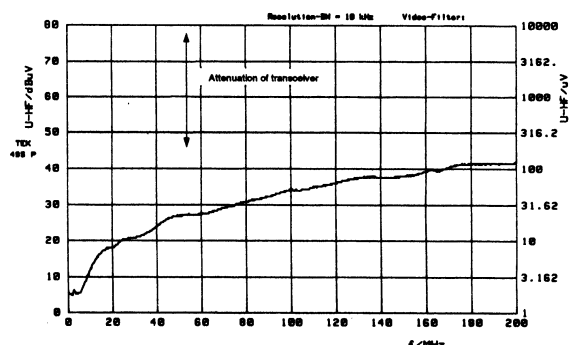
### EMC PERFORMANCE OF CF150C (RECEIVER)\*



\*) Typical behavior, not tested

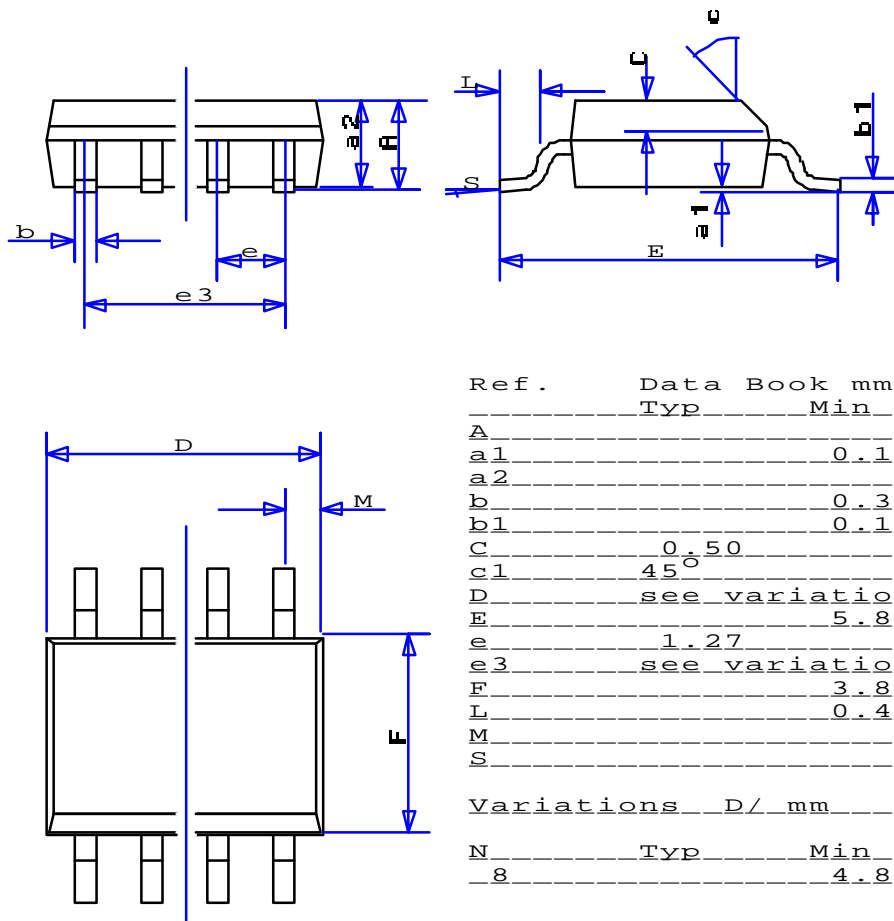


## EMC PERFORMANCE OF CF150C (TRANSMITTER)\*



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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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