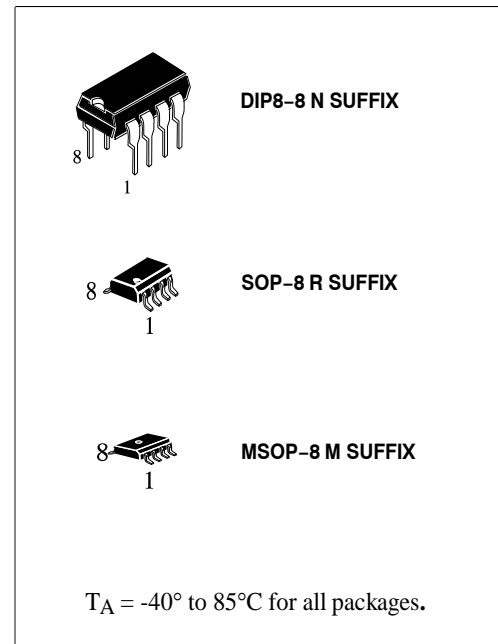


3.3V-Powered, $\pm 15\text{kV}$ ESD-Protected, 12Mbps and Slew-Rate-Limited True RS-485/RS-422 Transceivers

Functional equivalents of MAX3483/ MAX3485/ MAX3486 MAXIM (USA) - interface transceiver of the serial data of the standard RS - 485/422.-receiver) of serial data of RS - 485, RS- 422 standards with low supply voltage (3V). Microcircuit is purposed for application in low power telecom systems, that correspond to RS485, RS422 standards, level translators, transceiver units & E-field sensitive automation systems of industrial devices.

Functions and structure:

- Microcircuit contains 1 transmitter and 1 receiver of the serial data of the standards RS-485/422;
- Low dissipated power;
- One power supply voltage source $U_{CC} = (3,0 - 3,6)\text{V}$;
- Maximum data transfer rate 0.25Mbit/s(HT3483A); 12Mbit/s(HT3485A); 2,5 Mbit/s (HT3486A);
- Temperature range $-40 \dots + 85 \text{ }^\circ\text{C}$;
- Enhanced ESD Specifications:
 - 15kV IEC61000-4-2 Air Discharge
 - 8kV IEC61000-4-2 Contact Discharge
- Latch current not less than 300 mA for normal climatic conditions and supply voltage 3,3 V.



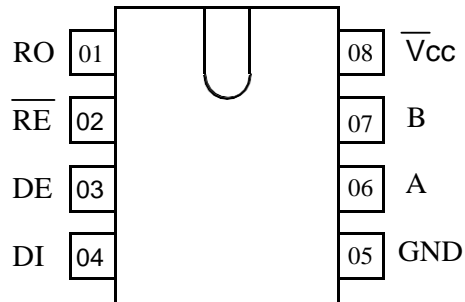


Fig. 2 – Pin configuration

Table 1 – Pin description

Pin number	Symbol	Description
01	RO	Receiver output
02	\overline{RE}	Receiver output enable pin
03	DE	Transmitter output enable pin
04	DI	Transmitter input
05	GND	Common pin
06	A	Receiver/transmitter uncomplemented I/O pin
07	\overline{B}	Receiver/transmitter complemented I/O pin
08	V_{CC}	Supply voltage pin

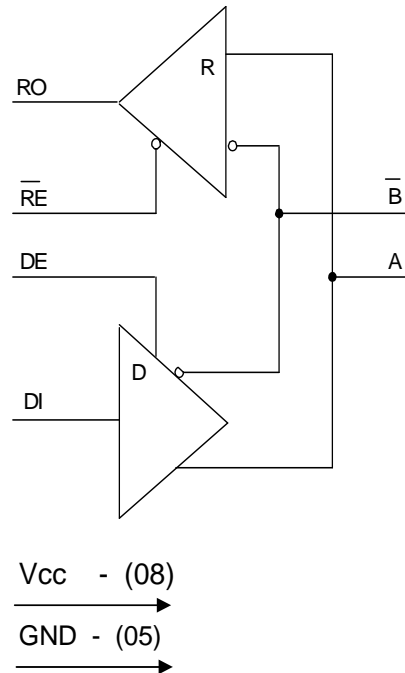


Fig. 3 – Block diagram

Table 2 – Transmitter truth table

Inputs			Outputs	
RE	DE	DI	\bar{B}	A
H or L	H	H	L	H
H or L	H	L	H	L
L	L	H or L	«OFF» state	«OFF» state
H*	L*	H or L	«OFF» state	«OFF» state

Note - H – high level voltage;
 L – low level voltage.

* Shout-down mode

Table 3 – Receiver truth table

Inputs			Output
RE	DE	A-B	RO
L	L	$\geq +0,2 V$	H
L	L	$\leq -0,2 V$	L
L	L	Input not used	H
H*	L*	H or L	«OFF» state

Note - H – high level voltage;
 L – low level voltage.

* Shout-down mode

Table 4 – Absolute maximum ratings

Symbol	Parameter	Norm		Unit
		Min	Max	
U_{CC}	Supply voltage	-	7,0	V
U_I	DI, DE, \overline{RE} pins input voltage	-0,3	7,0	V
U_{OD}	Voltage applied to transmitter output	-7,5	12,5	V
U_{RIN}	Receiver input voltage	-7,5	12,5	V
U_{OR}	Voltage applied to receiver output	-0,3	$U_{CC}+0,3$	V

Table 5 – Recommended operating mode

Symbol	Parameter	Norm		Unit
		Min	Max	
U_{CC}	Supply voltage	3,0	3,6	V
U_{IL}	DI, DE, \overline{RE} pins low level input voltage	0	0,8	V
U_{IH}	DI, DE, \overline{RE} pins high level input voltage	2,0	U_{CC}	V
U_{OD}	Voltage applied to transmitter output	-7,0	12,0	V
U_{RIN}	Receiver input voltage	-7,0	12,0	V
U_{OR}	Voltage applied to receiver output	0	U_{CC}	V
U_{TH}	Receiver differential threshold voltage	-0,2	0,2	V

Table 6 – Electric parameters

Symbol	Parameter	Mode of measurement	Norm		T _A , °C	Unit
			Min	Max		
I _{ILL}	Low level input leakage current	U _{DE} =U _{DI} =U _{RE} =0V U _{CC} = 3,6 V	-	-0,2 -2,0	25 ± 10 -40; 85	uA
I _{ILH}	High level input leakage current	U _{DE} =U _{DI} =U _{RE} = U _{CC} U _{CC} = 3,6 V	-	0,2 2,0	25 ± 10 -40; 85	uA
I _{CC}	Supply current	U _{RE} = 0 V or U _{CC} U _{DI} = 0 V or U _{CC} U _{DE} = U _{CC} U _{CC} = 3,6 V	-	1,9 2,2	25 ± 10 -40; 85	mA
		U _{RE} = 0 V U _{DI} = 0 V or U _{CC} U _{DE} = 0 U _{CC} = 3,6 V	-	1,6 1,9	25 ± 10 -40; 85	
I _{SHDN}	Shutdown mode supply current	U _{DE} = 0 U _{RE} = U _{CC} U _{DI} = 0 V or U _{CC} U _{CC} = 3,6 V	-	0,7 1,0	25 ± 10 -40; 85	uA
t _{SHDN}	Time of transition to low power consumption mode	U _{CC} = 3,3 V	80	300	25 ± 10	ns
Receiver parameters						
U _{OL}	Low level output voltage	U _{ID} =U _{TH} =-190 mV I _{OL} = 2,5 mA	-	0,36	25 ± 10	V
		U _{ID} =U _{TH} =-200 mV I _{OL} = 2,5 mA		0,40	-40; 85	
U _{OH}	High level output voltage	U _{ID} = U _{TH} =190 mV I _{OH} = - 1,5 mA	U _{CC} -0,4	-	25 ± 10	V
		U _{ID} = U _{TH} =200 mV I _{OH} = - 1,5 mA			-40; 85	
R _{IN}	Receiver input resistance	- 7 V ≤ U _{RIN} ≤ 12 V	12	-	25±10; -40; 85	k [∧]
I _{IN2}	Input current	U _{RIN} =12V	U _{DE} =0V U _{CC} =3,6V	0,95	25 ± 10	mA
		U _{RIN} = -7V		-0,7		
		U _{RIN} =12V		1,0		
		U _{RIN} = -7V		-0,8		
I _{OZLR}	Low level output current for "OFF" state	U _{OR} = 0 V U _{CC} =3,6 V	-	-0,5 -1,0	25 ± 10 -40; 85	uA
I _{OZHR}	High level output current for "OFF" state	U _{OR} = U _{CC} U _{CC} =3,6 V	-	0,5 1,0	25 ± 10 -40; 85	uA
I _{OSHR}	High level short circuit output current	U _{IH} = 3,0 V; U _{IL} = 0 V U _{OR} =3,6V; U _{CC} =3,6V	9,0 8,0	50 60	25 ± 10 -40; 85	mA
I _{OSLR}	Low level short circuit output current	U _{IH} = 3,0 V; U _{IL} = 0 V U _{OR} = 0 V; U _{CC} = 3,6 V	-9,0 -8,0	-50 -60	25 ± 10 -40; 85	mA

Operation description

The microcircuit consist of two main units: transmitter and receiver. Inputs of the receiver are connected to outputs of the transmitter that provides a half-duplex mode data transfer. The microcircuit provide function of switching to shutdown mode with consumption current not more 1 uA.

Switching to shutdown mode performed at simultaneous transition of the receiver and the transmitter to the third state after certain hold time which provides dynamic noise immunity.

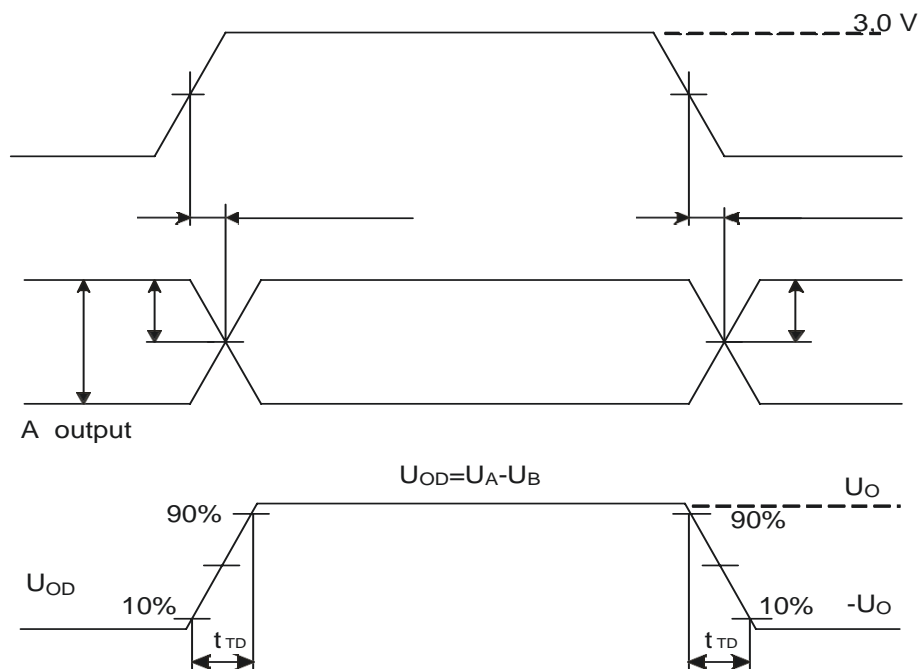
RS-485/422 transmitter

CMOS/TTL levels signals come to transmitter input DI, splitted inside the microcircuit on complement and uncomplemented, converted to RS-485/422 standard levels, after that signals transmitted in a long line through output ports with high load capacity. The differential signal has high level of noise immunity on background of common-mode interference that provides high reliability in a mode of signal transmitting in a long line. The microcircuit has some levels of protection against a overload of the power output stage for case of occurrence of a strong disturbance in a line. At voltage increase in a line load capacity of the output stage of the transmitter is reduced.

RS-485/422 receiver

The receiver processes reverse conversion of RS-485/422 levels to CMOS/TTL levels. The minimum differential input voltage of the receiver is + 200 mV for bias voltage range -7 ... +12V , simulating an in-phase component of a noise in a line. In a limiting (extrime) mode the level of an inphase noise changes in a range -8 ... +12,5 V. Operation stability of the microcircuit in case of receiving from a line signals with flat fronts is provided by a 40 - 70 mV hysteresis. According to requirements of standard RS-485/422 the input impedance of the receiver is not more than 12 k Ω . At absence of a signal on a differential input of the receiver the output of the receiver is switched in the state corresponding to a level of logical one.

Fig. 4, 5 display time diagrams of the microcircuit operating.



U_{OD} – differential output voltage on condition U_A low level
 $-U_{OD}$ – differential output voltage on condition U_A high level

Fig. 4 – Transmitter I/O signals time diagram

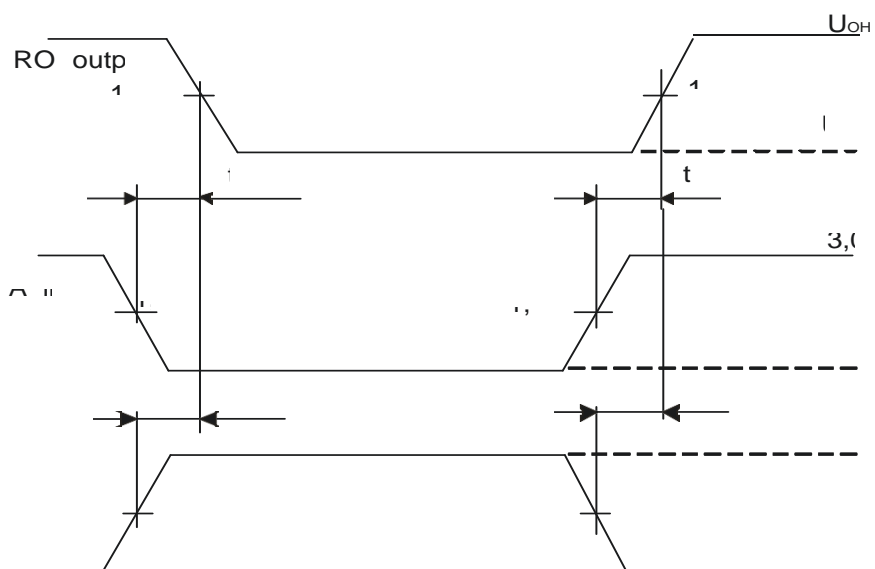


Fig. 5 – Receiver I/O signals time diagram

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