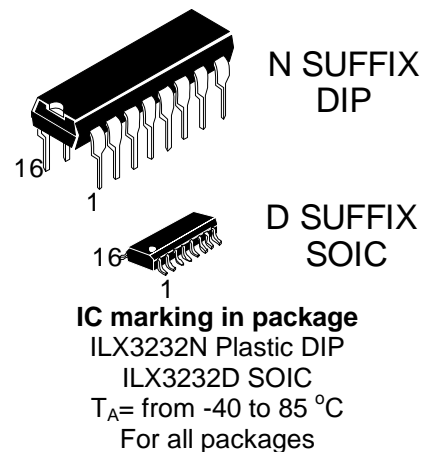


**MICROCIRCUIT ILX3232N, ILX3232D INTERFACE TRANSCEIVER
OF THE SERIAL DATA OF THE STANDARD RS -232
(compatible to MAX3232 (MAXIM USA))**

Microcircuits ILX3232 is interface transceiver of serial data under RS - 232 standard with single power supply source & bipolar output voltage of transmitter, forming by build-in voltage multiplier on 4 external capacities, 0.1 μ F. ILX3232 correspond to EIA/TIA-232E, V.28 standard and is purposed for application in modern high efficient calculating systems with the wide range of supply voltage, fast-operating electronic devices with high level of fidelity of information exchange among distant devices.



Functions and structure:

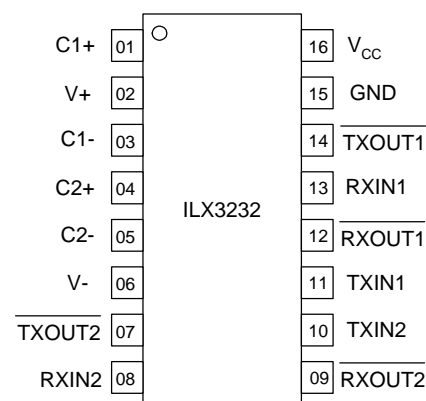
- Microcircuit contains 2 transmitters and 2 receivers of the serial data of the standard RS-232.
- The microcircuit supply voltage range is from 3.0 to 5.5 V.
- The microcircuits is available in 16-pin DIP-package (MS-001BB). 16-pin SO-package (MS-012AC).

Truth Table

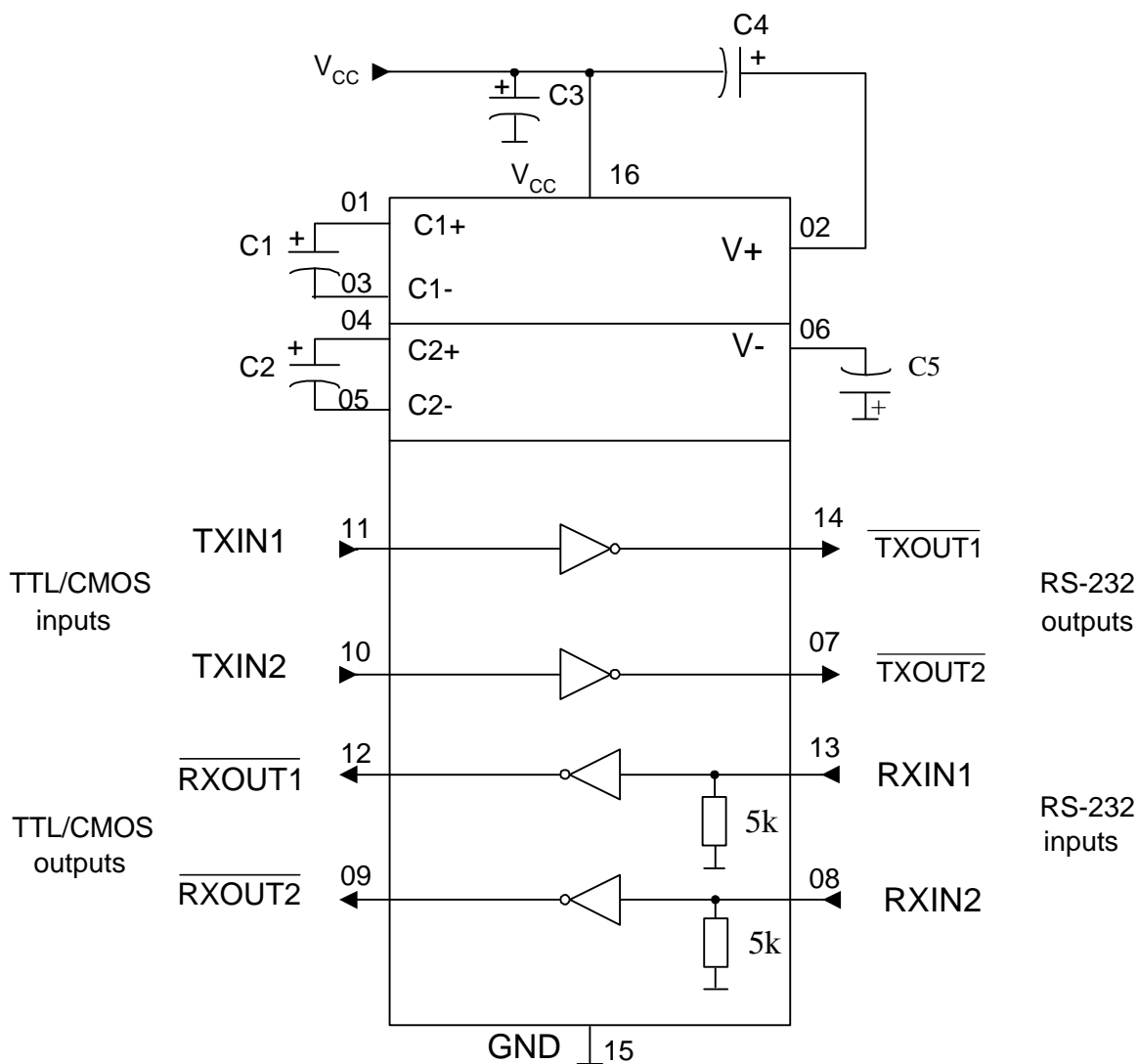
Input	Output
RXIN, TXIN	$\overline{\text{RXOUT}}, \overline{\text{TXOUT}}$
H	L
L	H

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

Pinning



Functional diagram



C1 – capacitor 0.1 $\mu\text{F} \pm 10\%$ for $U_{CC} = 3.3\text{ V} \pm 10\%$ (0.047 $\mu\text{F} \pm 10\%$ for $U_{CC} = 5.0\text{ V} \pm 10\%$)

C2, C4, C5– capacitors 0.1 $\mu\text{F} \pm 10\%$ for $U_{CC} = 3.3\text{ V} \pm 10\%$ (0.33 $\mu\text{F} \pm 10\%$ for $U_{CC} = 5.0\text{ V} \pm 10\%$)

C3 – capacitor 0.1 $\mu\text{F} \pm 10\%$

Pin description table

Pin number	Pin description	Symbol
01	Positive terminal of the voltage multiplier charge-pump capacitor	C1+
02	Positive voltage multiplier output	V+
03	Negative terminal of the voltage multiplier charge-pump capacitor	C1-
04	Positive terminal of the voltage multiplier charge-pump capacitor	C2+
05	Negative terminal of the voltage multiplier charge-pump capacitor	C2-
06	Negative voltage multiplier output	V-
07	Transmitter output (RS-232 levels)	$\overline{\text{TXOUT2}}$
08	Receiver input (RS-232 levels)	RXIN2
09	Receiver output (TTL/CMOS levels)	$\overline{\text{RXOUT2}}$
10	Transmitter input (TTL/CMOS levels)	TXIN2
11	Transmitter input (TTL/CMOS levels)	TXIN1
12	Receiver output (TTL/CMOS levels)	$\overline{\text{RXOUT1}}$
13	Receiver input (RS-232 levels)	RXIN1
14	Transmitter output (RS-232 levels)	$\overline{\text{TXOUT1}}$
15	Common pin	GND
16	Supply voltage	V _{CC}

Maximum Ratings & Recommended Operating Conditions

Parameter, unit	Symbol	Recommended operating conditions		Maximum rate	
		min	max	min	max
Supply voltage, V	U _{CC}	3.0	5.5	-0.3	6.0
Voltage applied to transmitter output, V	U _{OT}	–	–	-13.2	13.2
Multiplier positive output voltage, V	U ₊	5.0	–	-0.3	7.0
Multiplier negative output voltage, V	U ₋	-5.0	–	-7.0	0.3
Receiver input voltage, V	U _{IR}	-25	25	-25	25
Receiver output voltage, V	U _{OR}	–	–	-0.3	U _{CC} +0.3
Transmitter low level input voltage, V	U _{IL}	0	0.8	-0.3	–
Transmitter high level input voltage, V	U _{IH}	2.0 (U _{CC} =3.3 V)	U _{CC}	–	6
		2.4 (U _{CC} =5.0 V)			
Multiplier outputs voltages difference, V	U ₊ + U ₋	–	–	–	13
Receiver low level threshold input voltage, V	U _{ITL}	0.6 (U _{CC} =3.3 V)	–	–	–
		0.8 (U _{CC} =5.0 V)			
Receiver high level threshold input voltage, V	U _{ITH}	–	2.4	–	–

Electric parameters

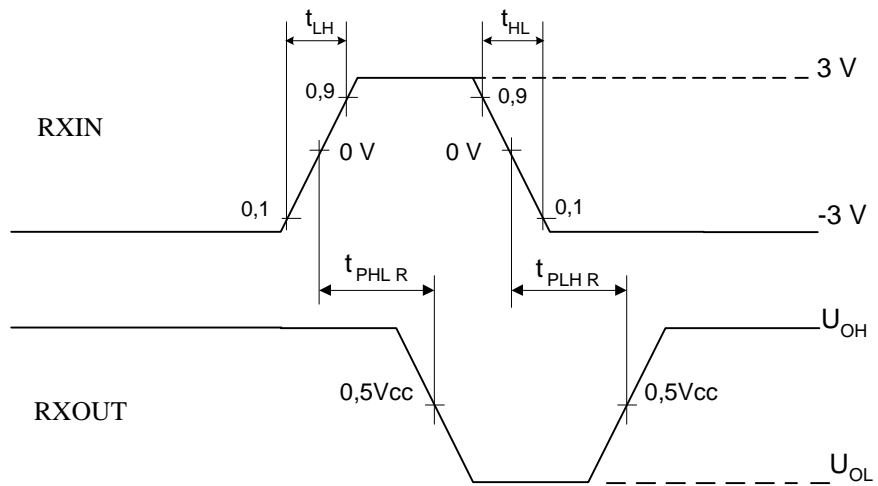
Parameter, unit	Symbol	Norm		Mode	T _A , °C
		Min	Max		
Supply current, μA	I _{CC1}	-	1.0 1.4	U _{CC} = 3.3 V; 5.0 V; U _{IL} = 0 V	25±10 -40; 85
Receiver					
Low level output voltage, V	U _{OLR}	-	0.3	U _{CC} = 3.3V ±10%; U _{ITH} = 2.4V; I _{OL} = 1.6 mA	25±10
			0.4		-40; 85
			0.3	U _{CC} = 5.0V ±10%; U _{ITH} = 2.4V; I _{OL} = 1.6 mA	25±10
			0.4		-40; 85
High level output voltage, V	U _{OHR1}	-	2.5	U _{CC} = 3.3V ±10%; U _{ITL} = 0.6 V; I _{OH} = -1.0 mA	25±10
			2.4		-40; 85
	U _{OHR2}		4.0	U _{CC} = 5.0V ±10%; U _{ITL} = 0.8 V; I _{OH} = -1.0 mA	25±10
			3.9		-40; 85
Receiver hysteresis, V	U _{hR}	0.2	1.0	U _{CC} = 3.3 V ± 10%; 5.0 V ± 10%	25±10
Input resistance, kOhm	R _I	3	7	-	25±10
OFF-ON switching propagation delay, ns	t _{PHLR} , t _{PLHR}	-	1500	U _{CC} = 5.0V ±10 %; C _L = 150 pF; U _{IL} = 0 V; U _{IH} = 3.0 V; t _{LH} = t _{HL} ≤ 10 ns	
Propagation delays difference, ns	t _{SKD}	-	600		
Transmitter					
Low level output voltage, V	U _{OLT1}	-	-5.07	U _{CC} =3.3V ±10%; U _{IH} = 2.0V; R _L = 3 kOhm	25±10
			-5.0		-40; 85
	U _{OLT2}		-5.07	U _{CC} =5.0V ±10%; U _{IH} = 2.4V; R _L = 3 kOhm	25±10
			-5.0		-40; 85
High level output voltage, V	U _{OHT}	-	5.07	U _{CC} =3.3V ±10%; U _{IL} = 0.8V; R _L = kOhm	25±10
			5.0		-40; 85
			5.07	U _{CC} =5.0V ±10%; U _{IL} = 0.8V; R _L = kOhm	25±10
			5.0		-40; 85
Transmitter hysteresis, V	U _{hT}	0.1	1.0	U _{CC} = 3.3 V ± 10%; 5.0 V ± 10%	25±10
Low level input leakage current, μA	I _{ILL}	-	-0.5	U _{CC} = 5.5 V; U _{IL} = 0V	25±10
			-1.0		-40; 85
High level input leakage current, μA	I _{ILH}	-	0.5	U _{CC} = 5.5 V; U _{IH} = 5.5V	25±10
			1.0		-40; 85
Output resistance, Ohm	R _O	-	350	U _{CC} = U _{V+} * = U _{V-} * = 0 V; U _O = ±2 V	25±10
			300		-40; 85

Electric parameters

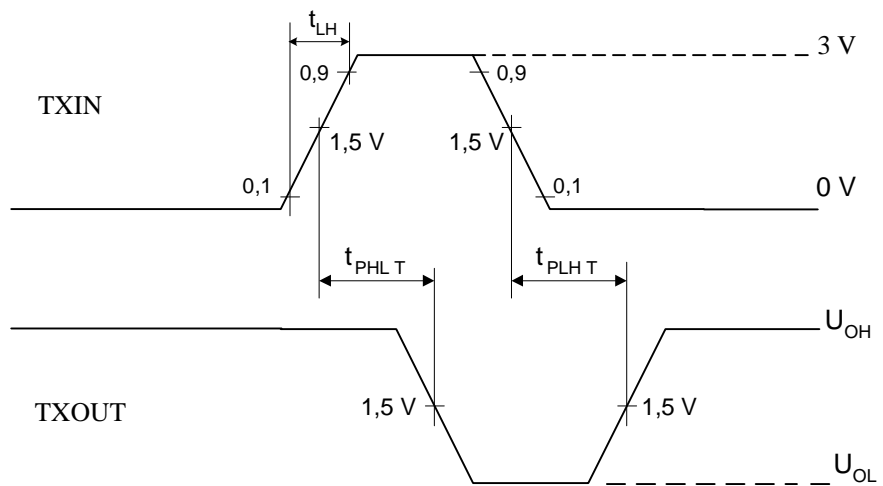
Parameter, unit	Symbol	Norm		Mode	T _A , °C
		Min	Max		
Transmitter					
Short circuit current, mA	I _{OS}	-	53	U _{CC} = 3.6 V	25±10
			60		-40; 85
			-53	U _{CC} = 3.6 V	25±10
			-60		-40; 85
			53	U _{CC} = 5.5 V	25±10
			60		-40; 85
			-53	U _{CC} = 5.5 V	25±10
			-60		-40; 85
Low level output current for OFF-state, µA	I _{OZLT}	-	-10 -25	U _{CC} = 0V; U _O = -12 V; transmitter output is disabled	25±10 -40; 85
High level output current for OFF-state, µA	I _{OZHT}	-	10 25	U _{CC} = 0V; U _O = 12 V; transmitter output is disabled	25±10 -40; 85
Maximum Data Rate, Kbit/s	ST	140	-	R _L = 3 kOhm; C _L = 1000 pF	25±10
		120			-40÷85
Transition-Region Slew Rate, V/µs	SR	6	30	U _{CC} = 3.3 V; R _L = (3-7) kOhm; U _{OT} is from +3 to -3 V or from -3 to +3 V; C _L = (150-1000) pF	25±10
		4	30	U _{CC} = 3.3 V; R _L = (3-7) kOhm; U _{OT} is from +3 to -3 V or from -3 to +3 V; C _L = (150-2500) pF	
Propagation delays difference, ns	t _{SKREW}	-	600	U _{CC} = 5.0V ±10 %; U _{IL} = 0 V; U _{IH} = 3.0 V; t _{LH} = t _{HL} ≤ 10 ns; R _L =3 kOhm; C _L =1000 pF	

* U_{V+}, U_{V-} - voltages applied to pins 02 , 06.

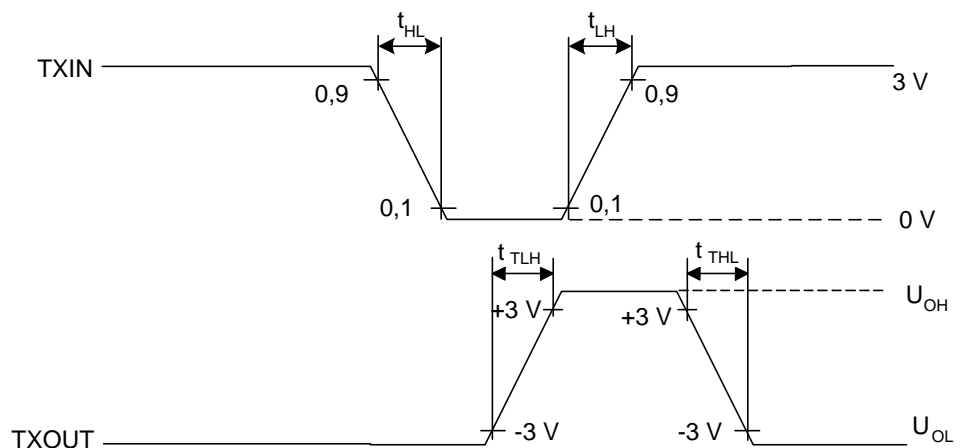
Note – Electric parameters is indicated for C1=0.047 µF, C2-C4 = 0.33 µF & U_{CC} = 5.0 V±10 %
(or C1-C4 = 0.1 µF & U_{CC} = 3.3 V±10 %)



Receiver output & input signals time diagram

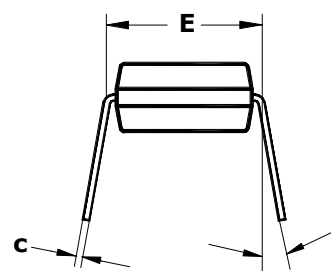
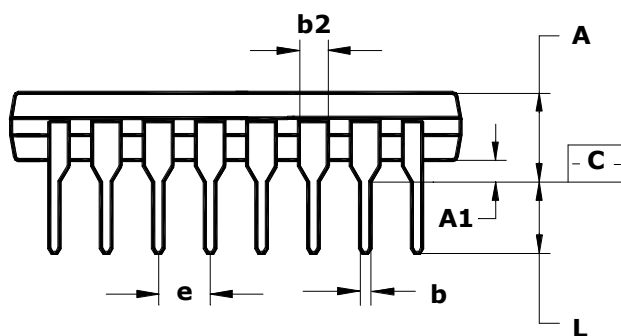
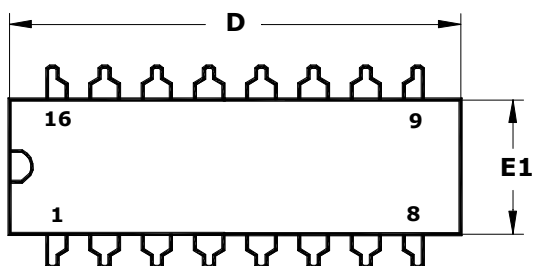


Transmitter output & input signals time diagram



Transmitter output & input signals time diagram

Package Dimensions
DIP-package MS-001BB

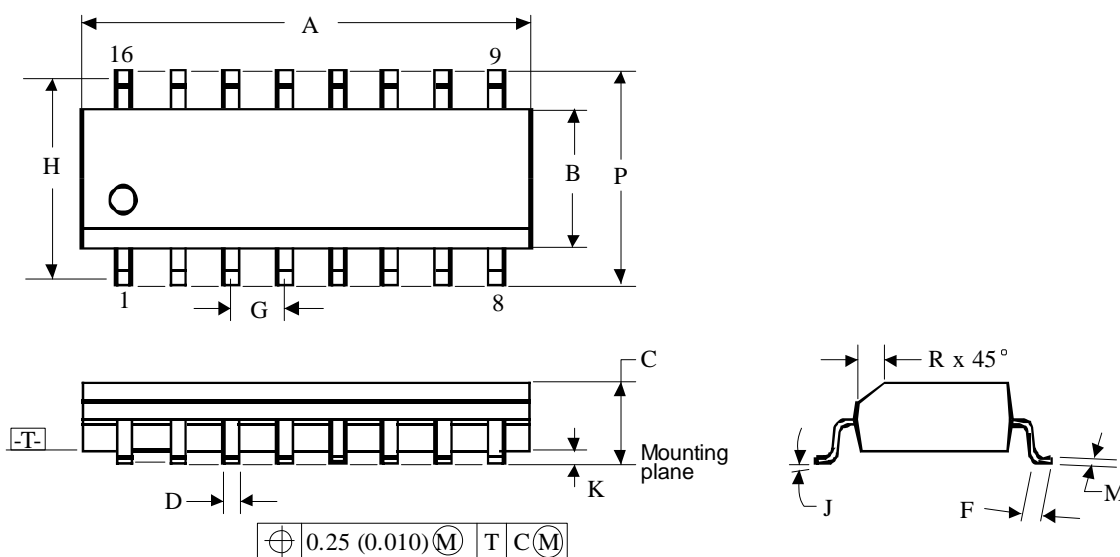


⊕ 0,25 (0,010) (M) C

Note - Dimensions D, E1 do not include the fin value, which should not exceed 0.25 mm (0.010) per side.

	D	E1	A	b	b2	e	α	L	E	c	A1
mm											
min	18.93	6.07	—	0.36	1.14	2.54	0°	2.93	7.62	0.20	0.38
max	19.43	7.11	5.33	0.56	1.78		15°	3.81	8.26	0.36	—
Inches											
min	0.355	0.240	—	0.014	0.045	0.1	0°	0.115	0.300	0.008	0.015
max	0.400	0.280	0.210	0.022	0.070		15°	0.150	0.325	0.014	—

Package Dimensions
SO-package MS-012AC



<p>Note:</p> <p>1. Dimensional sizes A and B are preset without consideration of fin and the metal bulges.</p> <p>2. Availability of the fin and the metal bulges for A – up to 0.15 mm (0.006) per side; for B – up to 0.25 mm (0.010) per side.</p>	<p>Identifi- cation</p>	<p>Sizes, mm</p>	
		<p>MIN</p>	<p>MAX</p>
	A	9.80	10.0
	B	3.80	4.00
	C	1.35	1.75
	D	0.33	0.51
	F	0.40	1.27
	G	1.27	
	H	5.72	
	J	0°	8°
	K	0.10	0.25
	M	0.19	0.25
P	5.80	6.20	
R	0.25	0.50	