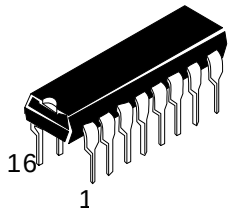
MICROCIRCUIT ILX3226N INTERFACE TRANSCEIVER OF THE SERIAL DATA OF THE STANDARD RS -232

(compatible to MAX3226 (MAXIM USA)

Microcircuits ILX3226 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 µF. ILX3226 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.



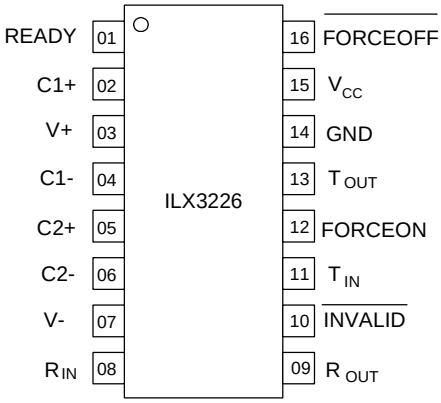
N SUFFIX
DIP

IC marking in package
ILX3226N Plastic DIP
T_A= from -40 to 85 °C

Functions and structure:

- Microcircuit contains 1 transmitter and 1 receivers of the serial data of the standard RS-232.
- AutoShutdown function provide low power consumption.
- The microcircuit supply voltage range is from 3.0 to 5.5 V.
- The microcircuits is available in 16-pin DIP-package (MS-001BB).

Pinning



Truth table

Mode	Inputs				Outputs		
	FORCEON	$\overline{\text{FORCEOFF}}$	R_{IN}	T_{IN}	R_{OUT}	T_{OUT}	**READY**
Low power consumption data receiving (without Autoshutdown function)	X	L	L	X	H	Z	L
	X	L	H	X	L	Z	L
Data transfer (without Autoshutdown function)	H	H	L	L	H	H	H
	H	H	L	H	H	L	H
	H	H	H	L	L	H	H
	H	H	H	H	L	L	H
Data transfer & receiving (with Autoshutdown function)	L	H	L1	L1	H	H	H
	L	H	L1	H1	H	L	H
	L	H	H1	L1	L	H	H
	L	H	H1	H1	L	L	H
Low power consumption (with Autoshutdown function)	L	H	ND_H	ND	L	Z	L
	L	H	ND_L	ND	H	Z	L

Mode	Inputs				Outputs		
	FORCEON	$\overline{\text{FORCEOFF}}$	R_{IN}	T_{IN}	R_{OUT}	T_{OUT}	**READY**
Data transfer & receiving	$\overline{\text{INVALID}}$ *	H	L	L	H	H	H
	$\overline{\text{INVALID}}$ *	H	L	H	H	L	H
	$\overline{\text{INVALID}}$ *	H	H	L	L	H	H
	$\overline{\text{INVALID}}$ *	H	H	H	L	L	H
	$\overline{\text{INVALID}}$ *	H	L_{INVL}	L1	H	H	H
	$\overline{\text{INVALID}}$ *	H	L_{INVL}	H1	H	L	H
	$\overline{\text{INVALID}}$ *	H	H/L	ND_L	L/H	H	H
	$\overline{\text{INVALID}}$ *	H	L/H	ND_H	H/L	L	H
Low power consumption	$\overline{\text{INVALID}}$ *	H	L_{INVL}	ND	H	Z	L
Data transfer & receiving	$\overline{\text{INVALID}}$ *	$\overline{\text{INVALID}}$ **	L	L	H	H	H
	$\overline{\text{INVALID}}$ *	$\overline{\text{INVALID}}$ **	L	H	H	L	H
	$\overline{\text{INVALID}}$ *	$\overline{\text{INVALID}}$ **	H	L	L	H	H
	$\overline{\text{INVALID}}$ *	$\overline{\text{INVALID}}$ **	H	H	L	L	H
Low power consumption	$\overline{\text{INVALID}}$ *	$\overline{\text{INVALID}}$ **	L_{INVL}	X	H	Z	L

Note
- H – high level;
- L – low level;
- X – any level (H or L);
- L1, H1 –Low & high levels after data changed with duration not more than $t_{AUTOSHDN}$;
- L_{INVL} – low level signal not less – 0.3 V & not more 0.3 V with duration not less than t_{PHLINV};
- ND – defined level signal (L or H) with duration not less $t_{AUTOSHDN}$;
- ND_L – low level L with duration not less $t_{AUTOSHDN}$;
- ND_H – high level H with duration not less $t_{AUTOSHDN}$;
- Z – third state of output

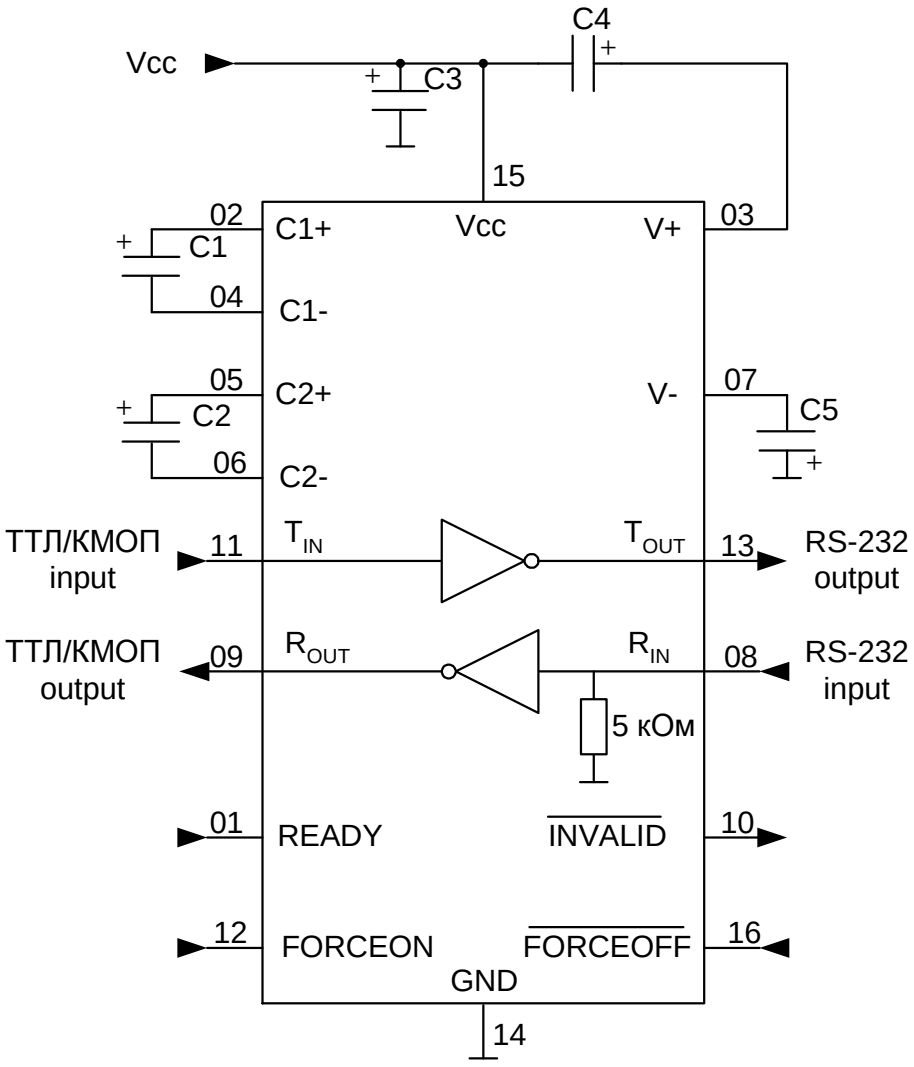
* $\overline{\text{INVALID}}$ is connected to FORCEON.

** $\overline{\text{INVALID}}$ is connected to FORCEON & $\overline{\text{FORCEOFF}}$

Truth table for $\overline{\text{INVALID}}$ pin

R_{IN}	$\overline{\text{INVALID}}$
L	H
H	H
L_{INVL}	L

Functional diagram



C1 – capacitor 0.1 µF ± 10 % for U_{CC} = 3.3 V ± 10% (0.047 µF ± 10 % for U_{CC} = 5.0 V ± 10%)

C2, C4, C5– capacitors 0.1 µF ± 10 % for U_{CC} = 3.3 V ± 10% (0.33 µF ± 10 % for U_{CC} = 5.0 V ± 10%)

C3 – capacitor 0.1 µF ± 10 %

Pin description table

Pin number	Symbol	Pin description
01	READY	Control input (for mode selection)
02	C1+	Positive terminal of the voltage multiplier charge-pump capacitor
03	V+	Positive voltage multiplier output
04	C1-	Negative terminal of the voltage multiplier charge-pump capacitor
05	C2+	Positive terminal of the voltage multiplier charge-pump capacitor
06	C2-	Negative terminal of the voltage multiplier charge-pump capacitor
07	V-	Negative voltage multiplier output
08	R_{IN}	RS-232 Receiver data inputs
09	R_{OUT}	TTL/CMOS Receiver data output
10	$\overline{\text{INVALID}}$	Output of the valid signal detector. Indicates if a valid RS-232 level is present on receiver inputs logic “1”.
11	T_{IN}	TTL/CMOS transmitter data input
12	FORCEON	Autoshutdown mode control input (enable active operation of the IC)
13	T_{OUT}	RS-232 transmitter data outputs
14	GND	Common pin
15	Vcc	Supply voltage
16	$\overline{\text{FORCEOFF}}$	Autoshutdown mode control input (switch the IC to low power consumption mode)

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	Ucc+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 (Ucc=3.3 V)	Ucc	–	6
		2.4 (Ucc=5.0 V)			
Multiplier outputs voltages difference, V	$U_+ + U_-$	–	–	–	13
Receiver low level threshold input voltage,V	U_{ITL}	0.6 (Ucc=3.3 V)	–	–	–
		0.8 (Ucc=5.0 V)			
Receiver high level threshold input voltage,V	U_{ITH}	–	2.4	–	–
Receiver threshold input voltage corresponding to low level on $\overline{\text{INVALID}}$ pin , V	U_{INVL}	-0.3	0.3	–	–
Receiver threshold input voltage corresponding to high level on $\overline{\text{INVALID}}$ pin , V	U_{INVH}	-2.7	2.7	–	–

Electric parameters

Parameter, unit	Symbol	Norm		Mode	T_A, °C
		Min	Max		
AutoShutdown mode supply current, µA	I_{CC1}	–	10	Ucc = 3.3; 5.0 V; FORCEON is connected to GND; $\overline{\text{FORCEOFF}}$ is connected to Vcc R_{IN} not connected	25±10
			14		-40; 85
Low power consumption mode supply current, µA	I_{CC2}	–	10	Ucc = 3.3; 5.0 V; $\overline{\text{FORCEOFF}}$ is connected to GND R_{IN} connected to GND	25±10
			14		-40; 85
AutoShutdown Disabled supply current, µA	I_{CC3}	–	1.0	Ucc = 3.3 V; 5.0 V; FORCEON & $\overline{\text{FORCEOFF}}$ are connected to Vcc without load	25±10
			1.4		-40; 85
Low level input leakage current, µA (for control inputs)	I_{ILL}	–	-0.5	Ucc = 5.5 V	25±10
			-1.0		-40; 85
High level input leakage current, µA (for control inputs)	I_{ILH}	–	0.5	Ucc = 5.5 V	25±10
			1.0		-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
		2.37			-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
Low level output voltage, V (for $\overline{\text{INVALID}}$ pin)	U_{OLINV}	–	0.3	U_{CC}=3.3V ±10 %; I_{OL} = 1.6 mA; U_{INVL} = 0.3 V or -0.3 V; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
			0.4		-40; 85
			0.3	U_{CC}=5.0V ±10 %; I_{OL} = 1.6 mA; U_{INVL} = 0.3 V or -0.3 V; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
			0.4		-40; 85
High level output voltage, V (for $\overline{\text{INVALID}}$ pin)	U_{OHINV1}	2.5	–	U_{CC}=3.3 V ±10 %; I_{OH}=-1.0 mA; U_{INVH} = 2.7 V or -2.7 V; FORCEON is connected to GND; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
		2.37			-40; 85
	U_{OHINV2}	4.0	–	U_{CC}=5.0V ±10%; I_{OH} = -1.0 mA; U_{INVH} = 2.7 V or -2.7 V; FORCEON is connected to GND; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
		3.9			-40; 85

Electric parameters

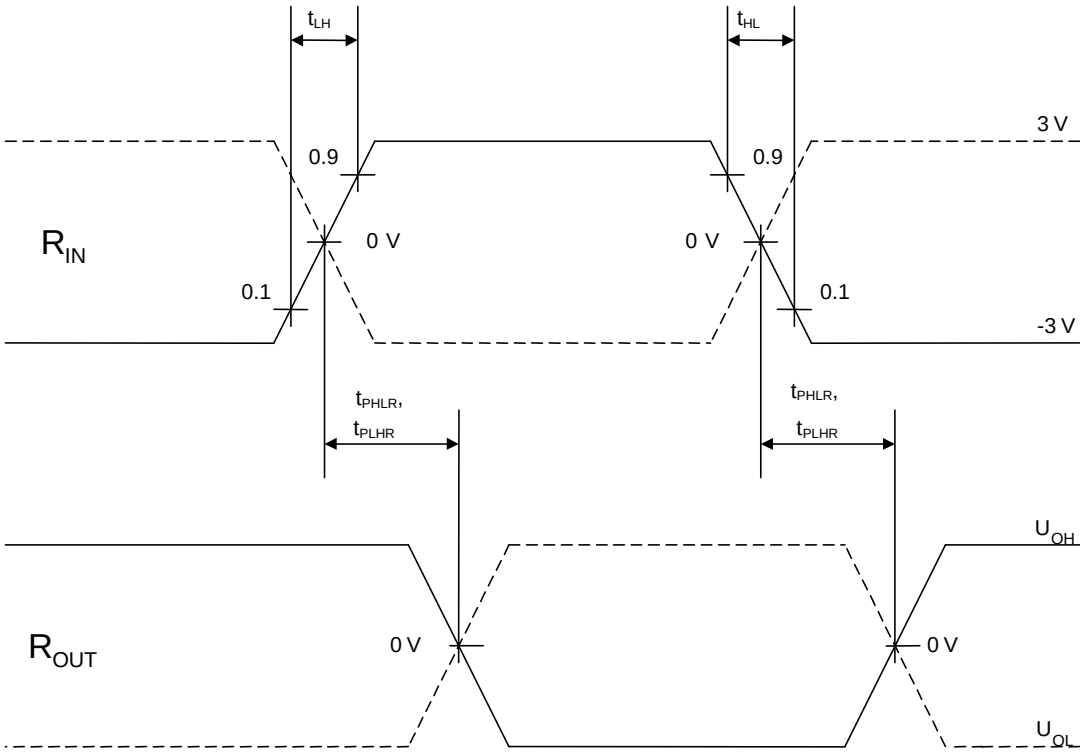
Parameter, unit	Symbol	Norm		Mode	T_A, °C
		Min	Max		
Receiver					
Low level output voltage (READY pin), V	U_{OLRE}	–	0.3	U_{CC}=3.3V ±10 %; I_{OL} = 1.6 mA; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to GND	25±10
			0.4		-40; 85
		–	0.3	U_{CC}=5.0V ±10 %; I_{OL} = 1.6 mA; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to GND	25±10
			0.4		-40; 85
High level output voltage (READY pin), V	U_{OHRE1}	2.5	–	U_{CC}=3.3V ±10 %; I_{OL} = 1.6 mA; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
		2.37			-40; 85
	U_{OHRE2}	4.0	–	U_{CC}=5.0V ±10 %; I_{OL} = 1.6 mA; FORCEON is connected to Vcc ; $\overline{\text{FORCEOFF}}$ is connected to Vcc	25±10
		3.9			-40; 85
Receiver hysteresis, V	Uh_R	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}	–	500	U_{CC} = 5.0V ±10 %; C_L = 150 pF; U_{IL} = 0 V; U_{IH} = 3.0 V; $t_{LH} = t_{HL} \leq$ 10 ns	
Propagation delays difference, ns	t_{SKD}	–	200		
Propagation delay of transition $\overline{\text{INVALID}}$ pin to low level state, µs	t_{PHLINV}	–	80	U_{CC} = 5.0V ±10 %; U_{IL} = 0; -3.0 V; U_{IH} = 3.0; 0 V; $t_{LH} = t_{HL} \leq$ 10 ns; C_L = 15 pF	
Propagation delay of transition $\overline{\text{INVALID}}$ pin to high level state, µs	t_{PLHINV}	–	2.9		
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	Uh_T	0.1	1.0	U_{CC} = 3.3 V ± 10%; 5.0 V ± 10%	25±10
Output resistance , Ohm	R_O	350	–	$U_{CC} = U_{V+}$*= U_V*- = 0 V; U_O = ±2 V	25±10
		300			-40; 85
Short circuit current, mA	I_{OS}	–	53	Ucc = 3.63 V; U_{IH} = 2.0V	25±10
			60		-40; 85
			-53	Ucc = 3.63 V; U_{IH} = 2.0V	25±10
			-60		-40; 85
			53	Ucc = 5.5 V; U_{IH} = 2.0V	25±10
			60		-40; 85
			-53	Ucc = 5.5 V; U_{IH} = 2.0V	25±10
			-60		-40; 85

Electric parameters

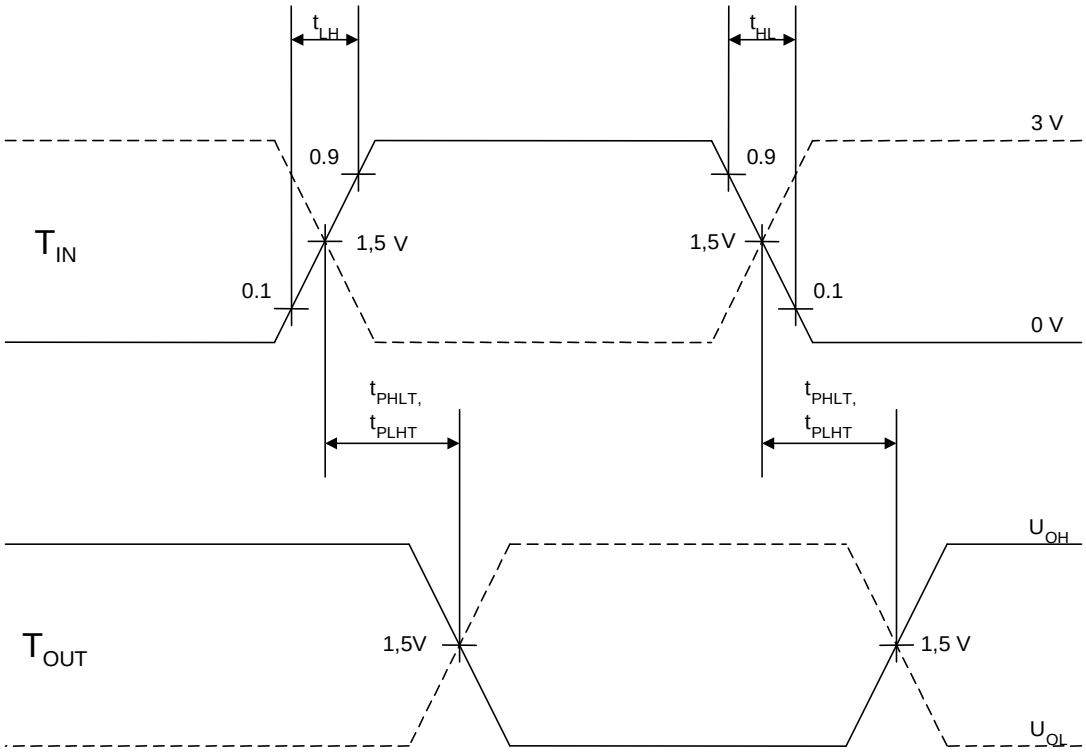
Parameter, unit	Symbol	Norm		Mode	T_A, °C
		Min	Max		
Transmitter					
Maximum Data Rate, Kbit/s	ST	250	–	R_L = 3 kOhm; C_L = 1000 pF	-40÷85
Low level output current for OFF-state, µA	I_{OZLT}	–	-10	U_{CC} = 0; 3.3; 5.5 V; U_O= -12 V; transmitter output isdisabled	25±10
			-25		-40; 85
High level output current for OFF-state, µA	I_{OZHT}	–	10	U_{CC} = 0; 3.3; 5.5 V U_O = 12 V; transmitter output isdisabled	25±10
			25		-40; 85
Transition-Region Slew Rate, V/us	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_{SKEW}	–	300	U_{CC} = 5.0V ±10 %; U_{IL} = 0 V; U_{IH} = 3.0 V; $t_{LH} = t_{HL} \leq 10$ ns; R_L=3 kOhm; C_L=1000 pF	
Transmitter output enable time, µs	t_{WU}	–	120	U_{CC} = 5.0V ±10 %; U_{IL} = 0 V; U_{IH} = 3.0 V; U_{IL} = -3.0 V; U_{IH} = 0 V	
Propagation delay of switching to low power consumption mode, s	$t_{AUTOSHDN}$	15	60	U_{CC} = 5.0V ; U_{IL} = 0 V; U_{IH} = 3.0 V	-40; 85

* U_{V+}, U_{V-} - voltages applied to pins 03 , 07.

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



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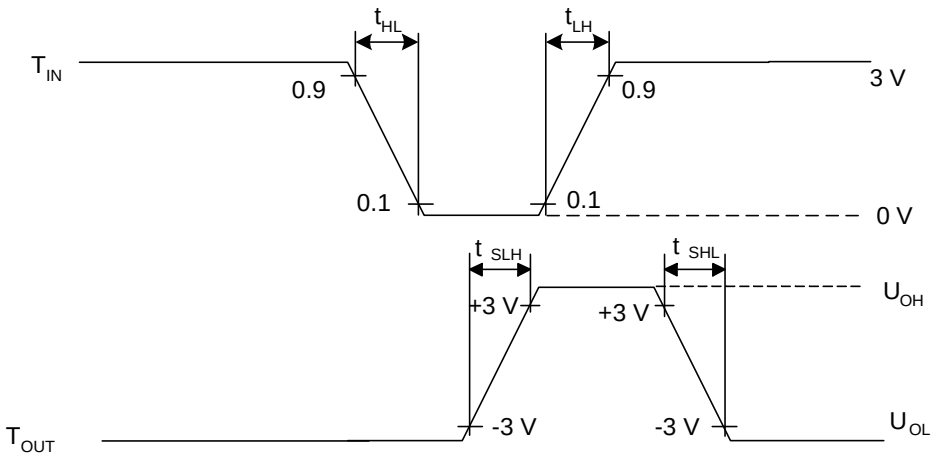

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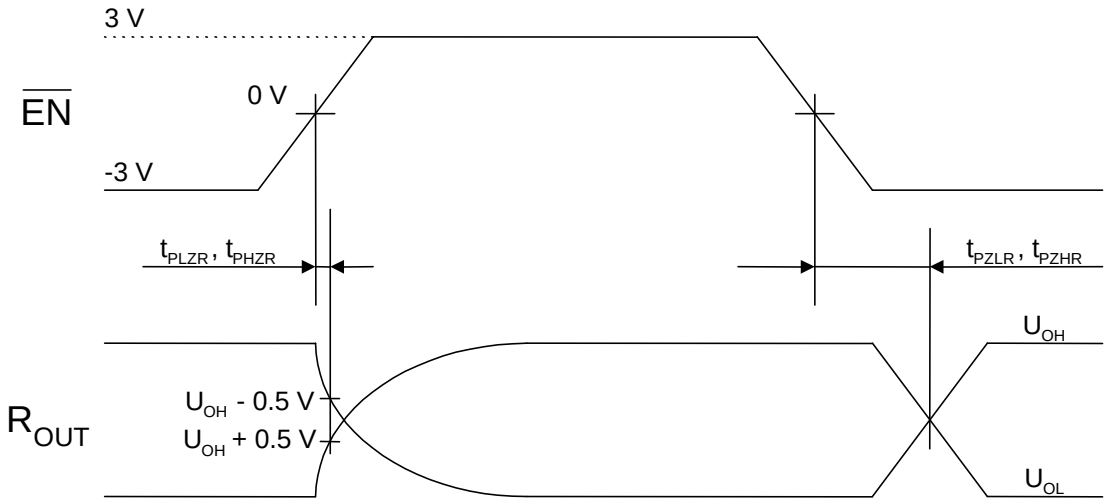
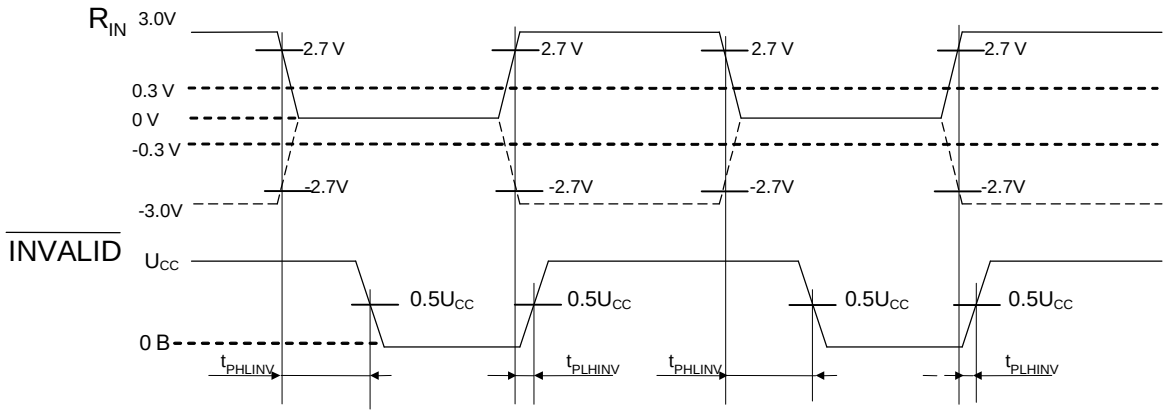
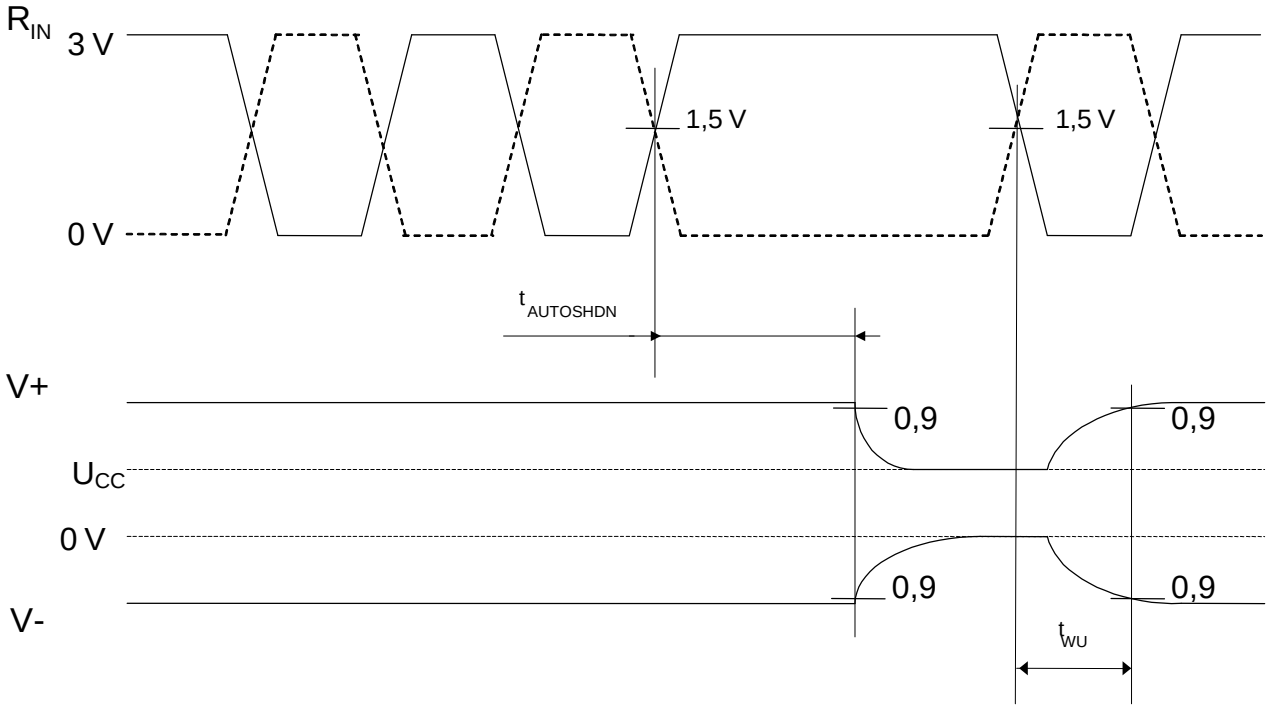


Receiver output & input signals time diagram



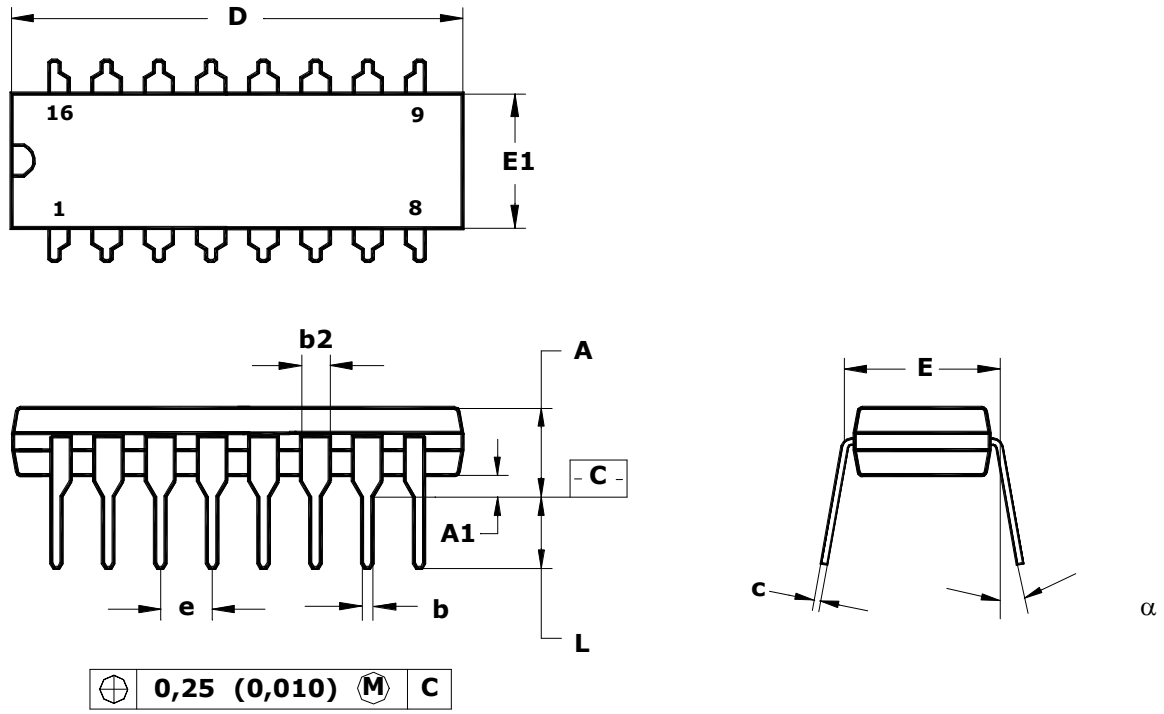
t_{PHLINV}, t_{PLHINV} dynamic parameters timing diagram



$t_{AUTOSHDN}$, t_{WU} dynamic parameters timing diagram

Package Dimensions

DIP-package MS-001BB



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	—