

74LVXC3245

8-Bit Dual Supply Configurable Voltage Interface Transceiver with TRI-STATE® Outputs for 3V System

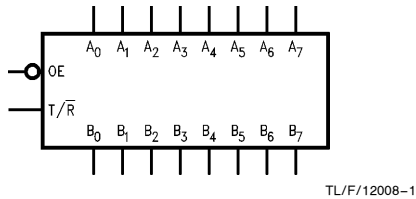
General Description

The LVXC3245 is a 24-pin dual-supply, 8-bit configurable voltage interface transceiver suited for PCMCIA and other real time configurable I/O applications. The V_{CCA} pin accepts a 3V supply level. The A port is a dedicated 3V port. The V_{CCB} pin accepts a 3V-to-5V supply level. The B port is configured to track the V_{CCB} supply level respectively. A 5V level on the V_{CC} pin will configure the I/O pins at a 5V level and a 3V V_{CC} will configure the I/O pins at a 3V level. The A port should interface with a 3V host system and the B port to the card slots. This device will allow the V_{CCB} voltage source pin and I/O pins on the B port to float when \overline{OE} is HIGH. This feature is necessary to buffer data to and from a PCMCIA socket that permits PCMCIA cards to be inserted and removed during normal operation.

Features

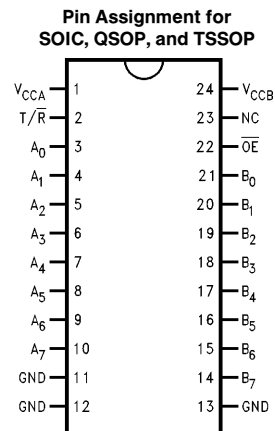
- Bidirectional interface between 3V and 3V-to-5V buses
- Control inputs compatible with TTL level
- Outputs source/sink up to 24 mA
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Available in SOIC, QSOP, and TSSOP packages
- Implements patented Quiet Series™ EMI reduction circuitry
- Flexible V_{CCB} operating range
- Allows B port and V_{CCB} to float simultaneously when \overline{OE} is HIGH
- Functionally compatible with the 74 series 245

Logic Symbol



Pin Names	Description
\overline{OE}	Output Enable Input
T/\overline{R}	Transmit/Receive Input
A_0 – A_7	Side A Inputs or TRI-STATE Outputs
B_0 – B_7	Side B Inputs or TRI-STATE Outputs

Connection Diagram



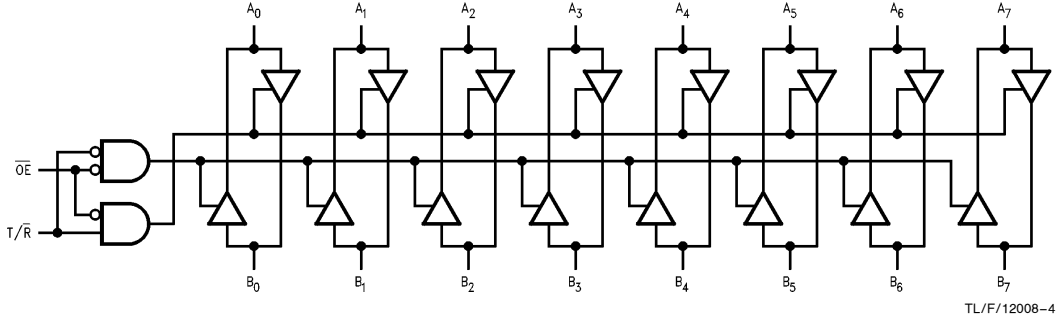
	SOIC JEDEC	QSOP	TSSOP
Order Number	74LVXC3245WM 74LVXC3245WMX	74LVXC3245QSC 74LVXC3245QSCX	74LVXC3245MTC 74LVXC3245MTCX
See NS Package Number	M24B	MQA24	MTC24

TRI-STATE® is a registered trademark of National Semiconductor Corporation.

Truth Table

Inputs		Outputs
\overline{OE}	T/\overline{R}	
L	L	Bus B Data to Bus A
L	H	Bus A Data to Bus B
H	X	HIGH-Z State

Logic Diagram



Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (V_{CCA}, V_{CCB})	-0.5V to +7.0V
DC Input Voltage (V_I) @ $\overline{OE}, T/\overline{R}$	-0.5V to $V_{CCA} + 0.5V$
DC Input/Output Voltage ($V_{I/O}$)	
@ A_n	-0.5V to $V_{CCA} + 0.5V$
@ B_n	-0.5V to $V_{CCB} + 0.5V$
DC Input Diode Curr. (I_{IK}) @ $\overline{OE}, T/\overline{R}$	± 20 mA
DC Output Diode Current (I_{OK})	± 50 mA
DC Output Source or Sink Current (I_O)	± 50 mA
DC V_{CC} or Ground Current per Output Pin (I_{CC} or I_{GND}) and Max Current	± 50 mA ± 200 mA
Storage Temperature Range (T_{STG})	-65°C to +150°C
DC Latch-Up Source or Sink Current	± 300 mA

Recommended Operating Conditions

Supply Voltage V_{CCA}	2.7V to 3.6V ($V_{CCA} \leq V_{CCB}$)
V_{CCB}	3.0V to 5.5V
Input Voltage (V_I) @ $\overline{OE}, T/\overline{R}$	0V to V_{CCA}
Input Output Voltage ($V_{I/O}$)	
@ A_n	0V to V_{CCA}
@ B_n	0V to V_{CCB}
Free Air Operating Temperature (T_A)	-40°C to +85°C
Minimum Input Edge Rate ($\Delta V/\Delta t$)	8 ns/V
V_{IN} from 30% to 70% of V_{CC}	
V_{CC} @ 3.0V, 4.5V, 5.5V	

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the "Electrical Characteristics" table are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

DC Electrical Characteristics

Symbol	Parameter	V_{CCA} (V)	V_{CCB} (V)	74LVXC3245		74LVXC3245		Units	Conditions
				$T_A = 25^\circ\text{C}$		$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$			
				Typ	Guaranteed Limits	Typ	Guaranteed Limits		
V_{IHA}	Minimum High Level Input Voltage	A_n	2.7	3.0		2.0	2.0	V	$V_{OUT} \leq 0.1V$ or $\geq V_{CC} - 0.1V$
		\overline{OE}	3.0	3.6		2.0	2.0		
		T/\overline{R}	3.6	5.5		2.0	2.0		
V_{IHB}		B_n	2.7	3.0		2.0	2.0	V	
			3.0	3.6		2.0	2.0		
			3.6	5.5		3.85	3.85		
V_{ILA}	Maximum Low Level Input Voltage	A_n	2.7	3.0		0.8	0.8	V	$V_{OUT} \leq 0.1V$ or $\geq V_{CC} - 0.1V$
		\overline{OE}	3.0	3.6		0.8	0.8		
		T/\overline{R}	3.6	5.5		0.8	0.8		
V_{ILB}		B_n	2.7	3.0		0.8	0.8	V	
			3.0	3.6		0.8	0.8		
			3.6	5.5		1.65	1.65		
V_{OHA}	Minimum High Level Output Voltage	3.0	3.0	2.99	2.9	2.9	V	$I_{OUT} = -100 \mu A$ $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$	
		3.0	3.0	2.85	2.56	2.46			
		3.0	3.0	2.65	2.35	2.25			
		2.7	3.0	2.5	2.3	2.2			
		2.7	4.5	2.3	2.1	2.0			
V_{OHB}		3.0	3.0	2.99	2.9	2.9	V	$I_{OUT} = -100 \mu A$ $I_{OH} = -12 \text{ mA}$ $I_{OH} = -24 \text{ mA}$ $I_{OH} = -24 \text{ mA}$	
		3.0	3.0	2.85	2.56	2.46			
		3.0	3.0	2.65	2.35	2.25			
		3.0	4.5	4.25	3.86	3.76			
V_{OLA}	Maximum Low Level Output Voltage	3.0	3.0	0.002	0.1	0.1	V	$I_{OUT} = 100 \mu A$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 12 \text{ mA}$ $I_{OL} = 24 \text{ mA}$	
		3.0	3.0	0.21	0.36	0.44			
		2.7	3.0	0.11	0.36	0.44			
		2.7	4.5	0.22	0.42	0.5			
V_{OLB}		3.0	3.0	0.002	0.1	0.1	V	$I_{OUT} = 100 \mu A$ $I_{OL} = 24 \text{ mA}$ $I_{OL} = 24 \text{ mA}$	
		3.0	3.0	0.21	0.36	0.44			
		3.0	4.5	0.18	0.36	0.44			

DC Electrical Characteristics (Continued)

Symbol	Parameter	V _{CCA} (V)	V _{CCB} (V)	74LVXC3245		74LVXC3245		Units	Conditions
				T _A = +25°C		T _A = -40°C to +85°C			
				Typ	Guaranteed Limits	Typ	Guaranteed Limits		
I _{IN}	Maximum Input Leakage Current @ \overline{OE} , T/ \overline{R}	3.6 3.6	3.6 5.5		±0.1 ±0.1	±1.0 ±1.0		μA	V _I = V _{CCA} , GND
I _{OZA}	Maximum TRI-STATE Output Leakage @ A _n	3.6 3.6	3.6 5.5		±0.5 ±0.5	±5.0 ±5.0		μA	V _I = V _{IL} , V _{IH} , \overline{OE} = V _{CCA} V _O = V _{CCA} , GND
I _{OZB}	Maximum TRI-STATE Output Leakage @ B _n	3.6 3.6	3.6 5.5		±0.5 ±0.5	±5.0 ±5.0		μA	V _I = V _{IL} , V _{IH} , \overline{OE} = V _{CCA} V _O = V _{CCB} , GND
ΔI _{CC}	Maximum I _{CC} /Input	B _n	3.6	5.5	1.0	1.35	1.5	mA	V _I = V _{CCB} -2.1V
		All Inputs	3.6	3.6		0.35	0.5		V _I = V _{CC} -0.6V
I _{CCA1}	Quiescent V _{CCA} Supply Current as B Port Floats	3.6	Open		5	50		μA	A _n = V _{CCA} or GND B _n = Open, \overline{OE} = V _{CCA} , T/ \overline{R} = V _{CCA} , V _{CCB} = Open
I _{CCA2}	Quiescent V _{CCA} Supply Current	3.6 3.6	3.6 5.5		5 5	50 50		μA	A _n = V _{CCA} or GND, B _n = V _{CCB} or GND, \overline{OE} = GND, T/ \overline{R} = GND
I _{CCB}	Quiescent V _{CCB} Supply Current	3.6 3.6	3.6 5.5		5 8	50 80		μA	A _n = V _{CCA} or GND, B _n = V _{CCB} or GND, \overline{OE} = GND, T/ \overline{R} = V _{CCA}
V _{OLPA}	Quiet Output Maximum Dynamic	3.3 3.3	3.3 5.0		0.8 0.8			V	(Notes 2, 3)
V _{OLPB}	V _{OL}	3.3 3.3	3.3 5.0		0.8 1.5			V	(Notes 2, 3)
V _{OLVA}	Quiet Output Minimum Dynamic	3.3 3.3	3.3 5.0		-0.8 -0.8			V	(Notes 2, 3)
V _{OLVB}	V _{OL}	3.3 3.3	3.3 5.0		-0.8 -1.2			V	(Notes 2, 3)
V _{IHDA}	Minimum High Level Dynamic	3.3 3.3	3.3 5.0		2.0 2.0			V	(Notes 2, 4)
V _{IHDB}	Input Voltage	3.3 3.3	3.3 5.0		2.0 3.5			V	(Notes 2, 4)
V _{ILDA}	Maximum Low Level Dynamic	3.3 3.3	3.3 5.0		0.8 0.8			V	(Notes 2, 4)
V _{ILDB}	Input Voltage	3.3 3.3	3.3 5.0		0.8 1.5			V	(Notes 2, 4)

Note 2: Worst case package.

Note 3: Max number of outputs defined as (n). Data inputs are driven 0V to V_{CC} level; one output at GND.

Note 4: Max number of Data Inputs (n) switching. (n-1) inputs switching 0V to V_{CC} level. Input-under-test switching: V_{CC} level to threshold (V_{IHD}), 0V to threshold (V_{ILD}), f = 1 MHz.

AC Electrical Characteristics

Symbol	Parameter	74LVXC3245			74LVXC3245		74LVXC3245			74LVXC3245		Units
		T _A = +25°C C _L = 50 pF V _{CCA} = 2.7V–3.6V V _{CCB} = 4.5V–5.5V			T _A = –40°C to +85°C C _L = 50 pF V _{CCA} = 2.7V–3.6V V _{CCB} = 4.5V–5.5V		T _A = +25°C C _L = 50 pF V _{CCA} = 2.7V–3.6V V _{CCB} = 3.0V–3.6V			T _A = –40°C to +85°C C _L = 50 pF V _{CCA} = 2.7V–3.6V V _{CCB} = 3.0V–3.6V		
		Min	Typ (Note 5)	Max	Min	Max	Min	Typ (Note 6)	Max	Min	Max	
t _{PHL} t _{PLH}	Propagation Delay A to B	1.0	4.8	8.0	1.0	8.5	1.0	5.5	8.5	1.0	9.0	ns
		1.0	3.9	6.5	1.0	7.0	1.0	5.2	8.0	1.0	8.5	
t _{PHL} t _{PLH}	Propagation Delay B to A	1.0	3.8	6.5	1.0	7.0	1.0	4.4	7.0	1.0	7.5	ns
		1.0	4.3	7.5	1.0	8.0	1.0	5.1	7.5	1.0	8.0	
t _{PZL} t _{PZH}	Output Enable Time OE to B	1.0	4.7	8.0	1.0	8.5	1.0	6.0	9.0	1.0	9.5	ns
		1.0	4.8	8.5	1.0	9.0	1.0	6.1	9.5	1.0	10.0	
t _{PZL} t _{PZH}	Output Enable Time OE to A	1.0	5.9	9.5	1.0	10.0	1.0	6.4	10.0	1.0	10.5	ns
		1.0	5.4	9.0	1.0	9.5	1.0	5.8	9.0	1.0	9.5	
t _{PHZ} t _{PLZ}	Output Disable Time OE to B	1.0	4.0	8.0	1.0	8.5	1.0	6.3	9.5	1.0	10.0	ns
		1.0	3.8	7.5	1.0	8.0	1.0	4.5	8.0	1.0	8.5	
t _{PHZ} t _{PLZ}	Output Disable Time OE to A	1.0	4.6	9.5	1.0	10.0	1.0	5.2	9.5	1.0	10.0	ns
		1.0	3.1	6.5	1.0	7.0	1.0	3.4	6.5	1.0	7.0	
t _{OSHL} t _{OSLH}	Output to Output Skew*		1.0	1.5		1.5		1.0	1.5		1.5	ns

Note 5: Typical values at V_{CCA} = 3.3V, V_{CCB} = 5.0V @ 25°C.

Note 6: Typical values at V_{CCA} = 3.3V, V_{CCB} = 3.3V @ 25°C.

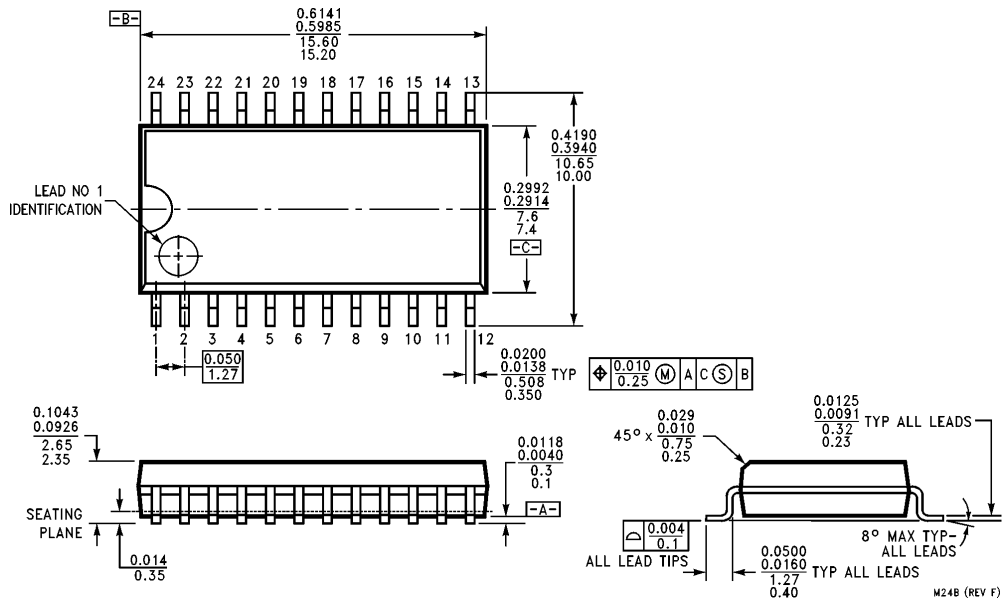
*Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH to LOW (t_{OSHL}) or LOW to HIGH (t_{OSLH}). Parameter guaranteed by design.

Capacitance

Symbol	Parameter	Typ	Units	Conditions	
C _{IN}	Input Capacitance	4.5	pF	V _{CC} = Open	
C _{I/O}	Input/Output Capacitance	10	pF	V _{CCA} = 3.3V V _{CCB} = 5.0V	
C _{PD}	Power Dissipation Capacitance	A → B	50	pF	V _{CCB} = 5.0V
		B → A	40	pF	V _{CCA} = 3.3V

C_{PD} is measured at 10 MHz.

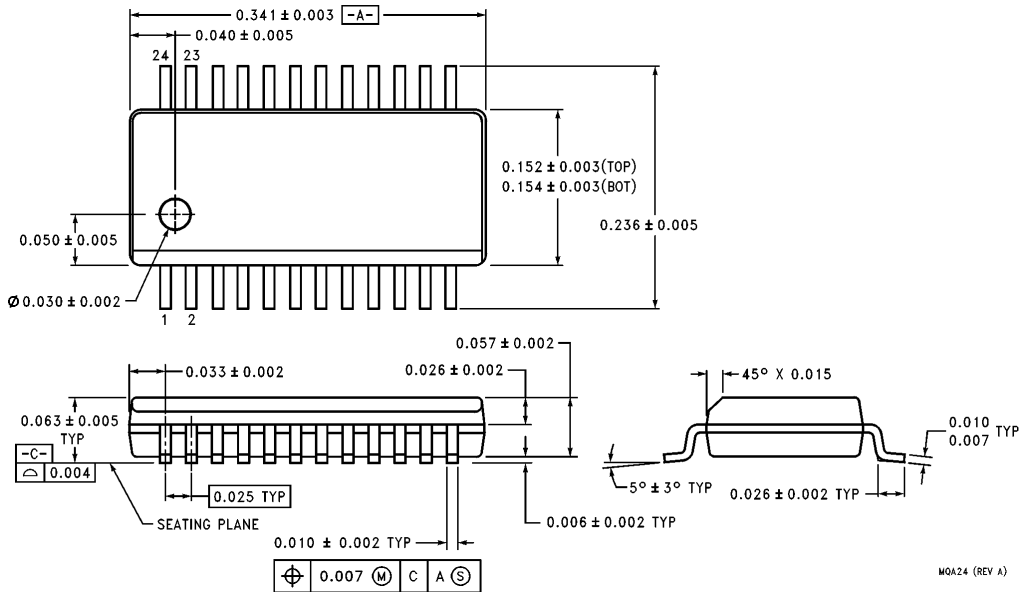
Physical Dimensions $\frac{\text{inches}}{\text{millimeters}}$



**24-Lead (0.300" Wide) Molded Small Outline Package, JEDEC
 Order Number 74LVXC3245WM or 74LVXC3245WMX
 NS Package Number M24B**

74LVXC3245 8-Bit Dual Supply Configurable Voltage Interface Transceiver with TRI-STATE Outputs for 3V System

Physical Dimensions inches (Continued)



MQA24 (REV A)

24-Lead (0.150" Wide) Molded Shrink Small Outline Package, JEDEC
(also known as QSOP)
Order Number 74LVXC3245QSC or 74LVXC3245QSCX
NS Package Number MQA24

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National Semiconductor Corporation
Americas
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018
 Email: support@nsc.com

National Semiconductor Europe
 Fax: +49 (0) 180-530 85 86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 180-530 85 85
 English Tel: +49 (0) 180-532 78 32
 Français Tel: +49 (0) 180-532 93 58
 Italiano Tel: +49 (0) 180-534 16 80

National Semiconductor Southeast Asia
 Fax: (852) 2376 3901
 Email: sea.support@nsc.com

National Semiconductor Japan Ltd.
 Tel: 81-3-5620-7561
 Fax: 81-3-5620-6179

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