

## 74LVXC3245

### 8-Bit Dual Supply Configurable Voltage Interface Transceiver with 3-STATE Outputs

#### 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

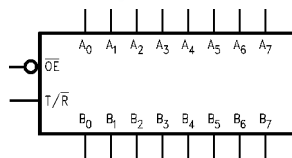
- Bidirectional interface between 3V and 3V-to-5V buses
- Control inputs compatible with TTL level
- Outputs source/sink up to 24 mA
- Guaranteed simultaneous switching noise level and dynamic threshold performance
- Implements patented EMI reduction circuitry
- Flexible  $V_{CCB}$  operating range
-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

#### Ordering Code:

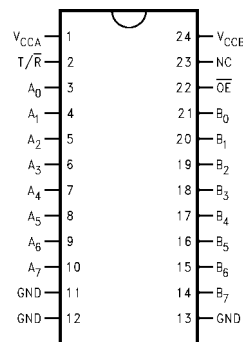
Order Number	Package Number	Package Description
74LVXC3245WM	M24B	224-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide
74LVXC3245QSC	MQA24	24-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide
74LVXC3245MTC	MTC24	24-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

#### Logic Symbol



#### Connection Diagram



#### Pin Descriptions

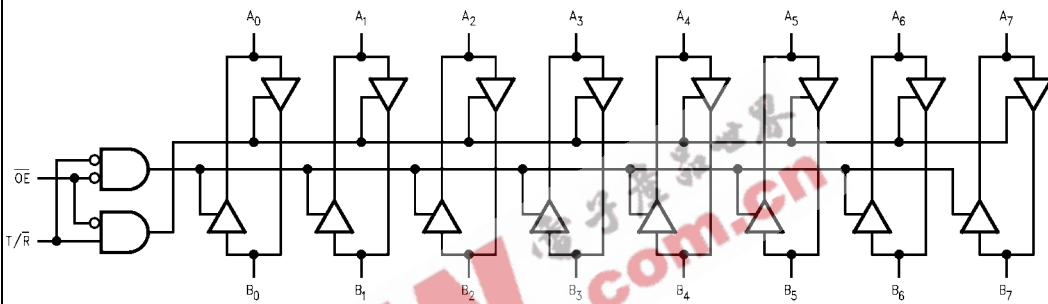
Pin Names	Description
$\overline{OE}$	Output Enable Input
$T/\overline{R}$	Transmit/Receive Input
$A_0$ - $A_7$	Side A Inputs or 3-STATE Outputs
$B_0$ - $B_7$	Side B Inputs or 3-STATE Outputs

### Truth Table

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

H = HIGH Voltage Level  
L = LOW Voltage Level  
X = Immaterial

### Logic Diagram



Absolute Maximum Ratings (Note 1)		Recommended Operating Conditions (Note 2)	
Supply Voltage ( $V_{CCA}, V_{CCB}$ )	-0.5V to +7.0V	Supply Voltage	
DC Input Voltage ( $V_I$ ) @ $\overline{OE}$ , $T/\overline{R}$	-0.5V to $V_{CCA}$ +0.5V	$V_{CCA}$	2.7V to 3.6V
DC Input/Output Voltage ( $V_{I/O}$ )		$V_{CCB}$	3.0V to 5.5V
@ $A_n$	-0.5V to $V_{CCA}$ +0.5V	Input Voltage ( $V_I$ ) @ $\overline{OE}$ , $T/\overline{R}$	0V to $V_{CCA}$
@ $B_n$	-0.5V to $V_{CCB}$ +0.5V	Input Output Voltage ( $V_{I/O}$ )	
DC Input Diode Current ( $I_{IK}$ )		@ $A_n$	0V to $V_{CCA}$
@ $\overline{OE}$ , $T/\overline{R}$	$\pm 20$ mA	@ $B_n$	0V to $V_{CCB}$
DC Output Diode ( $I_{OK}$ ) Current	$\pm 50$ mA	Free Air Operating Temperature ( $T_A$ )	-40°C to +85°C
DC Output Source or Sink Current ( $I_O$ )	$\pm 50$ mA	Minimum Input Edge Rate ( $\Delta V/\Delta t$ )	8 ns/V
DC $V_{CC}$ or Ground Current		$V_{IN}$ from 30% to 70% of $V_{CC}$	
per Output Pin ( $I_{CC}$ or $I_{GND}$ )	$\pm 50$ mA	$V_{CC}$ @ 3.0V, 4.5V, 5.5V	
and Max Current	$\pm 200$ mA		
Storage Temperature Range ( $T_{STG}$ )	-65°C to +150°C		
DC Latch-Up Source or Sink Current	$\pm 300$ mA		

**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 tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

**Note 2:** The A Port unused pins (inputs or I/Os) must be held HIGH or LOW. They may not float.

### DC Electrical Characteristics

Symbol	Parameter	$V_{CCA}$ (V)	$V_{CCB}$ (V)	$T_A = 25^\circ\text{C}$		$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
				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	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	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	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	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
$I_{IN}$	Maximum Input Leakage Current @ $\overline{OE}$ , $T/\overline{R}$		3.6	3.6		$\pm 0.1$	$\mu A$	$V_I = V_{CCA}, \text{ GND}$	
			3.6	5.5		$\pm 0.1$			$\pm 1.0$

DC Electrical Characteristics (Continued)									
Symbol	Parameter	V <sub>CCA</sub> (V)	V <sub>CCB</sub> (V)	T <sub>A</sub> = 25°C		T <sub>A</sub> = -40°C to +85°C		Units	Conditions
				Typ	Guaranteed Limits	Typ	Guaranteed Limits		
I <sub>OZA</sub>	Maximum 3-STATE Output Leakage @ A <sub>n</sub>	3.6 3.6	3.6 5.5		±0.5 ±0.5	±5.0 ±5.0		μA	V <sub>I</sub> = V <sub>IL</sub> , V <sub>IH</sub> , OE = V <sub>CCA</sub> , V <sub>O</sub> = V <sub>CCA</sub> , GND
I <sub>OZB</sub>	Maximum 3-STATE Output Leakage @ B <sub>n</sub>	3.6 3.6	3.6 5.5		±0.5 ±0.5	±5.0 ±5.0		μA	V <sub>I</sub> = V <sub>IL</sub> , V <sub>IH</sub> , OE = V <sub>CCA</sub> , V <sub>O</sub> = V <sub>CCB</sub> , GND
ΔI <sub>CC</sub>	Maximum I <sub>CC</sub> /Input	B <sub>n</sub>	3.6	5.5	1.0	1.35	1.5	mA	V <sub>I</sub> = V <sub>CCB</sub> -2.1V V <sub>I</sub> = V <sub>CC</sub> -0.6V
		All Inputs	3.6	3.6		0.35	0.5		
I <sub>CCA1</sub>	Quiescent V <sub>CCA</sub> Supply Current as B Port Floats	3.6	Open		5	50		μA	A <sub>n</sub> = V <sub>CCA</sub> or GND B <sub>n</sub> = Open, OE = V <sub>CCA</sub> , T/R = V <sub>CCA</sub> , V <sub>CCB</sub> = Open
I <sub>CCA2</sub>	Quiescent V <sub>CCA</sub> Supply Current	3.6	3.6		5	50		μA	A <sub>n</sub> = V <sub>CCA</sub> or GND, B <sub>n</sub> = V <sub>CCB</sub> or GND, OE = GND, T/R = GND
		3.6	5.5		5	50			
I <sub>CCB</sub>	Quiescent V <sub>CCB</sub> Supply Current	3.6	3.6		5	50		μA	A <sub>n</sub> = V <sub>CCA</sub> or GND, B <sub>n</sub> = V <sub>CCB</sub> or GND, OE = GND, T/R = V <sub>CCA</sub>
		3.6	5.5		8	80			
V <sub>OLPA</sub>	Quiet Output Maximum Dynamic	3.3	3.3		0.8			V	(Note 3)(Note 4)
		3.3	5.0		0.8				
V <sub>OLPB</sub>	V <sub>OL</sub>	3.3	3.3		0.8			V	(Note 3)(Note 4)
		3.3	5.0		1.5				
V <sub>OLVA</sub>	Quiet Output Minimum Dynamic	3.3	3.3		-0.8			V	(Note 3)(Note 4)
		3.3	5.0		-0.8				
V <sub>OLVB</sub>	V <sub>OL</sub>	3.3	3.3		-0.8			V	(Note 3)(Note 4)
		3.3	5.0		-1.2				
V <sub>IHDA</sub>	Minimum HIGH Level Dynamic	3.3	3.3		2.0			V	(Note 3)(Note 5)
		3.3	5.0		2.0				
V <sub>IHDB</sub>	Input Voltage	3.3	3.3		2.0			V	(Note 3)(Note 5)
		3.3	5.0		3.5				
V <sub>ILDA</sub>	Maximum LOW Level Dynamic	3.3	3.3		0.8			V	(Note 3)(Note 5)
		3.3	5.0		0.8				
V <sub>ILDB</sub>	Input Voltage	3.3	3.3		0.8			V	(Note 3)(Note 5)
		3.3	5.0		1.5				

**Note 3:** Worst case package.

**Note 4:** Max number of outputs defined as (n). Data inputs are driven 0V to V<sub>CC</sub> level; one output at GND.

**Note 5:** Max number of Data Inputs (n) switching. (n-1) inputs switching 0V to V<sub>CC</sub> level. Input-under-test switching: V<sub>CC</sub> level to threshold (V<sub>IHD</sub>), 0V to threshold (V<sub>ILD</sub>), f = 1 MHz.

AC Electrical Characteristics												
Symbol	Parameter	T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF V <sub>CCA</sub> = 2.7V–3.6V V <sub>CCB</sub> = 4.5V–5.5V			T <sub>A</sub> = –40°C to +85°C C <sub>L</sub> = 50 pF V <sub>CCA</sub> = 2.7V–3.6V V <sub>CCB</sub> = 4.5V–5.5V		T <sub>A</sub> = +25°C C <sub>L</sub> = 50 pF V <sub>CCA</sub> = 2.7V–3.6V V <sub>CCB</sub> = 3.0V–3.6V			T <sub>A</sub> = –40°C to +85°C C <sub>L</sub> = 50 pF V <sub>CCA</sub> = 2.7V–3.6V V <sub>CCB</sub> = 3.0V–3.6V		Units
		Min	Typ (Note 6)	Max	Min	Max	Min	Typ (Note 7)	Max	Min	Max	
t <sub>PHL</sub>	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
t <sub>PLH</sub>	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	
t <sub>PZH</sub>	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
t <sub>PZH</sub>	Output Enable Time OE to A	1.0	4.8	8.5	1.0	9.0	1.0	6.1	9.5	1.0	10.0	
t <sub>PZH</sub>	Output Enable Time OE to B	1.0	5.9	9.5	1.0	10.0	1.0	6.4	10.0	1.0	10.5	ns
t <sub>PZH</sub>	Output Enable Time OE to A	1.0	5.4	9.0	1.0	9.5	1.0	5.8	9.0	1.0	9.5	
t <sub>PHZ</sub>	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
t <sub>PLZ</sub>	Output Disable Time OE to A	1.0	3.8	7.5	1.0	8.0	1.0	4.5	8.0	1.0	8.5	
t <sub>PHZ</sub>	Output Disable Time OE to B	1.0	4.6	9.5	1.0	10.0	1.0	5.2	9.5	1.0	10.0	ns
t <sub>PLZ</sub>	Output Disable Time OE to A	1.0	3.1	6.5	1.0	7.0	1.0	3.4	6.5	1.0	7.0	
t <sub>OSSL</sub>	Output to Output Skew (Note 8)		1.0	1.5		1.5		1.0	1.5		1.5	ns
t <sub>OSLH</sub>	Data to Output											

**Note 6:** Typical values at V<sub>CCA</sub> = 3.3V, V<sub>CCB</sub> = 5.0V @ 25°C.

**Note 7:** Typical values at V<sub>CCA</sub> = 3.3V, V<sub>CCB</sub> = 3.3V @ 25°C.

**Note 8:** 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<sub>OSSL</sub>) or LOW-to-HIGH (t<sub>OSLH</sub>). Parameter guaranteed by design.

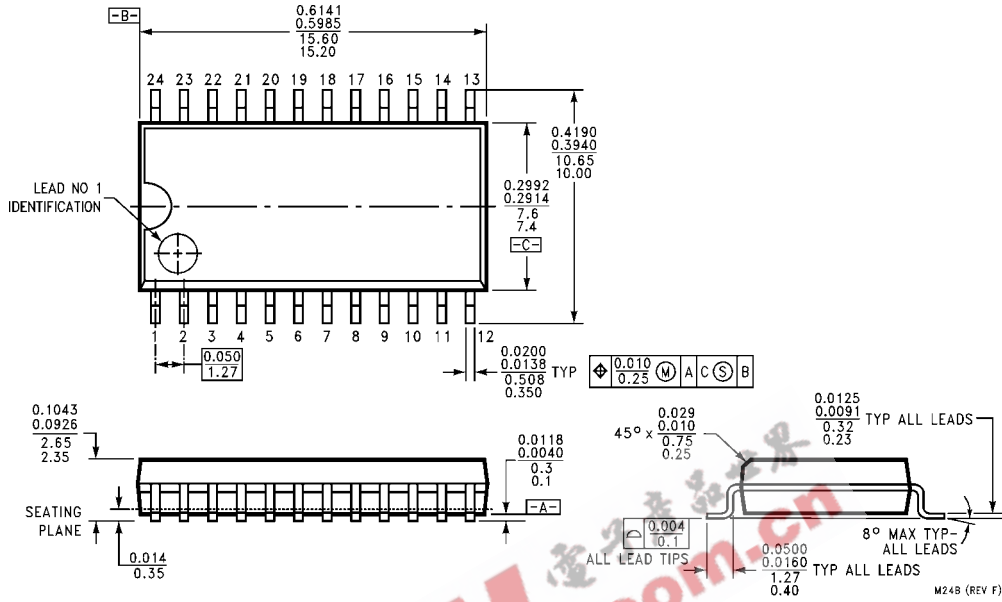
### Capacitance

Symbol	Parameter	Typ	Units	Conditions	
C <sub>IN</sub>	Input Capacitance	4.5	pF	V <sub>CC</sub> = Open	
C <sub>I/O</sub>	Input/Output Capacitance	10	pF	V <sub>CCA</sub> = 3.3V V <sub>CCB</sub> = 5.0V	
C <sub>PD</sub>	Power Dissipation Capacitance (Note 9)	A→B	50	pF	V <sub>CCB</sub> = 5.0V
		B→A	40	pF	V <sub>CCA</sub> = 3.3V

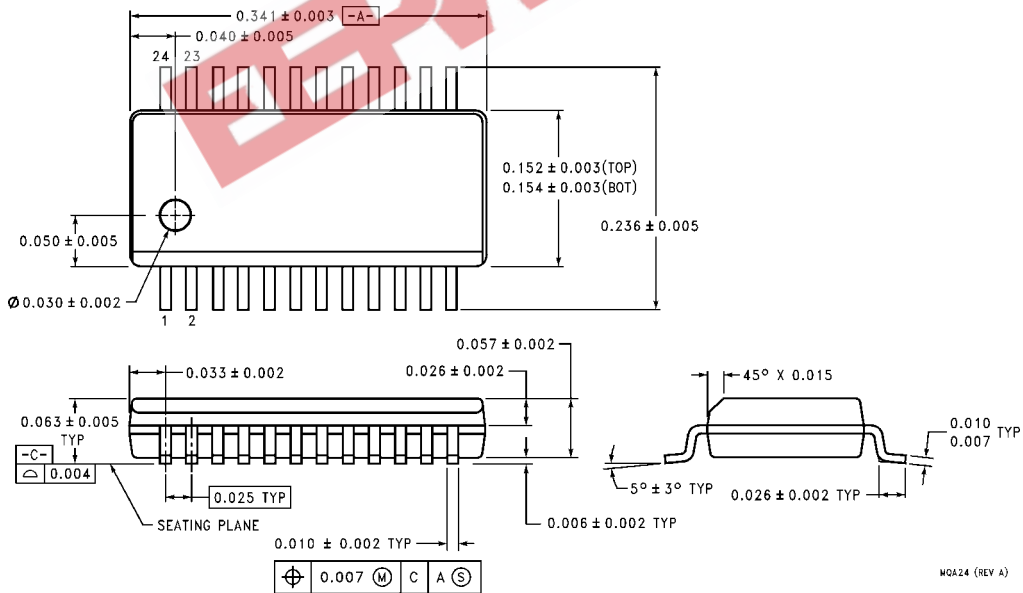
**Note 9:** C<sub>PD</sub> is measured at 10 MHz.



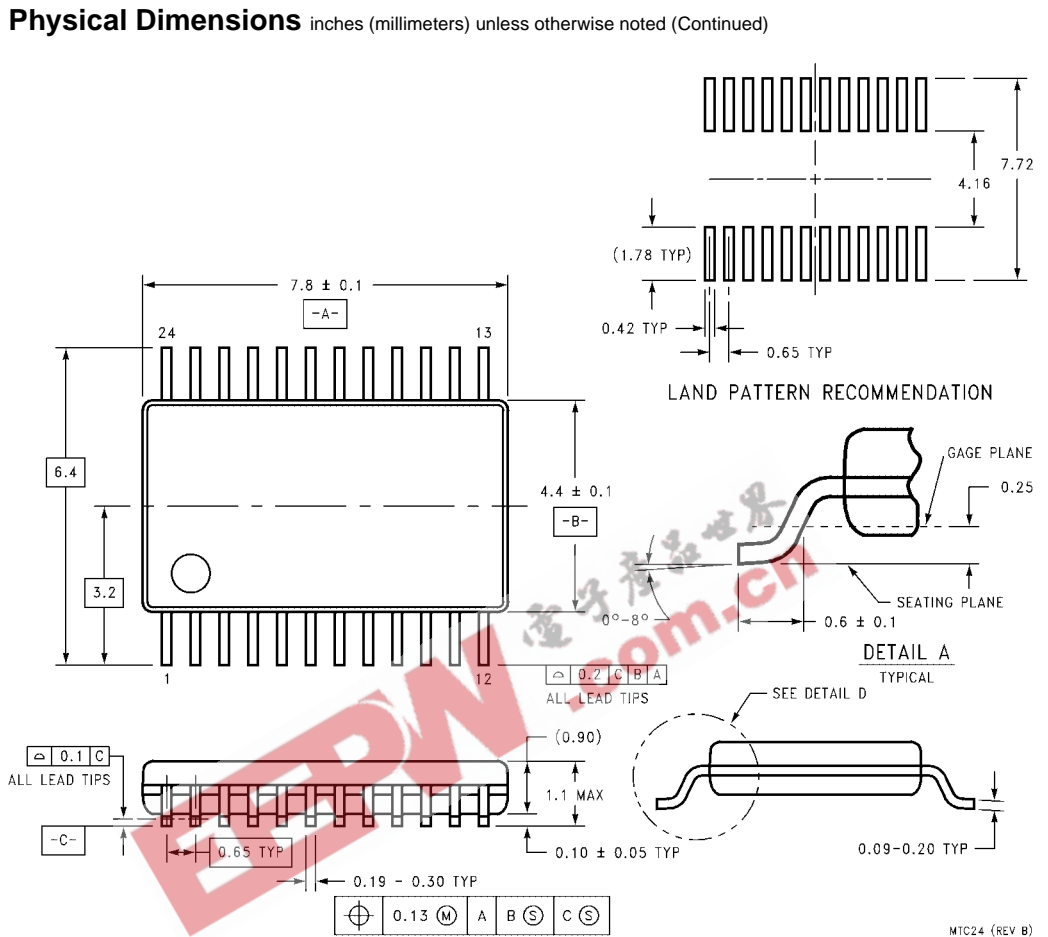
**Physical Dimensions** inches (millimeters) unless otherwise noted



**24-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-013, 0.300" Wide Package Number M24B**



**24-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150" Wide Package Number MQA24**



24-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide  
Package Number MTC24

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