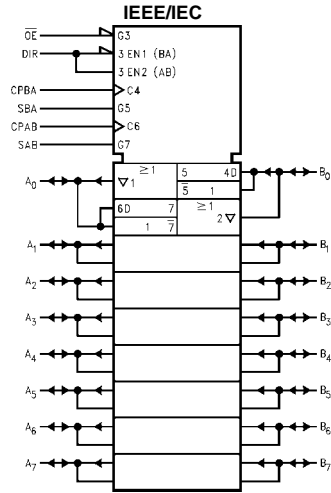
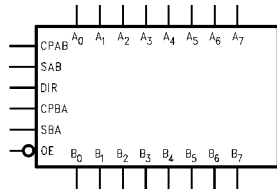


Logic Symbols



Truth Table

(Note 2)

Inputs						Data I/O		Function
\overline{OE}	DIR	CPAB	CPBA	SAB	SBA	A ₀ -A ₇	B ₀ -B ₇	
H	X	H or L	H or L	X	X			Isolation
H	X	↗	X	X	X	Input	Input	Clock A _n Data into A Register
H	X	X	↗	X	X			Clock B _n Data into B Register
L	H	X	X	L	X	Input	Output	A _n to B _n —Real Time (Transparent Mode)
L	H	↗	X	L	X			Clock A _n Data into A Register
L	H	H or L	X	H	X			A Register to B _n (Stored Mode)
L	H	↗	X	H	X			Clock A _n Data into A Register and Output to B _n
L	L	X	X	X	L	Output	Input	B _n to A _n —Real Time (Transparent Mode)
L	L	X	↗	X	L			Clock B _n Data into B Register
L	L	X	H or L	X	H			B Register to A _n (Stored Mode)
L	L	X	↗	X	H			Clock B _n Data into B Register and Output to A _n

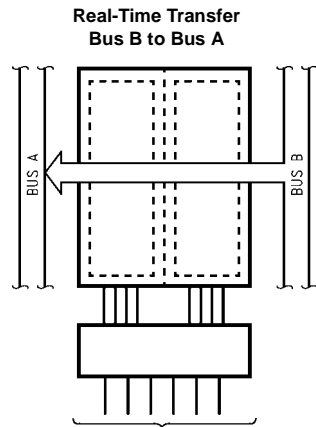
H = HIGH Voltage Level
 L = LOW Voltage Level
 X = Immaterial
 ↗ = LOW-to-HIGH Transition

Note 2: The data output functions may be enabled or disabled by various signals at the \overline{OE} and DIR inputs. Data input functions are always enabled; i.e., data at the bus pins will be stored on every LOW-to-HIGH transition of the appropriate clock inputs.

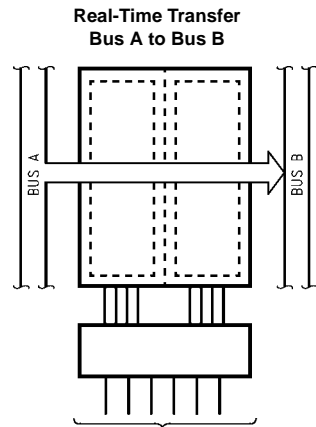
Functional Description

In the transceiver mode, data present at the HIGH impedance port may be stored in either the A or B register or both. The select (SAB, SBA) controls can multiplex stored and real-time. The examples shown below demonstrate the four fundamental bus-management functions that can be performed.

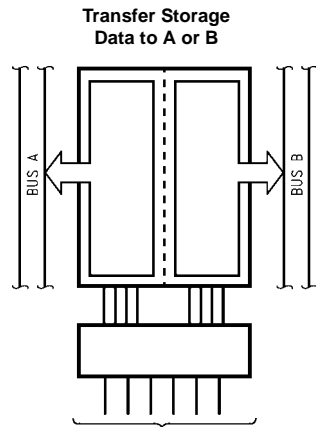
The direction control (DIR) determines which bus will receive data when \overline{OE} is LOW. In the isolation mode (\overline{OE} HIGH), A data may be stored in one register and/or B data may be stored in the other register. When an output function is disabled, the input function is still enabled and may be used to store and transmit data. Only one of the two busses, A or B, may be driven at a time.



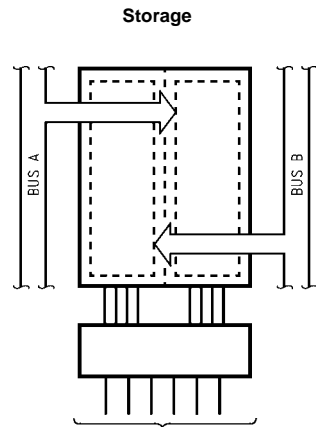
\overline{OE}	DIR	CPAB	CPBA	SAB	SBA
L	L	X	X	X	L



\overline{OE}	DIR	CPAB	CPBA	SAB	SBA
L	H	X	X	L	X

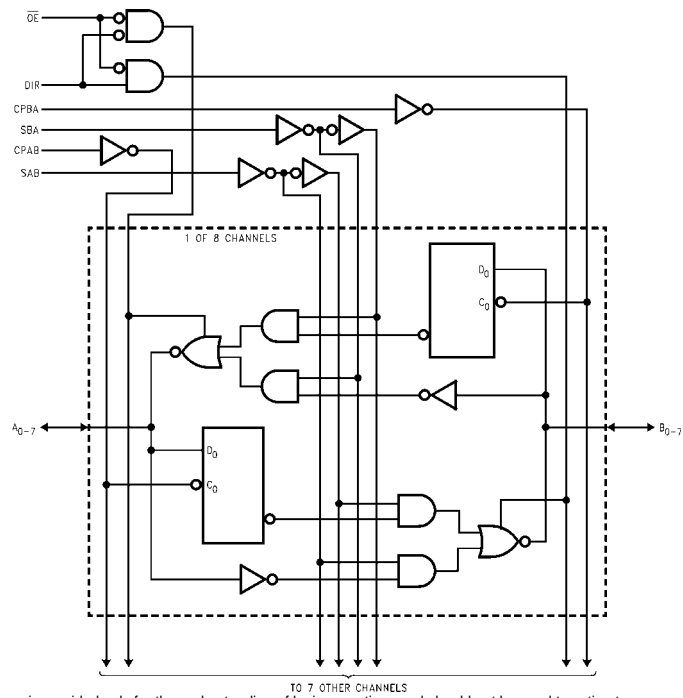


\overline{OE}	DIR	CPAB	CPBA	SAB	SBA
L	L	X	H or L	X	H
L	H	H or L	X	H	X



\overline{OE}	DIR	CPAB	CPBA	SAB	SBA
L	H	↗	X	L	X
L	L	X	↗	X	L
H	X	↗	X	X	X
H	X	X	↗	X	X

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings ^(Note 3)						
Symbol	Parameter	Value	Conditions	Units		
V _{CC}	Supply Voltage	-0.5 to +7.0		V		
V _I	DC Input Voltage	-0.5 to +7.0		V		
V _O	DC Output Voltage	-0.5 to +7.0 -0.5 to V _{CC} + 0.5	Output in 3-STATE Output in HIGH or LOW State (Note 4)	V		
I _{IK}	DC Input Diode Current	-50	V _I < GND	mA		
I _{OK}	DC Output Diode Current	-50 +50	V _O < GND V _O > V _{CC}	mA		
I _O	DC Output Source/Sink Current	±50		mA		
I _{CC}	DC Supply Current per Supply Pin	±100		mA		
I _{GND}	DC Ground Current per Ground Pin	±100		mA		
T _{STG}	Storage Temperature	-65 to +150		°C		
Recommended Operating Conditions (Note 5)						
Symbol	Parameter	Min	Max	Units		
V _{CC}	Supply Voltage	Operating	2.0	3.6	V	
		Data Retention	1.5	3.6		
V _I	Input Voltage	0	5.5	V		
V _O	Output Voltage	HIGH or LOW State	0	V _{CC}	V	
		3-STATE	0	5.5		
I _{OH} /I _{OL}	Output Current	V _{CC} = 3.0V – 3.6V		±24	mA	
		V _{CC} = 2.7V – 3.0V		±12		
		V _{CC} = 2.3V – 2.7V		±8		
T _A	Free-Air Operating Temperature	-40	85	°C		
Δt/ΔV	Input Edge Rate, V _{IN} = 0.8V – 2.0V, V _{CC} = 3.0V	0	10	ns/V		
<p>Note 3: 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.</p> <p>Note 4: I_O Absolute Maximum Rating must be observed.</p> <p>Note 5: Unused inputs or I/Os must be held HIGH or LOW. They may not float.</p>						
DC Electrical Characteristics						
Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units
				Min	Max	
V _{IH}	HIGH Level Input Voltage		2.3 – 2.7	1.7		V
			2.7 – 3.6	2.0		
V _{IL}	LOW Level Input Voltage		2.3 – 2.7		0.7	V
			2.7 – 3.6		0.8	
V _{OH}	HIGH Level Output Voltage	I _{OH} = -100 μA	2.3 – 3.6	V _{CC} - 0.2		V
		I _{OH} = -8 mA	2.3	1.8		
		I _{OH} = -12 mA	2.7	2.2		
		I _{OH} = -18 mA	3.0	2.4		
		I _{OH} = -24 mA	3.0	2.2		
V _{OL}	LOW Level Output Voltage	I _{OL} = 100 μA	2.3 – 3.6		0.2	V
		I _{OL} = 8 mA	2.3		0.6	
		I _{OL} = 12 mA	2.7		0.4	
		I _{OL} = 16 mA	3.0		0.4	
		I _{OL} = 24 mA	3.0		0.55	
I _I	Input Leakage Current	0 ≤ V _I ≤ 5.5V	2.3 – 3.6		±5.0	μA
I _{OZ}	3-STATE I/O Leakage	0 ≤ V _O ≤ 5.5V V _I = V _{IH} or V _{IL}	2.3 – 3.6		±5.0	μA
I _{OFF}	Power-Off Leakage Current	V _I or V _O = 5.5V	0		10	μA

DC Electrical Characteristics (Continued)

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = -40°C to +85°C		Units
				Min	Max	
I _{CC}	Quiescent Supply Current	V _I = V _{CC} or GND	2.3 – 3.6		10	μA
		3.6V ≤ V _I , V _O ≤ 5.5V (Note 6)	2.3 – 3.6		±10	
ΔI _{CC}	Increase in I _{CC} per Input	V _{IH} = V _{CC} - 0.6V	2.3 – 3.6		500	μA

Note 6: Outputs disabled or 3-STATE only.

AC Electrical Characteristics

Symbol	Parameter	T _A = -40°C to +85°C, R _L = 500Ω						Units
		V _{CC} = 3.3V ± 0.3V		V _{CC} = 2.7V		V _{CC} = 2.5V ± 0.2V		
		C _L = 50 pF		C _L = 50 pF		C _L = 30 pF		
		Min	Max	Min	Max	Min	Max	
t _{MAX}	Maximum Clock Frequency	150						MHz
t _{PHL}	Propagation Delay	1.5	7.0	1.5	8.0	1.5	8.4	ns
t _{PLH}	Bus to Bus	1.5	7.0	1.5	8.0	1.5	8.4	
t _{PHL}	Propagation Delay	1.5	8.5	1.5	9.5	1.5	10.5	ns
t _{PLH}	Clock to Bus	1.5	8.5	1.5	9.5	1.5	10.5	
t _{PHL}	Propagation Delay	1.5	8.5	1.5	9.5	1.5	10.5	ns
t _{PLH}	Select to Bus	1.5	8.5	1.5	9.5	1.5	10.5	
t _{PZL}	Output Enable Time	1.5	8.5	1.5	9.5	1.5	10.5	ns
t _{PZH}	Output Disable Time	1.5	8.5	1.5	9.5	1.5	10.5	
t _{PLZ}	Output Disable Time	1.5	8.5	1.5	9.5	1.5	10.5	ns
t _{PHZ}	Output Enable Time	1.5	8.5	1.5	9.5	1.5	10.5	
t _S	Setup Time	2.5		2.5		4.0		ns
t _H	Hold Time	1.5		1.5		2.0		ns
t _W	Pulse Width	3.3		3.3		4.0		ns
t _{OSSL}	Output to Output Skew		1.0					ns
t _{OSLH}	(Note 7)		1.0					

Note 7: 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_{OSSL}) or LOW-to-HIGH (t_{OSLH}).

Dynamic Switching Characteristics

Symbol	Parameter	Conditions	V _{CC} (V)	T _A = 25°C	Units
				Typical	
V _{OLP}	Quiet Output Dynamic Peak V _{OL}	C _L = 50 pF, V _{IH} = 3.3V, V _{IL} = 0V	3.3	0.8	V
		C _L = 30 pF, V _{IH} = 2.5V, V _{IL} = 0V	2.5	0.6	
V _{OLV}	Quiet Output Dynamic Valley V _{OL}	C _L = 50 pF, V _{IH} = 3.3V, V _{IL} = 0V	3.3	-0.8	V
		C _L = 30 pF, V _{IH} = 2.5V, V _{IL} = 0V	2.5	-0.6	

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C _{IN}	Input Capacitance	V _{CC} = Open, V _I = 0V or V _{CC}	7	pF
C _{I/O}	Input/Output Capacitance	V _{CC} = 3.3V, V _I = 0V or V _{CC}	8	pF
C _{PD}	Power Dissipation Capacitance	V _{CC} = 3.3V, V _I = 0V or V _{CC} , f = 10 MHz	25	pF

AC LOADING and WAVEFORMS Generic for LCX Family

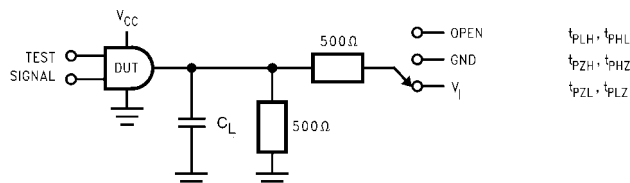
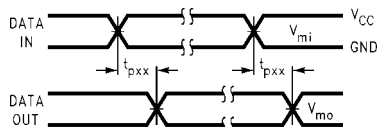
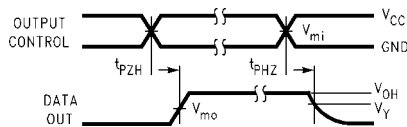


FIGURE 1. AC Test Circuit (C_L includes probe and jig capacitance)

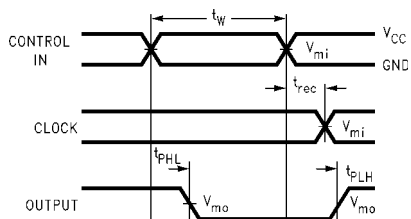
Test	Switch
t_{PLH}, t_{PHL}	Open
t_{PZL}, t_{PLZ}	6V at $V_{CC} = 3.3 \pm 0.3V$ $V_{CC} \times 2$ at $V_{CC} = 2.5 \pm 0.2V$
t_{PZH}, t_{PHZ}	GND



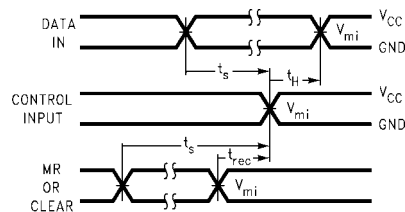
Waveform for Inverting and Non-Inverting Functions



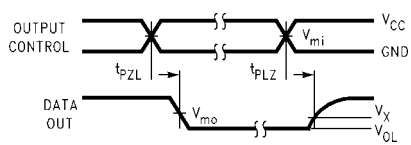
3-STATE Output High Enable and Disable Times for Logic



Propagation Delay, Pulse Width and t_{rec} Waveforms



Setup Time, Hold Time and Recovery Time for Logic



3-STATE Output Low Enable and Disable Times for Logic

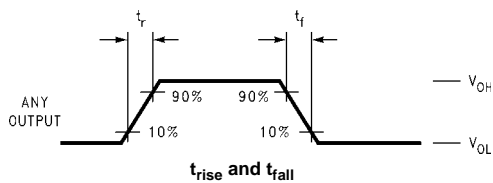
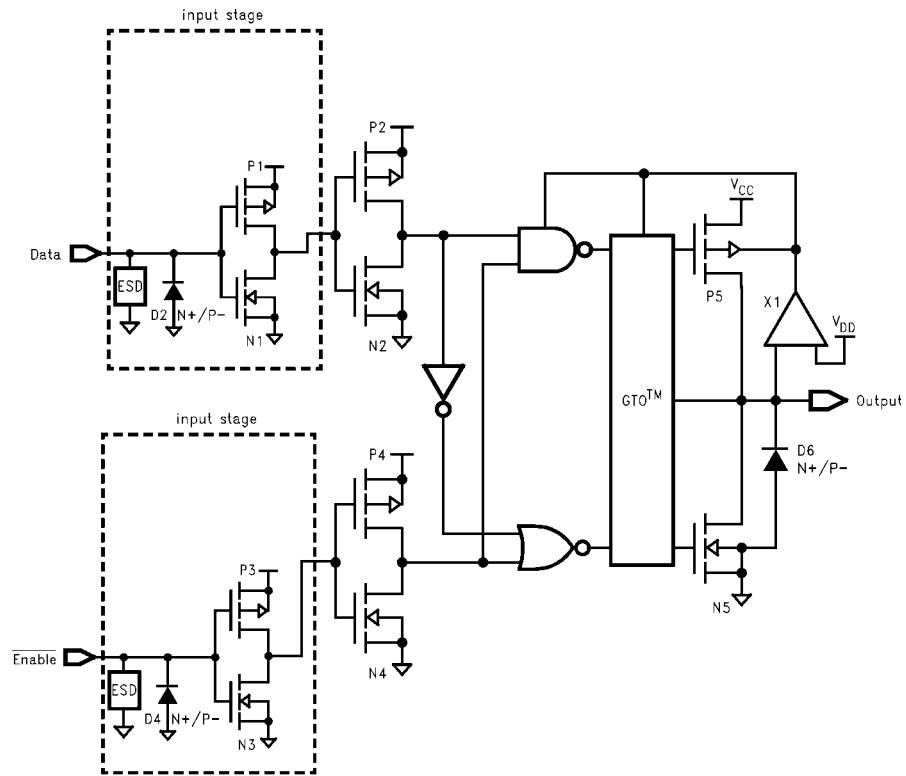


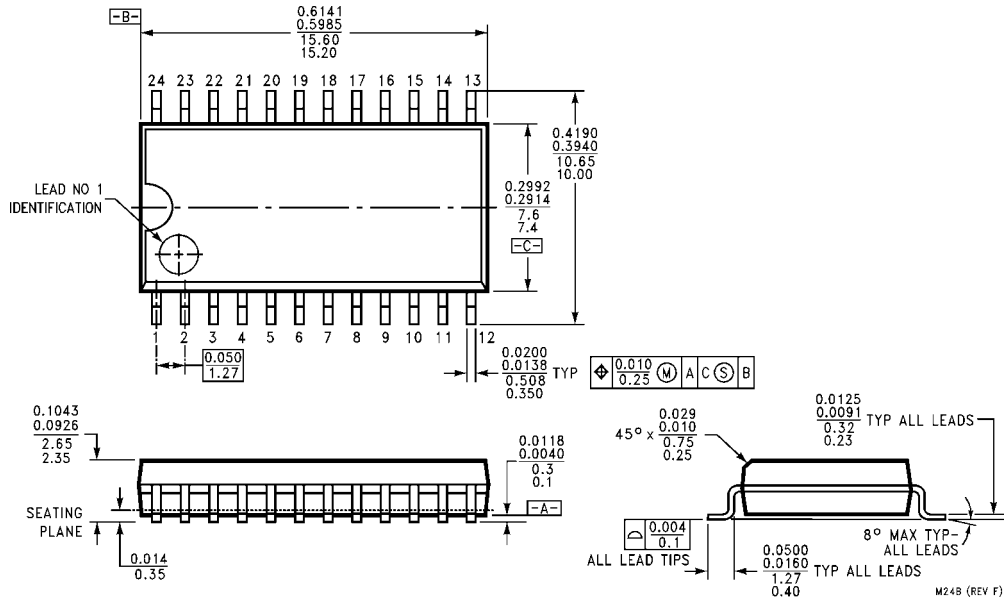
FIGURE 2. Waveforms
(Input Characteristics; $f = 1MHz, t_r = t_f = 3ns$)

Symbol	V_{CC}		
	$3.3V \pm 0.3V$	2.7V	$2.5V \pm 0.2V$
V_{mi}	1.5V	1.5V	$V_{CC}/2$
V_{mo}	1.5V	1.5V	$V_{CC}/2$
V_x	$V_{OL} + 0.3V$	$V_{OL} + 0.3V$	$V_{OL} + 0.15V$
V_y	$V_{OH} - 0.3V$	$V_{OH} - 0.3V$	$V_{OH} - 0.15V$

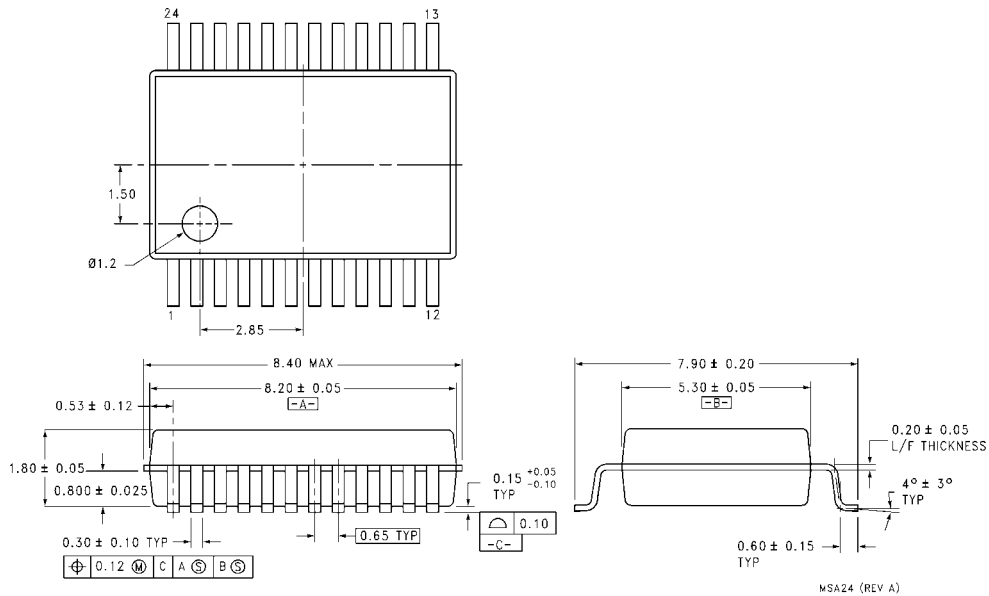
Schematic Diagram Generic for LCX Family



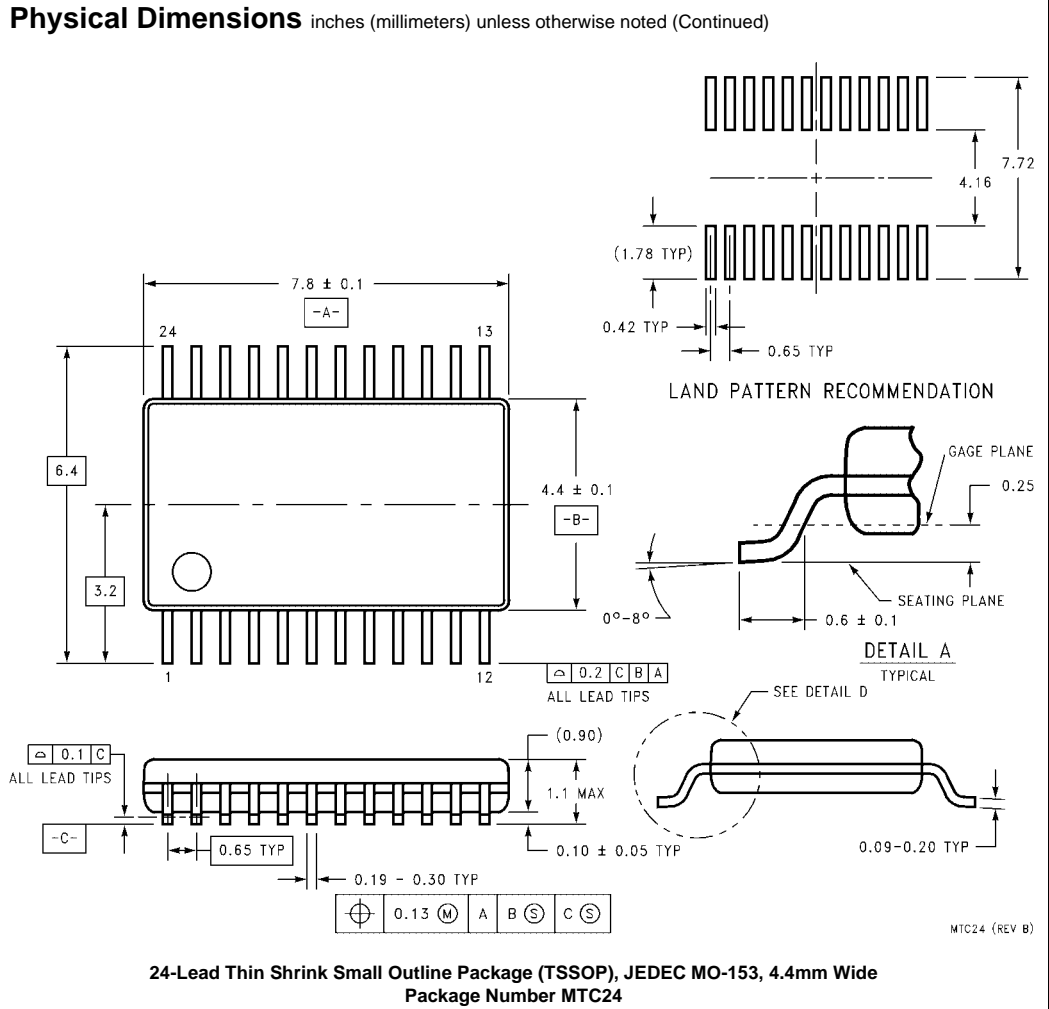
Physical Dimensions inches (millimeters) unless otherwise noted



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



24-Lead Shrink Small Outline Package (SSOP), EIAJ TYPE II, 5.3mm Wide Package Number MSA24



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