August 2002
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74LCX16646
Low Voltage 16-Bit Transceiver/Register with 5V Tolerant Inputs and Outputs

Connection Diagram

Truth Table

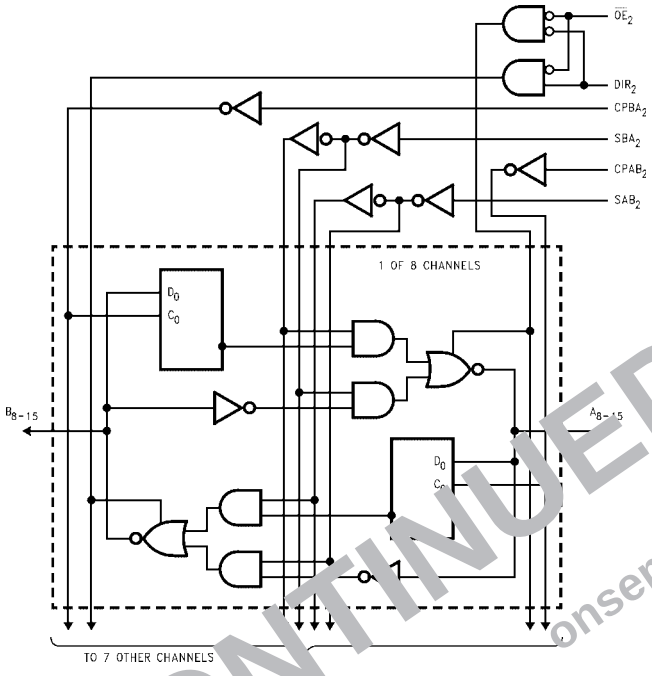
(Note 2)

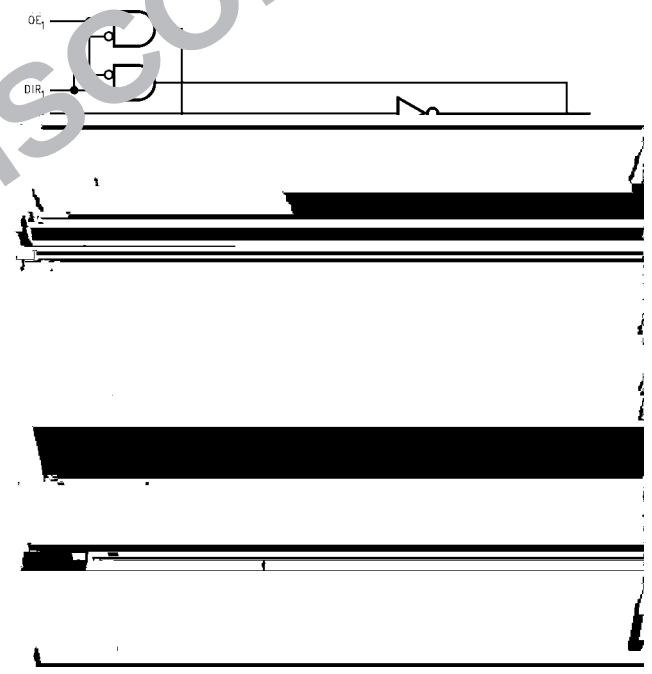
Inputs						Data I/O		Output Operation Mode
$\overline{OE}_1$	DIR_1	$CPAB_1$	$CPBA_1$	SAB_1	SBA_1	A_{0-7}	B_{0-7}	
H	X	H or L	H or L	X	X			Isolation
H	X							

H = HIGH Voltage Level X = Immaterial
L = LOW Voltage Level ⌐ = 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. Also applies to data I/O (A and B: 8-15) and #2 control pins.

Logic Diagrams





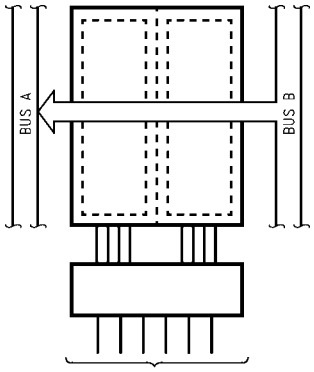
Please note that these diagrams are provided only for the understanding of logic operations and should not be used to estimate propagation delays.

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_n, SBA_n) controls can multiplex stored and real-time. The examples shown below demonstrate the four fundamental bus-management functions that can be performed.

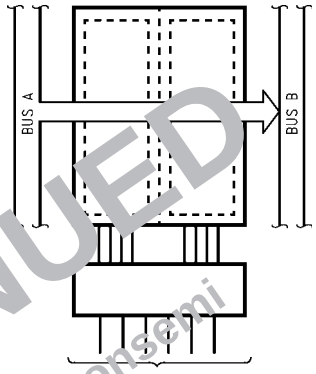
The direction control (DIR_n) determines which bus will receive data when $\overline{OE}_n$ is LOW. In the isolation mode ($\overline{OE}_n$ HIGH), A data may be stored in one register and/or B data may be stored in the other register. When an output function is disabled, the input function is still 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.

Real-Time Transfer
Bus B to Bus A



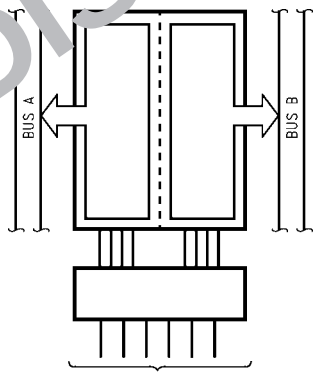
$\overline{OE}$	DIR	CPAB	CPBA	SAB	SBA
L	L	X	X	X	L

Real-Time Transfer
Bus A to Bus B



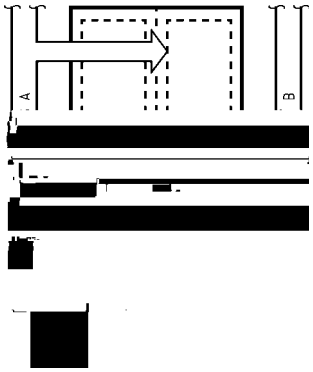
$\overline{OE}$	DIR	CPAB	CPBA	SAB	SBA
L	H	X	X	L	X

Transfer Storage
Data to A or B



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

Storage



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

Absolute Maximum Ratings(Note 3)

Symbol	Parameter	Value	Conditions	Units
V				

Recommended Operating Conditions (Note 5)

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.

Note 4: I_O Absolute Maximum Rating must be observed.

Note 5: Unused inputs and I/Os must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

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		20	µA
		$3.6V \le V_I$, $V_O \le 5.5V$ (Note 6)	2.3 – 3.6		±20	
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 $+85°C$, $R_L = 500\Omega$						Units
		$V_{CC} = 3.3V \pm 0.3V$		$V_{CC} = 2.7V$		$V_{CC} = 2.5V \pm 0.2V$		
		$C_L = 50$ pF		$C_L = 50$ pF		$C_L = 30$ pF		
		Min	Max	Min	Max	Min	Max	
f_{MAX}	Maximum Clock Frequency	170						ns
t_{PHL}	Propagation Delay	1.5	5.2	1.5	6.0	1.5	6.2	ns
t_{PLH}	Bus to Bus	1.5	5.2	1.5	6.0	1.5	6.2	
t_{PHL}	Propagation Delay	1.5	6.0	1.5	7.0	1.5	7.2	ns
t_{PLH}	Clock to Bus	1.5	6.0	1.5	7.0	1.5	7.2	
t_{PHL}	Propagation Delay	1.5	6.5	1.5	7.0	1.5	7.2	ns
t_{PLH}	Select to Bus	1.5	6.0	1.5	7.0	1.5	7.2	
t_{PZL}	Output Enable Time	1.5	7.5	1.5	8.5	1.5	9.8	ns
t_{PZH}		1.5	7.5	1.5	8.5	1.5	9.8	
t_{PLZ}	Output Disable Time	1.5	6.5	1.5	7.5	1.5	7.8	ns
t_{PHZ}		1.5	6.5	1.5	7.5	1.5	7.8	
t_S	Setup Time	2.5		2.5		3.0		ns
t_H	Hold Time	1.5		1.5		2.0		ns
t_W	Pulse Width	3.0		3.0		3.5		ns
t_{OSHL}	Output to Output Skew (Note 7)		1.0					ns
t_{OSLH}			1.0					

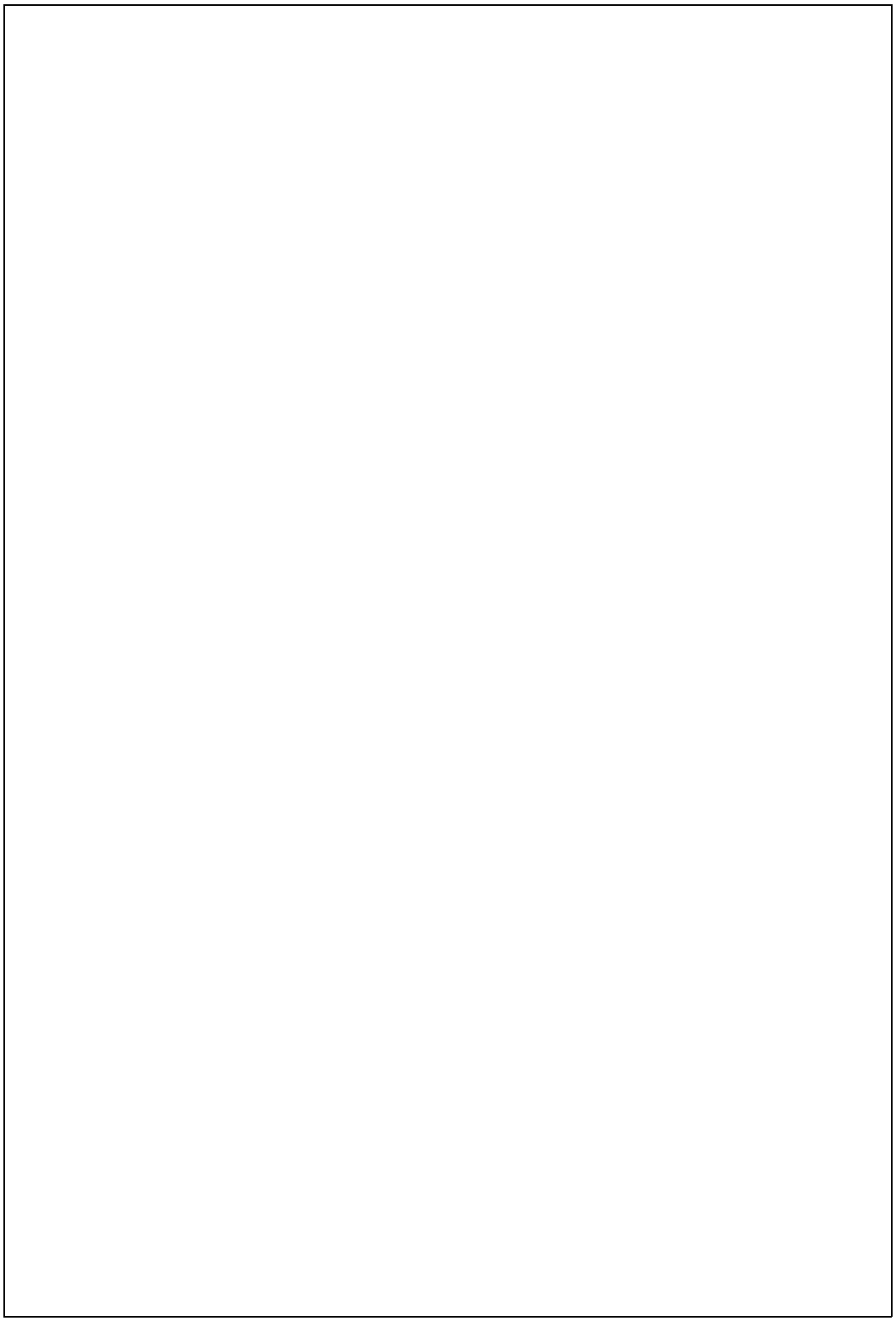
Note 7: Skew is defined as the absolute value of the difference between the actual propagation delay for any two separate outputs of the same device. The specification applies to any outputs switching in the same direction, either HIGH-to-LOW (t_{OSHL}) or LOW-to-HIGH (t_{OSLH}). Parameter guaranteed by design.

Dynamic Switching Characteristics

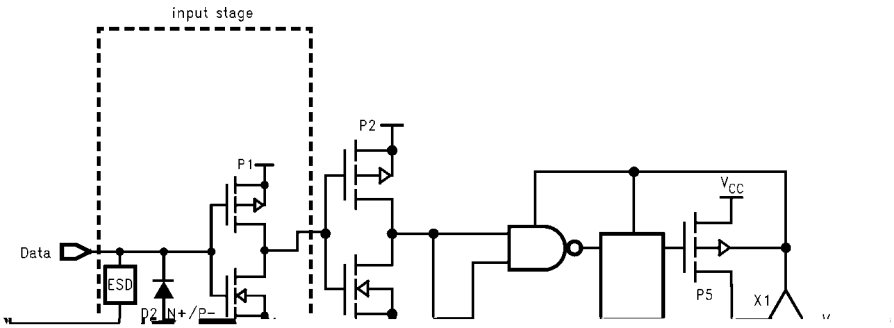
Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25°C$ Typical	Units
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50$ pF, $V_{IH} = 3.3V$, $V_{IL} = 0V$	3.3	0.8	V
		$C_L = 30$ pF, $V_{IH} = 2.5V$, $V_{IL} = 0V$	2.5	0.6	
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50$ pF, $V_{IH} = 3.3V$, $V_{IL} = 0V$	3.3	–0.8	V
		$C_L = 30$ pF, $V_{IH} = 2.5V$, $V_{IL} = 0V$	2.5	–0.6	

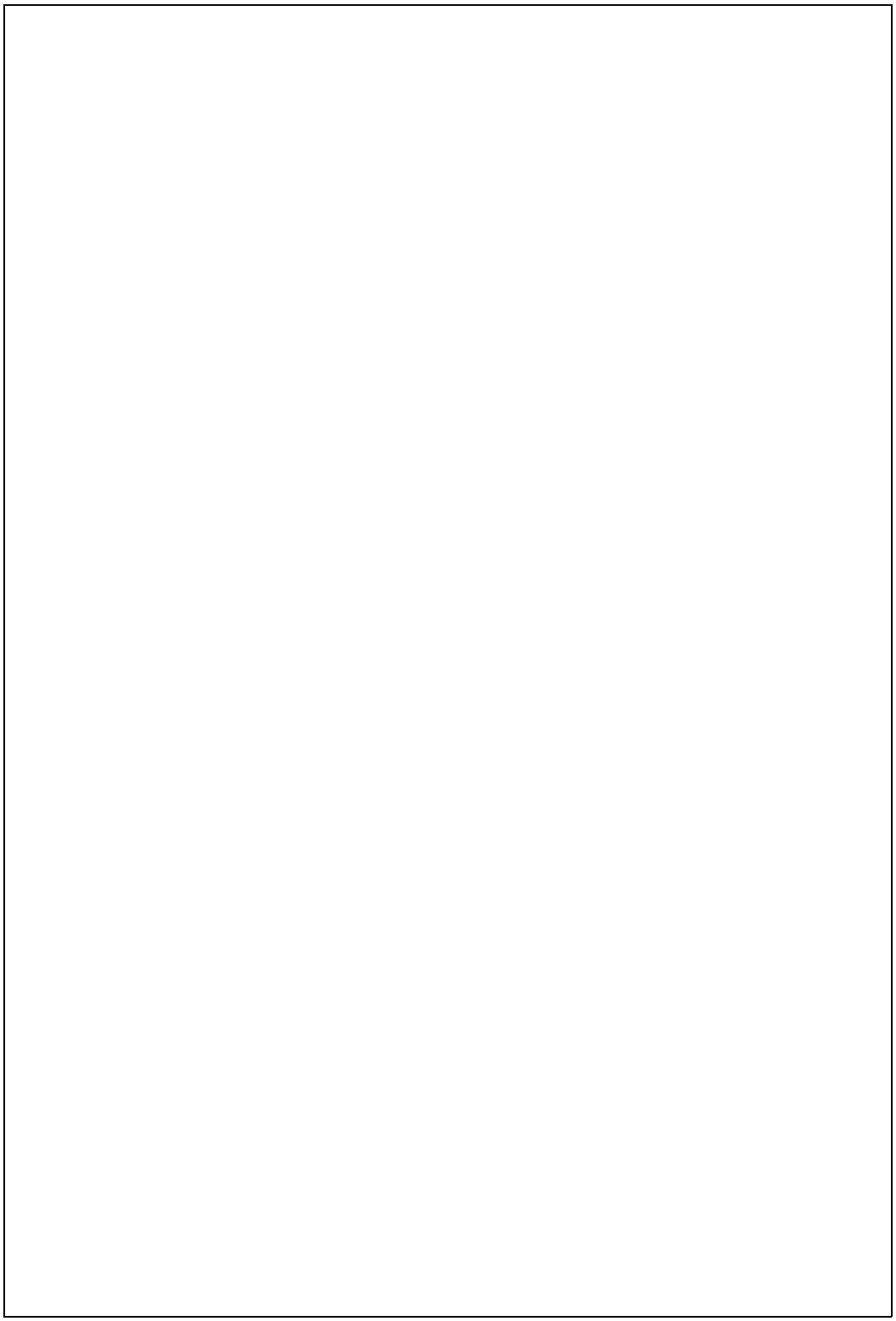
Capacitance

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	20	pF

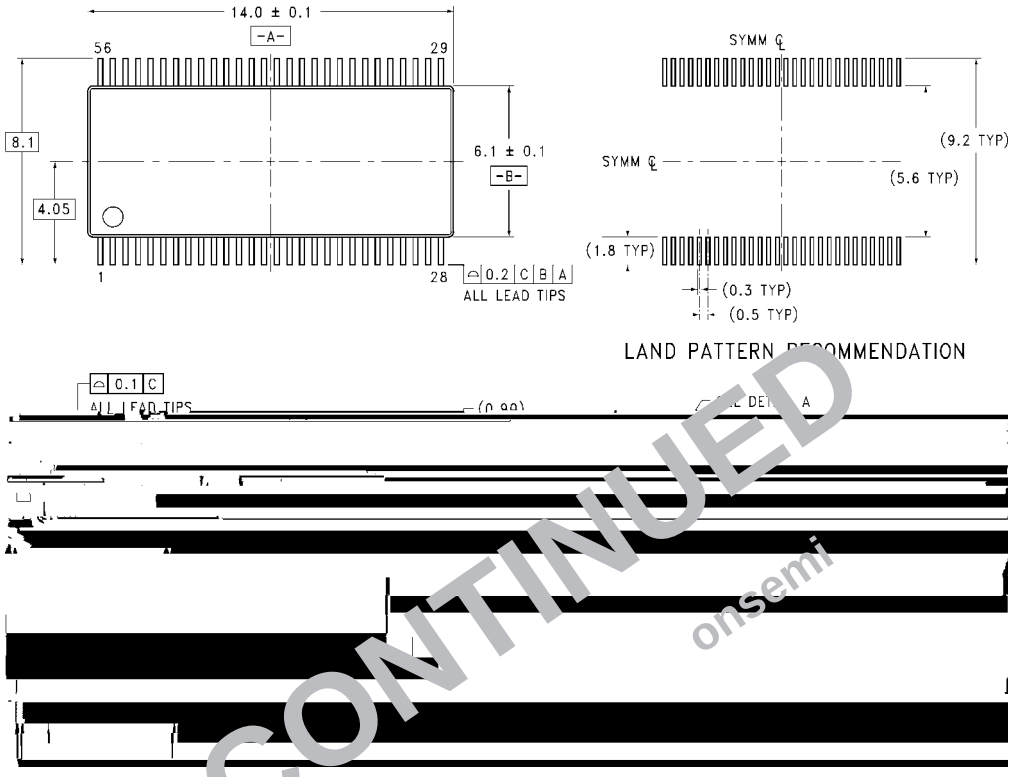


Schematic Diagram Generic for LCX Family





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



Package Number MTD56