

74LCX125

Low-Voltage Quad Buffer with 5V Tolerant Inputs and Outputs

General Description

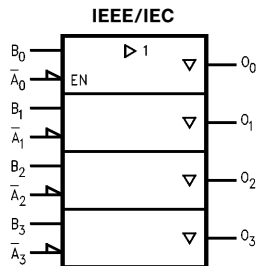
The LCX125 contains four independent non-inverting buffers with TRI-STATE outputs. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

Features

- 5V tolerant inputs and outputs
- 6.0 ns t_{PD} max, 10 μ A I_{CCQ} max
- Power down high impedance inputs and outputs

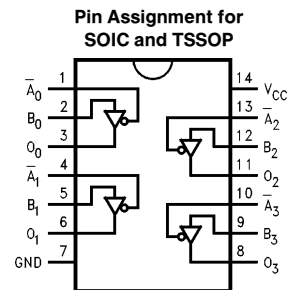
- Supports live insertion/withdrawal
- 2.0V–3.6V V_{CC} supply operation
- ± 24 mA output drive
- Implements patented Quiet Series™ noise/EMI reduction circuitry
- Functionally compatible with 74 series 125
- Latch-up performance exceeds 500 mA
- ESD performance:
 - Human body model > 2000V
 - Machine model > 100V

Logic Symbol



TL/F/12416-1

Connection Diagram



TL/F/12416-2

Pin Names	Description
A_n, B_n	Inputs
O_n	Outputs

Truth Table

Inputs		Output
A_n	B_n	O_n
L	L	L
L	H	H
H	X	Z

H = HIGH Voltage Level
 L = LOW Voltage Level
 Z = High Impedance
 X = Immaterial

	SOIC JEDEC	SOIC EIAJ	TSSOP
Order Number	74LCX125M 74LCX125MX	74LCX125SJ 74LCX125SJX	74LCX125MTC 74LCX125MTCX
See NS Package Number	M14A	M14D	MTC14

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 Quiet Series™ is a trademark of National Semiconductor Corporation.

Absolute Maximum Ratings (Note 1)

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

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	Output in TRI-STATE	V
		-0.5 to $V_{CC} + 0.5$	Output in High or Low State (Note 2)	V
I_{IK}	DC Input Diode Current	-50	$V_I < GND$	mA
I_{OK}	DC Output Diode Current	-50	$V_O < GND$	mA
		+50	$V_O > V_{CC}$	
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		$^{\circ}C$

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.

Note 2: I_O Absolute Maximum Rating must be observed.

Recommended Operating Conditions

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
		TRI-STATE	0	5.5	
I_{OH}/I_{OL}	Output Current		± 24 ± 12	mA	
T_A	Free-Air Operating Temperature	-40	85	$^{\circ}C$	
$\Delta t/\Delta V$	Input Edge Rate, $V_{IN} = 0.8V-2.0V$, $V_{CC} = 3.0V$	0	10	ns/V	

DC Electrical Characteristics

Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = -40^{\circ}C$ to $+85^{\circ}C$		Units
				Min	Max	
V_{IH}	HIGH Level Input Voltage		2.7-3.6	2.0		V
V_{IL}	LOW Level Input Voltage		2.7-3.6		0.8	V
V_{OH}	HIGH Level Output Voltage	$I_{OH} = -100 \mu A$	2.7-3.6	$V_{CC} - 0.2$		V
		$I_{OH} = -12 mA$	2.7	2.2		V
		$I_{OH} = -18 mA$	3.0	2.4		V
		$I_{OH} = -24 mA$	3.0	2.2		V
V_{OL}	LOW Level Output Voltage	$I_{OL} = 100 \mu A$	2.7-3.6		0.2	V
		$I_{OL} = 12 mA$	2.7		0.4	V
		$I_{OL} = 16 mA$	3.0		0.4	V
		$I_{OL} = 24 mA$	3.0		0.55	V
I_I	Input Leakage Current	$0 \leq V_I \leq 5.5V$	2.7-3.6		± 5.0	μA
I_{OZ}	TRI-STATE Output Leakage	$0 \leq V_O \leq 5.5V$ $V_I = V_{IH}$ or V_{IL}	2.7-3.6		± 5.0	μA
I_{OFF}	Power-Off Leakage Current	V_I or $V_O = 5.5V$	0		10	μA
I_{CC}	Quiescent Supply Current	$V_I = V_{CC}$ or GND	2.7-3.6		10	μA
		$3.6V \leq V_I, V_O \leq 5.5V$	2.7-3.6		± 10	μA
ΔI_{CC}	Increase in I_{CC} per Input	$V_{IH} = V_{CC} - 0.6V$	2.7-3.6		500	μA

AC Electrical Characteristics

Symbol	Parameter	$T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$				Units
		$V_{CC} = 3.3\text{V} \pm 0.3\text{V}$		$V_{CC} = 2.7\text{V}$		
		Min	Max	Min	Max	
t_{PHL} t_{PLH}	Propagation Delay	1.5 1.5	6.0 6.0	1.5 1.5	6.5 6.5	ns
t_{PZL} t_{PZH}	Output Enable Time	1.5 1.5	7.0 7.0	1.5 1.5	8.0 8.0	ns
t_{PLZ} t_{PHZ}	Output Disable Time	1.5 1.5	6.0 6.0	1.5 1.5	7.0 7.0	ns
t_{OSHL} t_{OSLH}	Output to Output Skew (Note 3)		1.0 1.0			ns

Note 3: 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}).

Dynamic Switching Characteristics

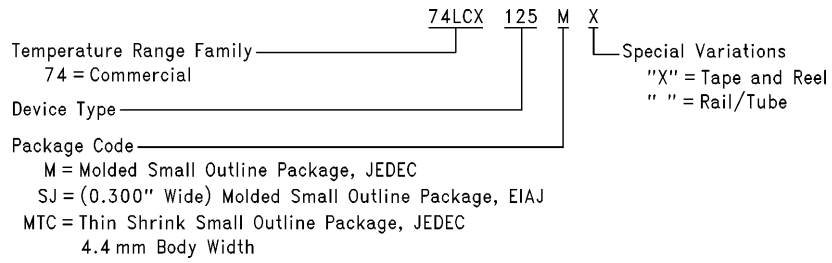
Symbol	Parameter	Conditions	V_{CC} (V)	$T_A = 25^{\circ}\text{C}$	Units
				Typical	
V_{OLP}	Quiet Output Dynamic Peak V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	0.8	V
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	$C_L = 50\text{ pF}, V_{IH} = 3.3\text{V}, V_{IL} = 0\text{V}$	3.3	-0.8	V

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	$V_{CC} = \text{Open}, V_I = 0\text{V or } V_{CC}$	7	pF
C_{OUT}	Output Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}$	8	pF
C_{PD}	Power Dissipation Capacitance	$V_{CC} = 3.3\text{V}, V_I = 0\text{V or } V_{CC}, F = 10\text{ MHz}$	25	pF

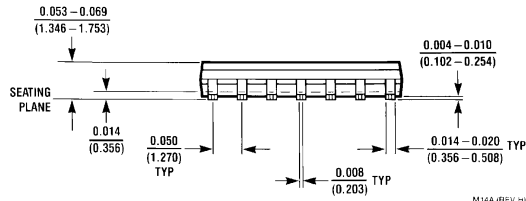
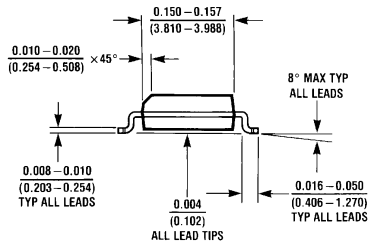
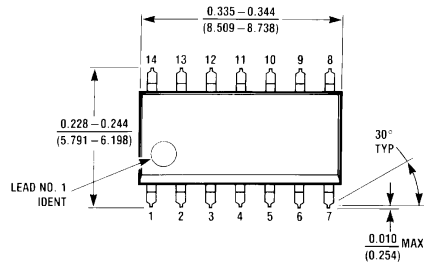
74LCX125 Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



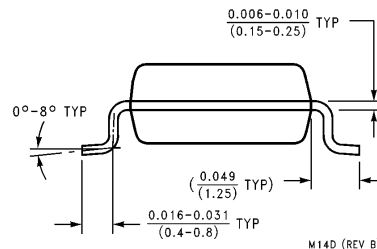
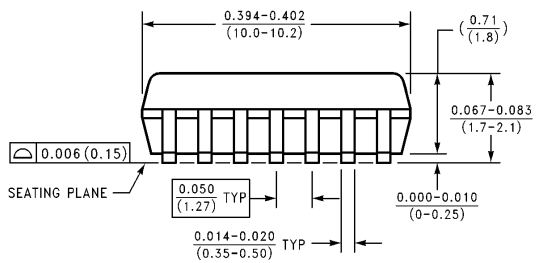
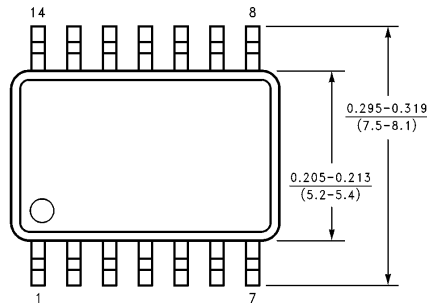
TL/F/12416-3

Physical Dimensions inches (millimeters) unless otherwise noted



M14A (REV H)

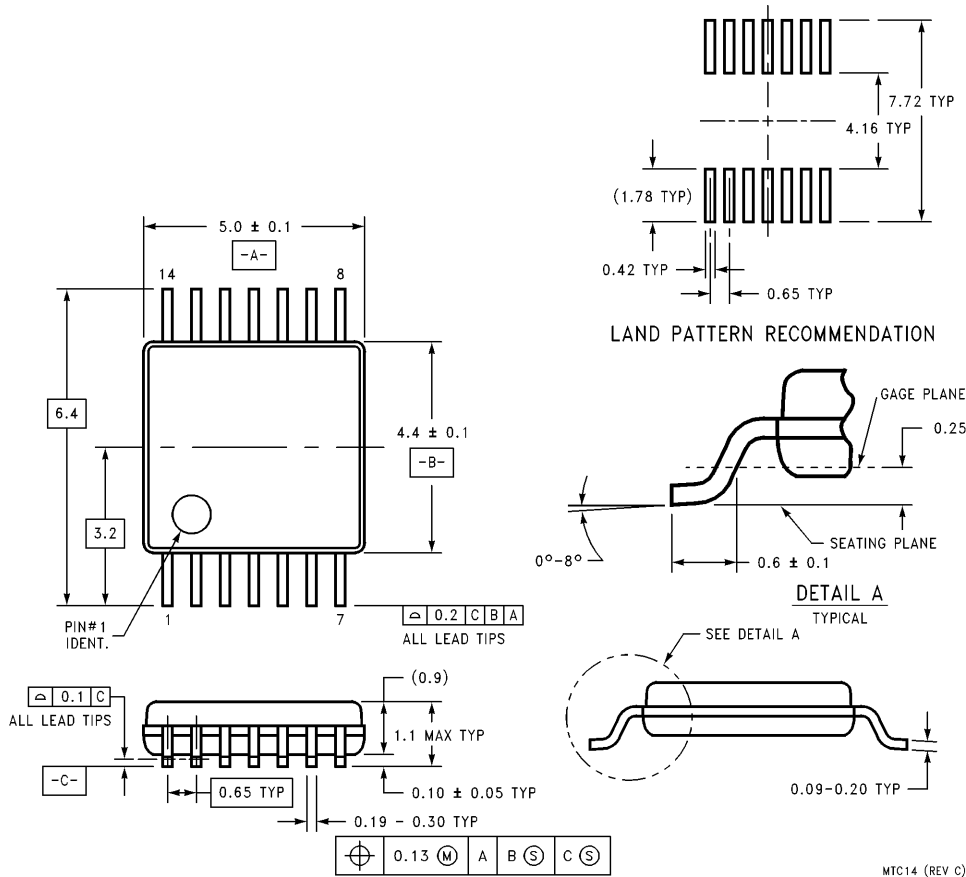
14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC
Order Number 74LCX125M or 74LCX125MX
NS Package Number M14A



M14D (REV B)

14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ
Order Number 74LCX125SJ or 74LCX125SJX
NS Package Number M14D

Physical Dimensions millimeters (Continued)



14-Lead Thin Shrink Small Outline Package (MTC)
Order Number 74LCX125MTC or 74LCX125MTCX
NS Package Number MTC14

MTC14 (REV C)

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