FAIRCHILD

SEMICONDUCTOR ™

74LCX08
Low Voltage Quad 2-Input AND Gate with 5V Tolerant Inputs

General Description

The LCX08 contains four 2-input AND gates. The inputs tolerate voltages up to 7V allowing the interface of 5V systems to 3V systems.

Features

- 5V tolerant inputs
- 5.5 ns t_{PD} max, 10 μA 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 noise/EMI reduction circuitry
- Functionally compatible with 74 series 08
- Latch-up performance exceeds 500 mA
- ESD performance:
 Human body model > 2000V
  Machine model > 150V

Ordering Code:

Order Number	Package Number	Package Description
74LCX08M	M14A	14-Lead Small Outline Package, SOIC, JEDEC
74LCX08SJ	M14D	14-Lead Small Outline Package, SOIC, EIAJ
74LCX08MTC	MTC14	14-Lead Thin Shrink Small Outline Package, TSSOP

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

Logic Symbol

IEEE/IEC

DS012411-1
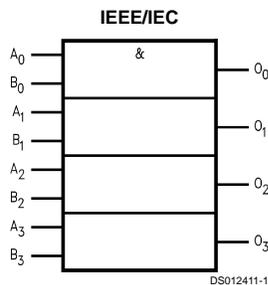
Connection Diagram

**Pin Assignment
for SOIC JEDEC, EIAJ and TSSOP**

DS012411-2
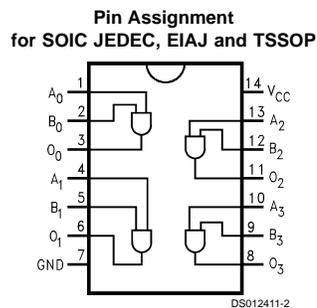
Pin Descriptions

Pin Names	Description
A_n, B_n	Inputs
O_n	Outputs

Absolute Maximum Ratings (Note 1)

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 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		˚C

Recommended Operating Conditions (Note 3)

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
I_{OH}/I_{OL}	Output Current	V_{CC} = 3.0V – 3.6V		±24	mA
		V_{CC} = 2.7V		±12	
T_A	Free-Air Operating Temperature		−40	85	˚C
$\Delta t/\Delta V$	Input Edge Rate, V_{IN} = 0.8V–2.0V, V_{CC} = 3.0V		0	10	ns/V

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: I_O Absolute Maximum Rating must be observed.

Note 3: Unused inputs must be held HIGH or LOW. They may not float.

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		2.7–3.6	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 µA	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 µA	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 ≤ V_I ≤ 5.5V	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 ≤ V_I ≤ 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°C to +85°C, C_L = 80pF, R_L = 500 Ω				Units
		V_{CC} = 3.3V ±0.3V		V_{CC} = 2.7V		
		Min	Max	Min	Max	
t_{PLH}	Propagation Delay	1.5	5.5	1.5	6.2	ns
t_{PHL}		1.5	5.5	1.5	6.2	
t_{OSLH}	Output to Output Skew		1.0			ns
t_{OSHL}	(Note 4)		1.0			

Note 4: 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°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
V_{OLV}	Quiet Output Dynamic Valley V_{OL}	C_L = 50 pF, V_{IH} = 3.3V, V_{IL} = 0V	3.3	−0.8	V

Capacitance

Symbol	Parameter	Conditions	Typical	Units
C_{IN}	Input Capacitance	V_{CC} = Open, V_I = 0V or V_{CC}	7	pF
C_{OUT}	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
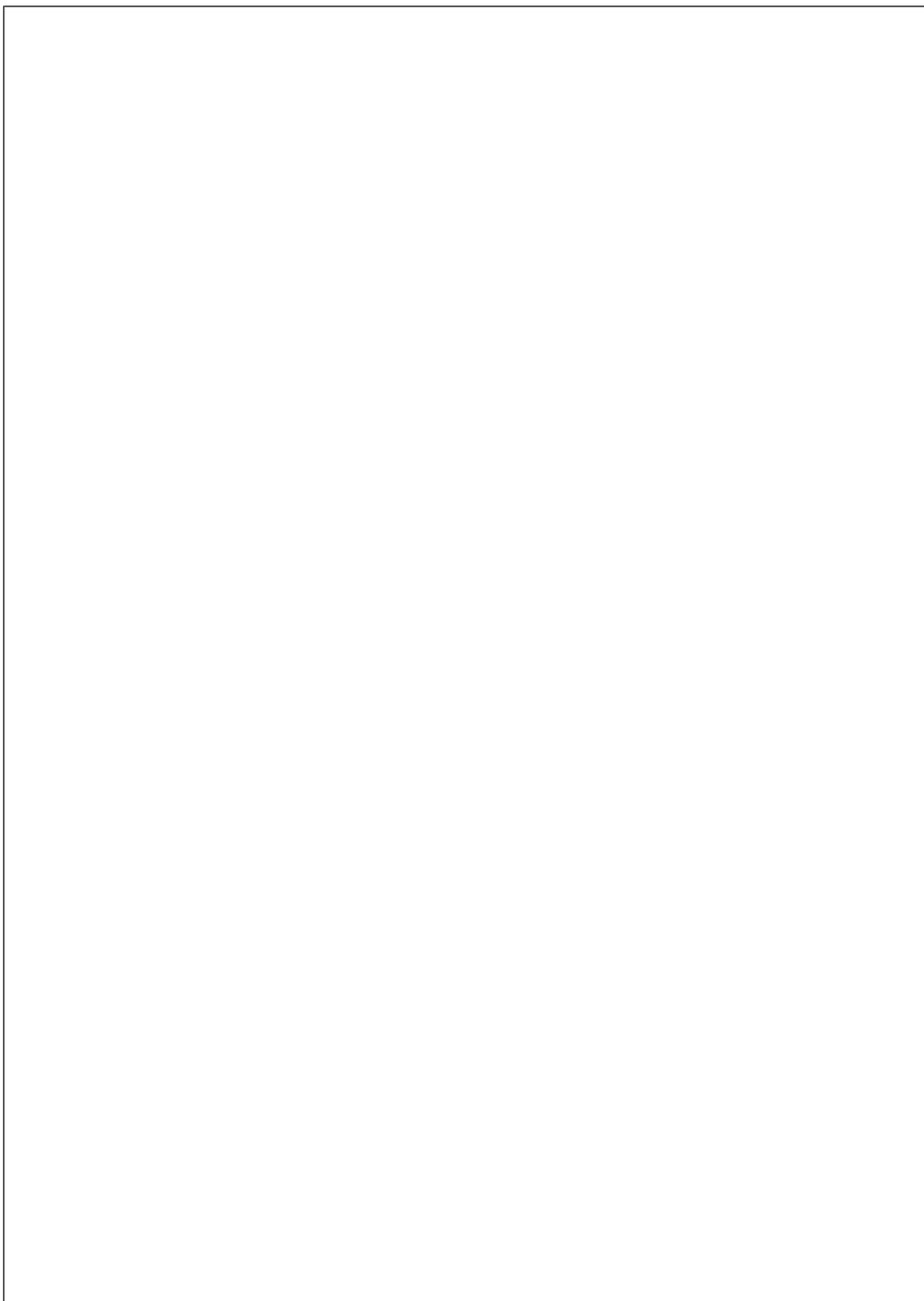
# Physical Dimensions inches (millimeters) unless otherwise noted

$\frac{0.335 - 0.344}{(8.509 - 8.738)}$

14 13 12 11 10 9 8

$\frac{0.228 - 0.244}{(5.791 - 6.198)}$

LEAD NO. 1
IDENT

1 2 3 4 5 6 7

30°
TYP

$\frac{0.010}{(0.254)}$ MAX

$\frac{0.150 - 0.157}{(3.810 - 3.988)}$

$\frac{0.010 - 0.020}{(0.254 - 0.508)}$ ×45°

8° MAX TYP
ALL LEADS

$\frac{0.008 - 0.010}{(0.203 - 0.254)}$
TYP ALL LEADS

$\frac{0.004}{(0.102)}$
ALL LEAD TIPS

$\frac{0.016 - 0.050}{(0.406 - 1.270)}$
TYP ALL LEADS

$\frac{0.053 - 0.069}{(1.346 - 1.753)}$

$\frac{0.004 - 0.010}{(0.102 - 0.254)}$

SEATING
PLANE

$\frac{0.014}{(0.356)}$

$\frac{0.050}{(1.270)}$
TYP

$\frac{0.008}{(0.203)}$ TYP

$\frac{0.014 - 0.020}{(0.356 - 0.508)}$ TYP
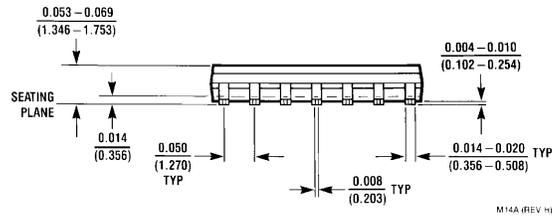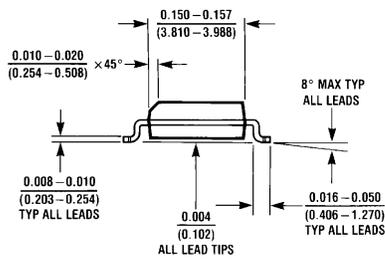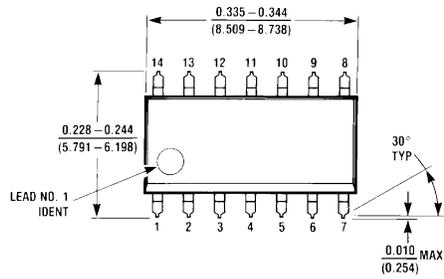
M14A (REV H)

14-Lead Small Outline Package JEDEC (M)
Package Number M14A

14   8

$\frac{0.295 - 0.319}{(7.5 - 8.1)}$

$\frac{0.205 - 0.213}{(5.2 - 5.4)}$

1   7

$\frac{0.394 - 0.402}{(10.0 - 10.2)}$

$\left(\frac{0.71}{1.8}\right)$

$\frac{0.067 - 0.083}{(1.7 - 2.1)}$

⌂ 0.006 (0.15)

SEATING PLANE

$\frac{0.050}{(1.27)}$ TYP

$\frac{0.014 - 0.020}{(0.35 - 0.50)}$ TYP

$\frac{0.000 - 0.010}{(0 - 0.25)}$

$\frac{0.006 - 0.010}{(0.15 - 0.25)}$ TYP

0° - 8° TYP

$\left(\frac{0.049}{1.25}\right)$ TYP

$\frac{0.016 - 0.031}{(0.4 - 0.8)}$ TYP
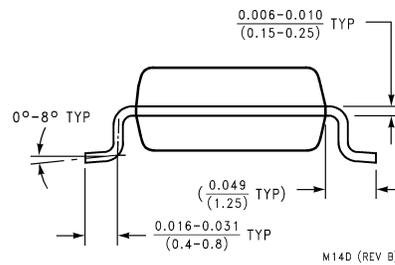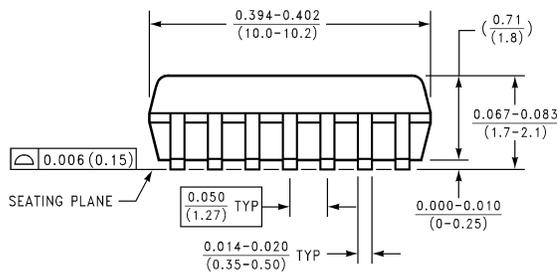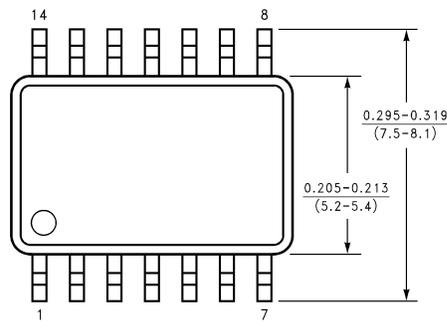
M14D (REV B)

14-Lead Small Outline Package EIAJ (SJ)
Package Number M14D

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

7.72 TYP

4.16 TYP

(1.78 TYP)

0.42 TYP

0.65 TYP

LAND PATTERN RECOMMENDATION

5.0 ± 0.1

−A−

14   8

6.4

4.4 ± 0.1

−B−

3.2

PIN #1
IDENT.   1   7

�', '0.2 C B A

ALL LEAD TIPS

GAGE PLANE

0.25

0°−8°

0.6 ± 0.1

SEATING PLANE

DETAIL A
TYPICAL

SEE DETAIL A

0.09−0.20 TYP

0.1 C

ALL LEAD TIPS

−C−

(0.9)

1.1 MAX TYP

0.65 TYP

0.10 ± 0.05 TYP

0.19 − 0.30 TYP

⊕ 0.13 Ⓜ A B Ⓢ C Ⓢ

MTC14 (REV C)
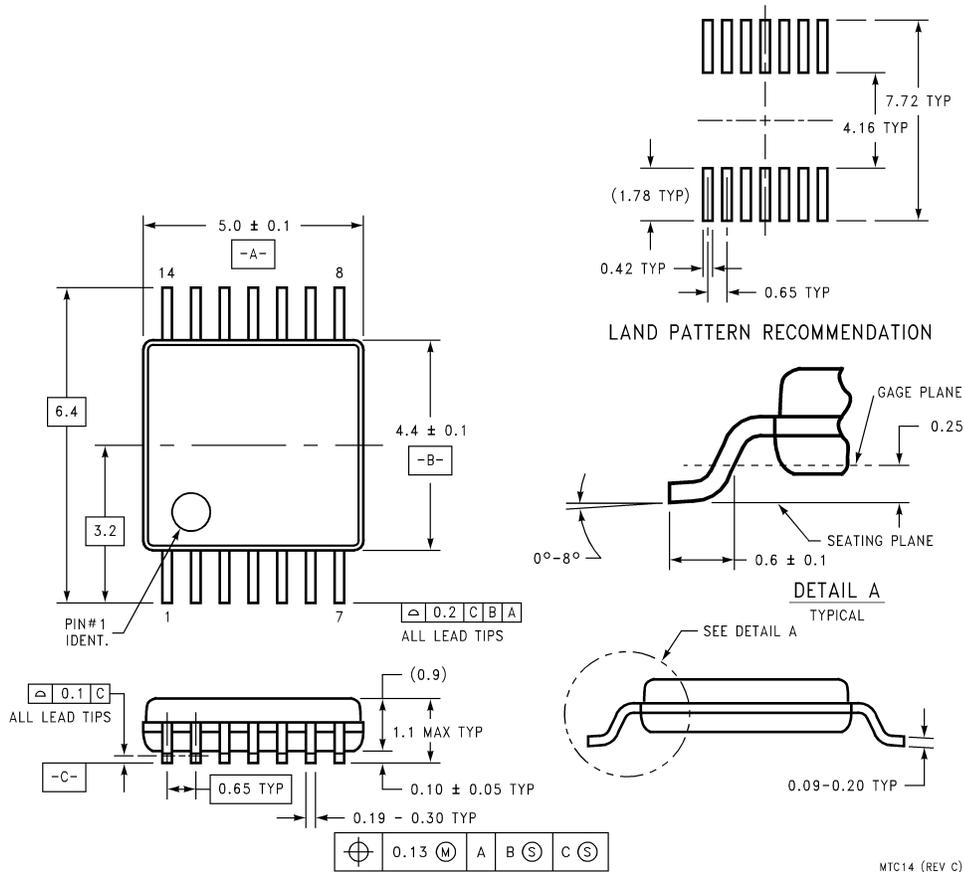
**14-Lead Thin Shrink Small Outline Package, JEDEC
Package Number MTC14**