

Quad 2-Input AND Gate

MM74HCT08

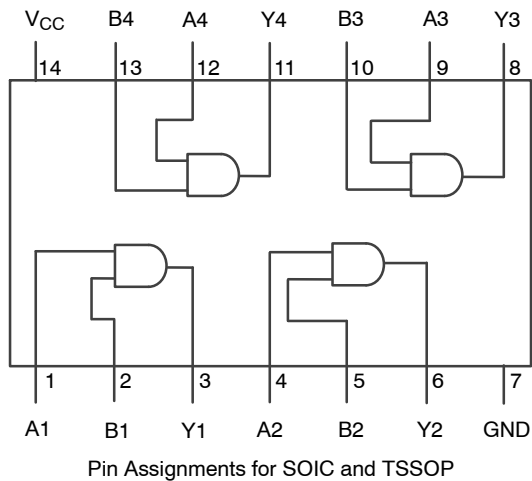
General Description

The MM74HCT08 is a logic function fabricated by using advanced silicon-gate CMOS technology which provides the inherent benefits of CMOS — low quiescent power and wide power supply range. This device is input and output characteristic and pinout compatible with standard 74LS logic families. All inputs are protected from static discharge damage by internal diodes to V_{CC} and ground.

MM74HCT devices are intended to interface between TTL and NMOS components and standard CMOS devices. These parts are also plug-in replacements for LS-TTL devices and can be used to reduce power consumption in existing designs.

Features

- TTL, LS Pin-out and Threshold Compatible
- Fast Switching: t_{PLH} , t_{PHL} = 9 ns (Typ.)
- Low Power: 10 μ W at DC
- High Fan-out, 10 LS-TTL Loads
- This Device is Pb-Free and Halide Free



Pin Assignments for SOIC and TSSOP

Figure 1. Connection Diagram

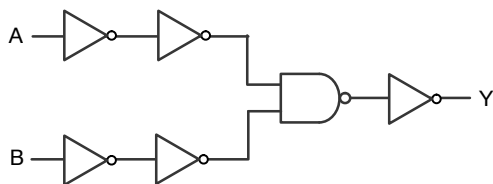
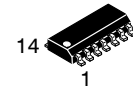
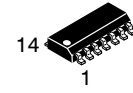


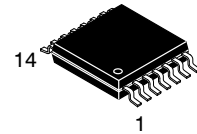
Figure 2. Logic Diagram



SOIC-14 NB
CASE 751A-03

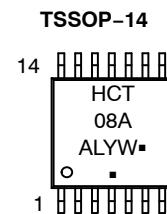
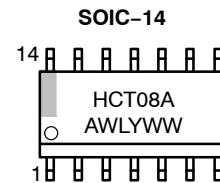


SOIC14
CASE 751EF



TSSOP-14 WB
CASE 948G-01

MARKING DIAGRAMS



HCT08A = Specific Device Code
A = Assembly Location
WL, L = Wafer Lot Number
Y = Year
WW, YW = Work Week

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

MM74HCT08

ABSOLUTE MAXIMUM RATINGS (Note 1)

| Symbol | Rating | Min | Max | Unit |
|------------------|--|------|----------------|------|
| V_{CC} | Supply Voltage | -0.5 | +7.0 | V |
| V_{IN} | DC Input Voltage | -0.5 | $V_{CC} + 0.5$ | V |
| V_{OUT} | DC Output Voltage | -0.5 | $V_{CC} + 0.5$ | V |
| I_{IK}, I_{OK} | Clamp Diode Current | | ± 20 | mA |
| I_{OUT} | DC Output Current, per pin | | ± 25 | mA |
| I_{CC} | DC V_{CC} or GND Current, per pin | | ± 50 | mA |
| T_{STG} | Storage Temperature Range | -65 | +150 | °C |
| P_D | Power Dissipation | | 500 | mW |
| | SOIC Package only | | | |
| T_L | Lead Temperature (Soldering 10 second) | | 260 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Unless otherwise specified all voltages are referenced to ground.

RECOMMENDED OPERATING CONDITIONS

| Symbol | Parameter | Min | Max | Unit |
|-------------------|-----------------------------|-----|----------|------|
| V_{CC} | Supply Voltage | 4.5 | 5.5 | V |
| V_{IN}, V_{OUT} | DC Input or Output Voltage | 0 | V_{CC} | V |
| T_A | Operating Temperature Range | -55 | +125 | °C |
| t_r, t_f | Input Rise or Fall Times | - | 500 | ns |

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

MM74HCT08

DC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5\text{ V} \pm 10\%$, unless otherwise specified)

| Symbol | Parameter | Conditions | $T_A = 25^\circ\text{C}$ | | $T_A = -40\text{ to }85^\circ\text{C}$ | $T_A = -55\text{ to }125^\circ\text{C}$ | Unit |
|----------|-----------------------------------|--|--------------------------|-------------------|--|---|---------------|
| | | | Typ | Guaranteed Limits | | | |
| V_{IH} | Minimum HIGH Level Input Voltage | | | 2.0 | 2.0 | 2.0 | V |
| V_{IL} | Maximum LOW Level Input Voltage | | | 0.8 | 0.8 | 0.8 | V |
| V_{OH} | Minimum HIGH Level Output Voltage | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 20\ \mu\text{A}$ | V_{CC} | $V_{CC} - 0.1$ | $V_{CC} - 0.1$ | $V_{CC} - 0.1$ | V |
| | | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 4.0\ \text{mA}$, $V_{CC} = 4.5\ \text{V}$ | 4.2 | 3.98 | 3.84 | 3.7 | |
| | | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 4.8\ \text{mA}$, $V_{CC} = 5.5\ \text{V}$ | 5.2 | 4.98 | 4.84 | 4.7 | |
| V_{OL} | Maximum LOW Level Voltage | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 20\ \mu\text{A}$ | 0 | 0.1 | 0.1 | 0.1 | V |
| | | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 4.0\ \text{mA}$, $V_{CC} = 4.5\ \text{V}$ | 0.2 | 0.26 | 0.33 | 0.4 | |
| | | $V_{IN} = V_{IH}\text{ or }V_{IL}$, $ I_{OUT} = 4.8\ \text{mA}$, $V_{CC} = 5.5\ \text{V}$ | 0.2 | 0.26 | 0.33 | 0.4 | |
| I_{IN} | Maximum Input Current | $V_{IN} = V_{CC}\text{ or GND}$, $V_{IH}\text{ or }V_{IL}$ | | ± 0.1 | ± 1.0 | ± 1.0 | μA |
| I_{CC} | Maximum Quiescent Supply Current | $V_{IN} = V_{CC}\text{ or GND}$, $I_{OUT} = 0\ \mu\text{A}$ | | 2.0 | 20 | 40 | μA |
| | | $V_{IN} = 2.4\ \text{V}\text{ or }0.5\ \text{V}$ (Note 2) | | 1.2 | 1.4 | 1.5 | mA |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. This is measured per input with all other inputs held at V_{CC} or ground.

AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5.0\ \text{V}$, $t_r = t_f = 6\ \text{ns}$, $C_L = 15\ \text{pF}$, $T_A = 25^\circ\text{C}$)

| Symbol | Parameter | Conditions | Typ | Guaranteed Limit | Unit |
|-----------------------|---------------------------|------------|-----|------------------|------|
| t_{PLH} , t_{PHL} | Maximum Propagation Delay | | 9 | 15 | ns |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

AC ELECTRICAL CHARACTERISTICS ($V_{CC} = 5.0\ \text{V} \pm 10\%$, $t_r = t_f = 6\ \text{ns}$, $C_L = 50\ \text{pF}$)

| Symbol | Parameter | Conditions | $T_A = 25^\circ\text{C}$ | | $T_A = -40\text{ to }85^\circ\text{C}$ | $T_A = -55\text{ to }125^\circ\text{C}$ | Unit |
|-----------------------|-----------------------------------|------------|--------------------------|-------------------|--|---|------|
| | | | Typ | Guaranteed Limits | | | |
| t_{PLH} , t_{PHL} | Maximum Propagation Delay | | 11 | 18 | 23 | 27 | ns |
| t_{THL} , t_{TLH} | Maximum Output Rise and Fall Time | | 7 | 15 | 19 | 22 | ns |
| C_{PD} | Power Dissipation Capacitance | (Note 3) | 38 | | | | pF |
| C_{IN} | Input Capacitance | | 5 | 10 | 10 | 10 | pF |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. C_{PD} determines the no load dynamic power consumption, $P_D = C_{PD} V_{CC}^2 f + I_{CC} V_{CC}$, and the no load dynamic current consumption, $I_S = C_{PD} V_{CC} f + I_{CC}$.

MM74HCT08

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|---------------|--|--------------------------|
| MM74HCT08M | SOIC-14 NB, Case 751A-03 (Pb-Free and Halide Free) | 55 Units / Tube |
| MM74HCT08MX | SOIC 14, Case 751EF (Pb-Free and Halide Free) | 2500 Units / Tape & Reel |
| MM74HCT08MTC | TSSOP-14 WB, Case 948G-01 (Pb-Free and Halide Free) | 96 Units / Tube |
| MM74HCT08MTCX | | 2500 Units / Tape & Reel |

For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

NOTE: All packages are lead free per JEDEC: J-STD-020B standard.

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



SCALE 1:1

SOIC-14 NB
CASE 751A-03
ISSUE L

DATE 03 FEB 2016



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF AT MAXIMUM MATERIAL CONDITION.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD PROTRUSIONS.
5. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.

| DIM | MILLIMETERS | | INCHES | |
|-----|-------------|------|-----------|-------|
| | MIN | MAX | MIN | MAX |
| A | 1.35 | 1.75 | 0.054 | 0.068 |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 |
| A3 | 0.19 | 0.25 | 0.008 | 0.010 |
| b | 0.35 | 0.49 | 0.014 | 0.019 |
| D | 8.55 | 8.75 | 0.337 | 0.344 |
| E | 3.80 | 4.00 | 0.150 | 0.157 |
| e | 1.27 BSC | | 0.050 BSC | |
| H | 5.80 | 6.20 | 0.228 | 0.244 |
| h | 0.25 | 0.50 | 0.010 | 0.019 |
| L | 0.40 | 1.25 | 0.016 | 0.049 |
| M | 0° | 7° | 0° | 7° |

SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



- XXXXXX = Specific Device Code
- A = Assembly Location
- WL = Wafer Lot
- Y = Year
- WW = Work Week
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

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SOIC-14
CASE 751A-03
ISSUE L

DATE 03 FEB 2016

STYLE 1:
 PIN 1. COMMON CATHODE
 2. ANODE/CATHODE
 3. ANODE/CATHODE
 4. NO CONNECTION
 5. ANODE/CATHODE
 6. NO CONNECTION
 7. ANODE/CATHODE
 8. ANODE/CATHODE
 9. ANODE/CATHODE
 10. NO CONNECTION
 11. ANODE/CATHODE
 12. ANODE/CATHODE
 13. NO CONNECTION
 14. COMMON ANODE

STYLE 2:
 CANCELLED

STYLE 3:
 PIN 1. NO CONNECTION
 2. ANODE
 3. ANODE
 4. NO CONNECTION
 5. ANODE
 6. NO CONNECTION
 7. ANODE
 8. ANODE
 9. ANODE
 10. NO CONNECTION
 11. ANODE
 12. ANODE
 13. NO CONNECTION
 14. COMMON CATHODE

STYLE 4:
 PIN 1. NO CONNECTION
 2. CATHODE
 3. CATHODE
 4. NO CONNECTION
 5. CATHODE
 6. NO CONNECTION
 7. CATHODE
 8. CATHODE
 9. CATHODE
 10. NO CONNECTION
 11. CATHODE
 12. CATHODE
 13. NO CONNECTION
 14. COMMON ANODE

STYLE 5:
 PIN 1. COMMON CATHODE
 2. ANODE/CATHODE
 3. ANODE/CATHODE
 4. ANODE/CATHODE
 5. ANODE/CATHODE
 6. NO CONNECTION
 7. COMMON ANODE
 8. COMMON CATHODE
 9. ANODE/CATHODE
 10. ANODE/CATHODE
 11. ANODE/CATHODE
 12. ANODE/CATHODE
 13. NO CONNECTION
 14. COMMON ANODE

STYLE 6:
 PIN 1. CATHODE
 2. CATHODE
 3. CATHODE
 4. CATHODE
 5. CATHODE
 6. CATHODE
 7. CATHODE
 8. ANODE
 9. ANODE
 10. ANODE
 11. ANODE
 12. ANODE
 13. ANODE
 14. ANODE

STYLE 7:
 PIN 1. ANODE/CATHODE
 2. COMMON ANODE
 3. COMMON CATHODE
 4. ANODE/CATHODE
 5. ANODE/CATHODE
 6. ANODE/CATHODE
 7. ANODE/CATHODE
 8. ANODE/CATHODE
 9. ANODE/CATHODE
 10. ANODE/CATHODE
 11. COMMON CATHODE
 12. COMMON ANODE
 13. ANODE/CATHODE
 14. ANODE/CATHODE

STYLE 8:
 PIN 1. COMMON CATHODE
 2. ANODE/CATHODE
 3. ANODE/CATHODE
 4. NO CONNECTION
 5. ANODE/CATHODE
 6. ANODE/CATHODE
 7. COMMON ANODE
 8. COMMON ANODE
 9. ANODE/CATHODE
 10. ANODE/CATHODE
 11. NO CONNECTION
 12. ANODE/CATHODE
 13. ANODE/CATHODE
 14. COMMON CATHODE

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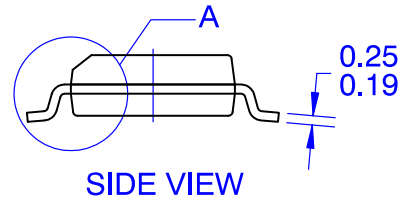
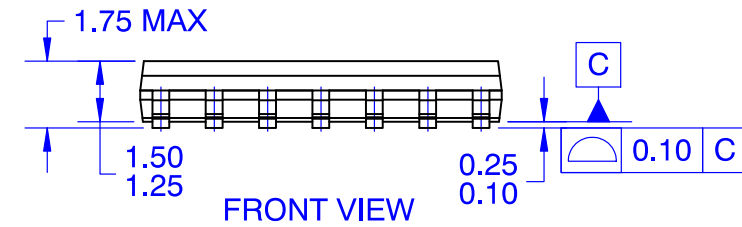
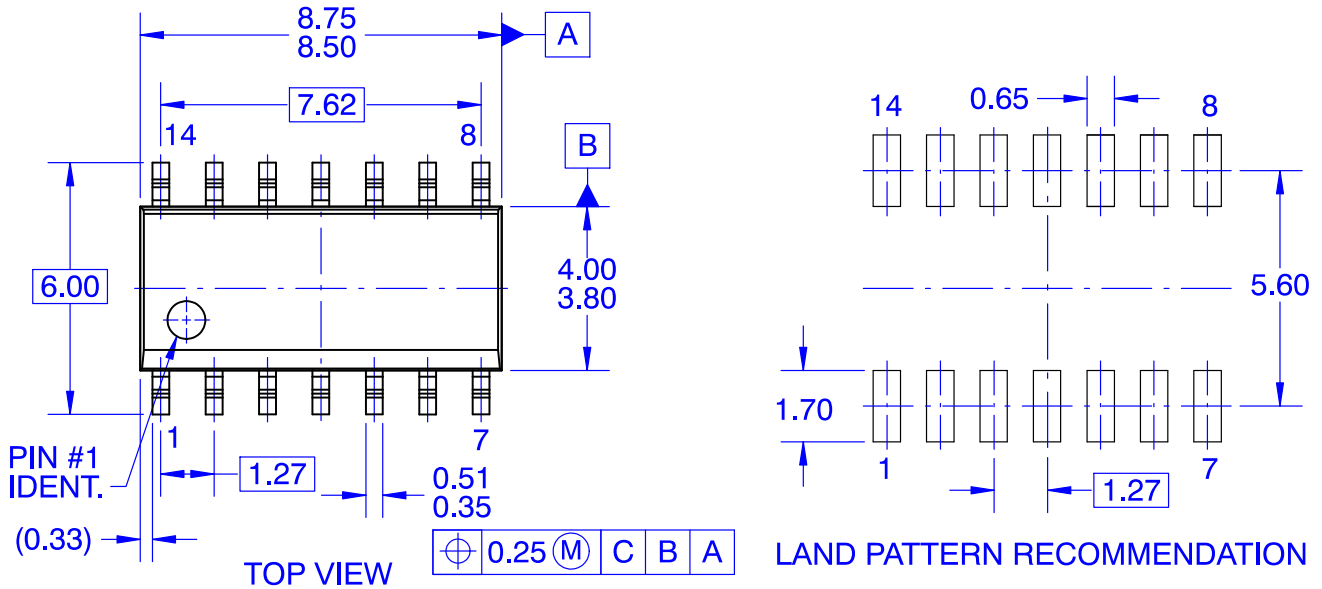
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®



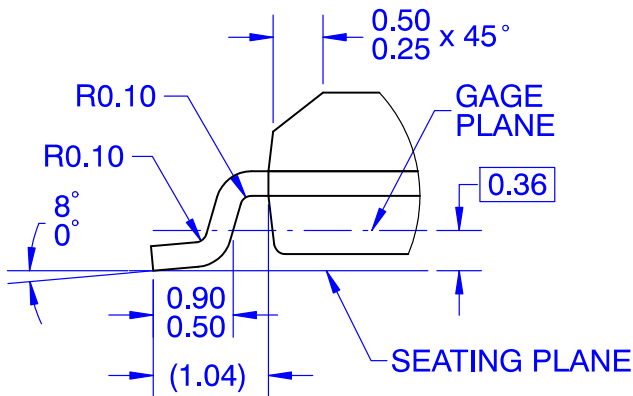
SOIC14
CASE 751EF
ISSUE O

DATE 30 SEP 2016



NOTES:

- A. CONFORMS TO JEDEC MS-012, VARIATION AB, ISSUE C
- B. ALL DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS
- D. LAND PATTERN STANDARD: SOIC127P600X145-14M
- E. CONFORMS TO ASME Y14.5M, 2009



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