## Single 2-Input AND Gate <br> MC74VHC1G08, MC74VHC1GT08

The MC74VHC1G08 / MC74VHC1GT08 is a single 2 input AND gate in tiny footprint packages. The MC74VHC1G08 has CMOS-level input thresholds while the MC74VHC1GT08 has TTL-level input thresholds.

The input structures provide protection when voltages up to 5.5 V are applied, regardless of the supply voltage. This allows the device to be used to interface 5 V circuits to 3 V circuits. Some output structures also provide protection when $\mathrm{V}_{\mathrm{CC}}=0 \mathrm{~V}$ and when the output voltage exceeds $\mathrm{V}_{\mathrm{CC}}$. These input and output structures help prevent device destruction caused by supply voltage - input/output voltage mismatch, battery backup, hot insertion, etc.

## Features

- Designed for 2.0 V to $5.5 \mathrm{~V} \mathrm{~V}_{\mathrm{CC}}$ Operation
- $3.5 \mathrm{~ns} \mathrm{t}_{\mathrm{PD}}$ at 5 V (typ)
- Inputs/Outputs Over-Voltage Tolerant up to 5.5 V
- I OFF Supports Partial Power Down Protection
- Source/Sink 8 mA at 3.0 V
- Available in SC-88A, SC-74A, SOT-953 and UDFN6 Packages
- Chip Complexity < 100 FETs
- -Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable
- These Devices are $\mathrm{Pb}-$ Free, Halogen Free/BFR Free and are RoHS Compliant


Figure 1. Logic Symbol

(Note: Microdot may be in either location)
*Date Code orientation and/or position may vary depending upon manufacturing location.

ORDERING INFORMATION
See detailed ordering, marking and shipping information on page 7 of this data sheet.

## MC74VHC1G08, MC74VHC1GT08


(SC-88A / SC-74A)

(SOT-953)

(UDFN6)

Figure 2. Pinout (Top View)
PIN ASSIGNMENT
(SC-88A / SC-74A)

| Pin | Function |
| :---: | :---: |
| 1 | B |
| 2 | A |
| 3 | GND |
| 4 | Y |
| 5 | $\mathrm{~V}_{\mathrm{CC}}$ |

PIN ASSIGNMENT (SOT-953)

| Pin | Function |
| :---: | :---: |
| 1 | A |
| 2 | GND |
| 3 | B |
| 4 | Y |
| 5 | $\mathrm{~V}_{\mathrm{CC}}$ |

PIN ASSIGNMENT (UDFN)

| Pin | Function |
| :---: | :---: |
| 1 | B |
| 2 | A |
| 3 | GND |
| 4 | Y |
| 5 | NC |
| 6 | $\mathrm{~V}_{\mathrm{CC}}$ |

FUNCTION TABLE

| Input |  | Output |
| :---: | :---: | :---: |
| A | B | Y |
| L | L | L |
| L | H | L |
| H | L | L |
| H | H | H |

## MC74VHC1G08, MC74VHC1GT08

MAXIMUM RATINGS

| Symbol | Characteristics | Value | Unit |
| :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | DC Supply Voltage | -0.5 to +6.5 | V |
| $\mathrm{V}_{\text {IN }}$ | DC Input Voltage | -0.5 to +6.5 | V |
| $\mathrm{V}_{\text {OUT }}$ | Active-Mode (High or Low State) Tri-State Mode (Note 1) Power-Down Mode $\left(\mathrm{V}_{\mathrm{CC}}=0 \mathrm{~V}\right)$ | $\begin{gathered} -0.5 \text { to } V_{\mathrm{CC}}+0.5 \\ -0.5 \text { to }+6.5 \\ -0.5 \text { to }+6.5 \end{gathered}$ | V |
| $\mathrm{I}_{\text {IK }}$ | DC Input Diode Current $\quad \mathrm{V}_{\text {IN }}<$ GND | -20 | mA |
| lok | DC Output Diode Current $\quad \mathrm{V}_{\text {OUT }}<\mathrm{GND}$ | -20 | mA |
| Iout | DC Output Source/Sink Current | $\pm 25$ | mA |
| $\mathrm{I}_{\text {CC }}$ or I IGND | DC Supply Current per Supply Pin or Ground Pin | $\pm 50$ | mA |
| TSTG | Storage Temperature Range | -65 to +150 | ${ }^{\circ} \mathrm{C}$ |
| TL | Lead Temperature, 1 mm from Case for 10 secs | 260 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{T}_{J}$ | Junction Temperature Under Bias | +150 | ${ }^{\circ} \mathrm{C}$ |
| $\theta_{\mathrm{JA}}$ | Thermal Resistance (Note 2) SC-88A <br> SC-74A  <br> SOT-553  <br> SOT-953  <br> UDFN6  | $\begin{aligned} & 377 \\ & 320 \\ & 324 \\ & 254 \\ & 154 \end{aligned}$ | ${ }^{\circ} \mathrm{C} / \mathrm{W}$ |
| $P_{\text {D }}$ | Power Dissipation in Still Air SC-88A <br> SC-74A  <br> SOT-553  <br> SOT-953  <br>  UDFN6 | $\begin{aligned} & 332 \\ & 390 \\ & 386 \\ & 491 \\ & 812 \end{aligned}$ | mW |
| MSL | Moisture Sensitivity | Level 1 | - |
| $\mathrm{F}_{\mathrm{R}}$ | Flammability Rating Oxygen Index: 28 to 34 | UL 94 V-0 @ 0.125 in | - |
| $\mathrm{V}_{\text {ESD }}$ | ESD Withstand Voltage (Note 3) $\begin{gathered}\text { Human Body Model } \\ \text { Charged Device Model }\end{gathered}$ | $\begin{aligned} & 2000 \\ & 1000 \end{aligned}$ | V |
| ILatchup | Latchup Performance (Note 4) | $\pm 100$ | mA |

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. Applicable to devices with outputs that may be tri-stated.
2. Measured with minimum pad spacing on an FR4 board, using 10 mm -by-1inch, 2 ounce copper trace no air flow per JESD51-7.
3. HBM tested to ANSI/ESDA/JEDEC JS-001-2017. CDM tested to EIA/JESD22-C101-F. JEDEC recommends that ESD qualification to EIA/JESD22-A115-A (Machine Model) be discontinued per JEDEC/JEP172A.
4. Tested to EIA/JESD78 Class II.

## MC74VHC1G08, MC74VHC1GT08

RECOMMENDED OPERATING CONDITIONS

| Symbol | Characteristics |  | Min | Max | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{V}_{\mathrm{CC}}$ | Positive DC Supply Voltage |  | 2.0 | 5.5 | V |
| $\mathrm{V}_{\text {IN }}$ | DC Input Voltage |  | 0 | 5.5 | V |
| $\mathrm{V}_{\text {OUT }}$ | DC Output Voltage | Active-Mode (High or Low State) <br> Tri-State Mode (Note 1) Power-Down Mode ( $\mathrm{V}_{\mathrm{CC}}=0 \mathrm{~V}$ ) | $\begin{aligned} & 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} \hline \mathrm{V}_{\mathrm{CC}} \\ 5.5 \\ 5.5 \end{gathered}$ | V |
| $\mathrm{T}_{\mathrm{A}}$ | Operating Temperature Range |  | -55 | +125 | ${ }^{\circ} \mathrm{C}$ |
| $\mathrm{t}_{\mathrm{r}}, \mathrm{t}_{\mathrm{f}}$ | Input Rise and Fall Time | $\begin{array}{r} \mathrm{V}_{\mathrm{CC}}=2.0 \mathrm{~V} \\ \mathrm{~V}_{\mathrm{CC}}=2.3 \mathrm{~V} \text { to } 2.7 \mathrm{~V} \\ \mathrm{~V}_{\mathrm{CC}}=3.0 \mathrm{~V} \text { to } 3.6 \mathrm{~V} \text { 就 } 5.5 \mathrm{~V} \end{array}$ | $\begin{aligned} & \hline 0 \\ & 0 \\ & 0 \\ & 0 \end{aligned}$ | $\begin{gathered} 20 \\ 20 \\ 10 \\ 5 \end{gathered}$ | $\mathrm{ns} / \mathrm{V}$ |

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.

DC ELECTRICAL CHARACTERISTICS (MC74VHC1G08)

| Symbol | Parameter | Test Conditions | $\mathrm{V}_{\mathrm{cc}}$ <br> (V) | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ |  |  | $-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 85^{\circ} \mathrm{C}$ |  | $-55^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 125^{\circ} \mathrm{C}$ |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min | Typ | Max | Min | Max | Min | Max |  |
| $\mathrm{V}_{\mathrm{IH}}$ | High-Level Input Voltage |  | 2.0 | 1.5 | - | - | 1.5 | - | 1.5 | - | V |
|  |  |  | 3.0 | 2.1 | - | - | 2.1 | - | 2.1 | - |  |
|  |  |  | 4.5 | 3.15 | - | - | 3.15 | - | 3.15 | - |  |
|  |  |  | 5.5 | 3.85 | - | - | 3.85 | - | 3.85 | - |  |
| $\mathrm{V}_{\text {IL }}$ | Low-Level Input Voltage |  | 2.0 | - | - | 0.5 | - | 0.5 | - | 0.5 | V |
|  |  |  | 3.0 | - | - | 0.9 | - | 0.9 | - | 0.9 |  |
|  |  |  | 4.5 | - | - | 1.35 | - | 1.35 | - | 1.35 |  |
|  |  |  | 5.5 | - | - | 1.65 | - | 1.65 | - | 1.65 |  |
| $\mathrm{V}_{\mathrm{OH}}$ | High-Level Output Voltage | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IH}} \text { or } \mathrm{V}_{\mathrm{IL}} \\ & \mathrm{I}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OH}}=-4 \mathrm{~mA} \\ & \mathrm{I}_{\mathrm{OH}}=-8 \mathrm{~mA} \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 3.0 \\ & 4.5 \end{aligned}$ | $\begin{gathered} 1.9 \\ 2.9 \\ 4.4 \\ 2.58 \\ 3.94 \end{gathered}$ | $\begin{gathered} 2.0 \\ 3.0 \\ 4.5 \\ - \\ - \end{gathered}$ | - - - - - | $\begin{gathered} 1.9 \\ 2.9 \\ 4.4 \\ 2.48 \\ 3.80 \end{gathered}$ | - - - - | $\begin{gathered} 1.9 \\ 2.9 \\ 4.4 \\ 2.34 \\ 3.66 \end{gathered}$ | - - - - - | V |
| $\mathrm{V}_{\mathrm{OL}}$ | Low-Level Output Voltage | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IH}} \text { or } \mathrm{V}_{\mathrm{IL}} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OL}}=4 \mathrm{~mA} \\ & \mathrm{I}_{\mathrm{OL}}=8 \mathrm{~mA} \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 3.0 \\ & 4.5 \end{aligned}$ | - - - - - | $\begin{gathered} 0.0 \\ 0.0 \\ 0.0 \\ - \\ - \end{gathered}$ | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.36 \\ 0.36 \end{gathered}$ | $\begin{aligned} & - \\ & - \\ & - \\ & - \\ & - \end{aligned}$ | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.44 \\ 0.44 \end{gathered}$ | - - - - - | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.52 \\ 0.52 \end{gathered}$ | V |
| $\mathrm{I}_{\mathrm{IN}}$ | Input Leakage Current | $\begin{aligned} & V_{\text {IN }}=5.5 \mathrm{~V} \text { or } \\ & \text { GND } \end{aligned}$ | $\begin{gathered} 2.0 \text { to } \\ 5.5 \end{gathered}$ | - | - | $\pm 0.1$ | - | $\pm 1.0$ | - | $\pm 1.0$ | $\mu \mathrm{A}$ |
| IOFF | Power Off Leakage Current | $\mathrm{V}_{\mathrm{IN}}=5.5 \mathrm{~V}$ or <br> $\mathrm{V}_{\text {OUT }}=5.5 \mathrm{~V}$ | 0.0 | - | - | 1.0 | - | 10 | - | 10 | $\mu \mathrm{A}$ |
| $\mathrm{I}_{\mathrm{CC}}$ | Quiescent Supply Current | $\begin{aligned} & V_{I N}=V_{C C} \text { or } \\ & \text { GND } \end{aligned}$ | 5.5 | - | - | 1.0 | - | 20 | - | 40 | $\mu \mathrm{A}$ |

DC ELECTRICAL CHARACTERISTICS (MC74VHC1GT08)

| Symbol | Parameter | Test Conditions | $\mathrm{V}_{\mathrm{cc}}$ <br> (V) | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ |  |  | $-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 85^{\circ} \mathrm{C}$ |  | $-55^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 125^{\circ} \mathrm{C}$ |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min | Typ | Max | Min | Max | Min | Max |  |
| $\mathrm{V}_{\mathrm{IH}}$ | High-Level Input Voltage |  | 2.0 | 1.0 | - | - | 1.0 | - | 1.0 | - | V |
|  |  |  | 3.0 | 1.4 | - | - | 1.4 | - | 1.4 | - |  |
|  |  |  | 4.5 | 2.0 | - | - | 2.0 | - | 2.0 | - |  |
|  |  |  | 5.5 | 2.0 | - | - | 2.0 | - | 2.0 | - |  |
| $\mathrm{V}_{\text {IL }}$ | Low-Level Input Voltage |  | 2.0 | - | - | 0.28 | - | 0.28 | - | 0.28 | V |
|  |  |  | 3.0 | - | - | 0.45 | - | 0.45 | - | 0.45 |  |
|  |  |  | 4.5 | - | - | 0.8 | - | 0.8 | - | 0.8 |  |
|  |  |  | 5.5 | - | - | 0.8 | - | 0.8 | - | 0.8 |  |
| $\mathrm{V}_{\mathrm{OH}}$ | High-Level Output Voltage | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IH}} \text { or } \mathrm{V}_{\mathrm{IL}} \\ & \mathrm{I}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{l}_{\mathrm{OH}}=-50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OH}}=-4 \mathrm{~mA} \\ & \mathrm{I}_{\mathrm{OH}}=-8 \mathrm{~mA} \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 3.0 \\ & 4.5 \end{aligned}$ | $\begin{aligned} & 1.9 \\ & 2.9 \\ & 4.4 \\ & 2.58 \\ & 3.94 \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & - \\ & - \end{aligned}$ | - <br> - <br> - <br> - | $\begin{aligned} & 1.9 \\ & 2.9 \\ & 4.4 \\ & 2.48 \\ & 3.80 \end{aligned}$ | - - - - | $\begin{aligned} & 1.9 \\ & 2.9 \\ & 4.4 \\ & 2.34 \\ & 3.66 \end{aligned}$ | - - - - | V |
| $\mathrm{V}_{\text {OL }}$ | Low-Level Output Voltage | $\begin{aligned} & \mathrm{V} \mathrm{~V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{IH}} \text { or } \mathrm{V}_{\mathrm{IL}} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{OL}}=50 \mu \mathrm{~A} \\ & \mathrm{I}_{\mathrm{LL}}=4 \mathrm{~mA} \\ & \mathrm{I}_{\mathrm{OL}}=8 \mathrm{~mA} \end{aligned}$ | $\begin{aligned} & 2.0 \\ & 3.0 \\ & 4.5 \\ & 3.0 \\ & 4.5 \end{aligned}$ | $\begin{aligned} & - \\ & - \\ & - \\ & - \end{aligned}$ | $\begin{gathered} 0.0 \\ 0.0 \\ 0.0 \\ - \\ - \end{gathered}$ | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.36 \\ 0.36 \end{gathered}$ | $\begin{aligned} & - \\ & - \\ & - \\ & - \end{aligned}$ | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.44 \\ 0.44 \end{gathered}$ | $\begin{aligned} & - \\ & - \\ & - \\ & - \end{aligned}$ | $\begin{gathered} 0.1 \\ 0.1 \\ 0.1 \\ 0.52 \\ 0.52 \end{gathered}$ | V |
| $\mathrm{I}_{\mathrm{N}}$ | Input Leakage Current | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=5.5 \mathrm{~V} \text { or } \\ & \mathrm{GND} \end{aligned}$ | $\begin{gathered} 2.0 \text { to } \\ 5.5 \end{gathered}$ | - | - | $\pm 0.1$ | - | $\pm 1.0$ | - | $\pm 1.0$ | $\mu \mathrm{A}$ |
| IofF | Power Off Leakage Current | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=5.5 \mathrm{~V} \text { or } \\ & \mathrm{V}_{\text {OUT }}=5.5 \mathrm{~V} \end{aligned}$ | 0 | - | - | 1.0 | - | 10 | - | 10 | $\mu \mathrm{A}$ |
| $I_{\text {cc }}$ | Quiescent Supply Current | $\begin{aligned} & \mathrm{V}_{\mathrm{IN}}=\mathrm{V}_{\mathrm{CC}} \text { or } \\ & \text { GND } \end{aligned}$ | 5.5 | - | - | 1.0 | - | 20 | - | 40 | $\mu \mathrm{A}$ |
| $\mathrm{I}_{\text {CCT }}$ | Increase in Quiescent Supply Current per Input Pin | One Input: $\mathrm{V}_{\mathrm{IN}}$ = 3.4 V; Other Input at $\mathrm{V}_{\mathrm{CC}}$ or GND | 5.5 | - | - | 1.35 | - | 1.5 | - | 1.65 | 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.

AC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Conditions | $\mathrm{V}_{\mathrm{cc}}(\mathrm{V})$ | $\mathrm{T}_{\mathrm{A}}=25^{\circ} \mathrm{C}$ |  |  | $-40^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 85^{\circ} \mathrm{C}$ |  | $-55^{\circ} \mathrm{C} \leq \mathrm{T}_{\mathrm{A}} \leq 125^{\circ} \mathrm{C}$ |  | Unit |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Min | Typ | Max | Min | Max | Min | Max |  |
| $\begin{aligned} & \text { tpLH, } \\ & \mathrm{t}_{\mathrm{PH}} \end{aligned}$ | Propagation Delay, A to Y (Figures 3 and 4) | $\mathrm{C}_{\mathrm{L}}=15 \mathrm{pF}$ | 3.0 to 3.6 | - | 4.1 | 8.8 | - | 10.5 | - | 12.5 | ns |
|  |  | $\mathrm{C}_{\mathrm{L}}=50 \mathrm{pF}$ |  | - | 5.9 | 12.3 | - | 14.0 | - | 16.5 |  |
|  |  | $\mathrm{C}_{\mathrm{L}}=15 \mathrm{pF}$ | 4.5 to 5.5 | - | 3.5 | 5.9 | - | 7.0 | - | 9.0 |  |
|  |  | $\mathrm{C}_{\mathrm{L}}=50 \mathrm{pF}$ |  | - | 4.2 | 7.9 | - | 9.0 | - | 11.0 |  |
| $\mathrm{C}_{\text {IN }}$ | Input Capacitance |  |  | - | 4.0 | 10 | - | 10 | - | 10 | pF |
| Cout | Output Capacitance | Output in High Impedance State |  | - | 6.0 | - | - | - | - | - | pF |
| Symbol | Parameter |  |  |  |  |  |  | Typical @ $25^{\circ} \mathrm{C}, \mathrm{V}_{\mathrm{cc}}=5.0 \mathrm{~V}$ |  |  | Unit |
| $\mathrm{C}_{\text {PD }}$ | Power Dissipation Capacitance (Note 5) |  |  |  |  |  |  | 8.0 |  |  | pF |

5. $\mathrm{C}_{P \mathrm{PD}}$ is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: $I_{C C(O P R)}=C_{P D} \bullet V_{C C} \bullet f_{i n}+I_{C C} . C_{P D}$ is used to determine the no-load dynamic power consumption; $P_{D}=C_{P D} \bullet V_{C C}{ }^{2} \bullet f_{\text {in }}+I_{C C} \bullet V_{C C}$.

## MC74VHC1G08, MC74VHC1GT08



| Test | Switch Position | $C_{L}, \mathrm{pF}$ | RL, $\boldsymbol{\Omega}$ |
| :---: | :---: | :---: | :---: |
| $\mathrm{t}_{\text {PLH }} / \mathrm{t}_{\text {PHL }}$ | Open | See AC Characteristics Table | X |
| $\mathrm{t}_{\text {PLZ }} / \mathrm{t}_{\text {PZL }}$ | $V_{\text {CC }}$ |  | 1 k |
| $\mathrm{t}_{\text {PHZ }} / \mathrm{t}_{\text {PZH }}$ | GND |  | 1 k |

X = Don't Care
$\mathrm{C}_{\mathrm{L}}$ includes probe and jig capacitance
$\mathrm{R}_{\mathrm{T}}$ is $\mathrm{Z}_{\mathrm{OUT}}$ of pulse generator (typically $50 \Omega$ )
$\mathrm{f}=1 \mathrm{MHz}$
Figure 3. Test Circuit


Figure 4. Switching Waveforms

| $\mathbf{v}_{\mathbf{C C}}, \mathbf{v}$ | $\mathbf{V}_{\mathbf{m o}}, \mathbf{V}$ |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\mathbf{t}_{\mathbf{P Z L}}, \mathbf{t}_{\mathbf{P L Z}}, \mathbf{t}_{\mathbf{P Z H}}, \mathbf{t}_{\mathbf{P H Z}}$ | $\mathbf{v}_{\mathbf{Y},} \mathbf{v}$ |
|  | $\mathrm{~V}_{\mathrm{CC}} / 2$ | $\mathrm{~V}_{\mathrm{CC}} / 2$ | $\mathrm{~V}_{\mathrm{CC}} / 2$ | 0.3 |
| 4.5 to 5.5 | $\mathrm{~V}_{\mathrm{CC}} / 2$ | $\mathrm{~V}_{\mathrm{CC}} / 2$ | $\mathrm{~V}_{\mathrm{CC}} / 2$ | 0.3 |

## MC74VHC1G08, MC74VHC1GT08

ORDERING INFORMATION

| Device | Packages | Specific Device Code | Pin 1 Orientation (See below) | Shipping ${ }^{\dagger}$ |
| :---: | :---: | :---: | :---: | :---: |
| MC74VHC1G08DFT1G | SC-88A | V2 | Q2 | 3000 / Tape \& Reel |
| MC74VHC1G08DFT2G | SC-88A | V2 | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08DFT1G-Q* | SC-88A | V2 | Q2 | 3000 / Tape \& Reel |
| MC74VHC1G08DFT2G-Q* | SC-88A | V2 | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08DFT1G | SC-88A | VT | Q2 | 3000 / Tape \& Reel |
| MC74VHC1GT08DFT2G | SC-88A | VT | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08DFT1G-Q* | SC-88A | VT | Q2 | 3000 / Tape \& Reel |
| MC74VHC1GT08DFT2G-Q* | SC-88A | VT | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08DBVT1G | SC-74A | V2 | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08DBVT1G-Q* | SC-74A | V2 | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08DBVT1G | SC-74A | VT | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08DBVT1G-Q* | SC-74A | VT | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08P5T5G | SOT-953 | E | Q2 | 8000 / Tape \& Reel |
| MC74VHC1GT08P5T5G | SOT-953 | P | Q2 | 8000 / Tape \& Reel |
| MC74VHC1G08MU1TCG | UDFN6, $1.45 \times 1.0,0.5 \mathrm{P}$ | K (Rotated $180^{\circ} \mathrm{CW}$ ) | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08MU1TCG | UDFN6, $1.45 \times 1.0,0.5 \mathrm{P}$ | 4 (Rotated $270^{\circ} \mathrm{CW}$ ) | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08MU2TCG | UDFN6, $1.2 \times 1.0,0.4 \mathrm{P}$ | 2 | Q4 | 3000 / Tape \& Reel |
| MC74VHC1G08MU3TCG | UDFN6, $1.0 \times 1.0,0.35$ | D (Rotated $270^{\circ} \mathrm{CW}$ ) | Q4 | 3000 / Tape \& Reel |
| MC74VHC1GT08MU3TCG | UDFN6, $1.0 \times 1.0,0.35$ | K | Q4 | 3000 / Tape \& Reel |

$\dagger$ 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.
*-Q Suffix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q100 Qualified and PPAP Capable.

PIN 1 ORIENTATION IN TAPE AND REEL
Direction of Feed


SC-74A-5 3.00x1.50x0.95, 0.95P
CASE 318BQ
ISSUE C
DATE 26 FEB 2024


$$
\frac{\text { DETAIL "A" }}{\text { SCALE } 2: 1}
$$

## GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code

- = Pb-Free Package
(Note: Microdot may be in either location)
*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, " $G$ " or microdot " $\mathrm{\nabla}$ ", may or may not be present. Some products may not follow the Generic Marking.


## NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS (ANGLES IN DEGREES).
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. minimum lead thickness is the minimum thickness of BASE MATERIAL.
4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OF GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE.

|  | DIM | MILLIMETERS |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  |  | MIN. | NOM. | MAX. |
|  | A | 0.90 | 1.00 | 1.10 |
|  | A1 | 0.01 | 0.18 | 0.10 |
|  | A2 | 0.95 REF. |  |  |
| DETAIL A | b | 0.25 | 0.37 | 0.50 |
|  | c | 0.10 | 0.18 | 0.26 |
| C | D | 2.85 | 3.00 | 3.15 |
| , तை | E | 2.75 BSC |  |  |
| - $\sim^{\prime}$ | E1 | 1.35 | 1.50 | 1.65 |
| FND VIEW | e | 0.95 BSC |  |  |
| EIND VIE V | L | 0.20 | 0.40 | 0.60 |
|  | L1 | 0.62 REF. |  |  |
|  | L2 | 0.25 BSC |  |  |
|  | $\theta$ | $0{ }^{\circ}$ | 5. | $10^{\circ}$ |



RECOMMENDED MOUNTING FOOTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE

STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING techniques reference manual, solderrm/D.

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| ---: | :--- | :--- | :--- |
| DESCRIPTION: | SC-74A-5 3.00x1.50x0.95, 0.95P | PAGE 1 OF 1 |

[^0]

## SC-88A (SC-70-5/SOT-353)

CASE 419A-02
ISSUE M
DATE 11 APR 2023


RECDMMENDED
MIUNTING FGUTPRINT

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

NDTES:

1. DIMENSIDNING AND TQLERANCING PER ANSI Y14.5M, 1982.
2. CDNTRZLLING DIMENSIDN: MILLIMETERS
3. 419A-01 BBSOLETE, NEW STANDARD 419A-02
4. DIMENSIDNS D AND E1 D NDT INCLUDE MULD FLASH, PRDTRUSIUNS, $\square R$ GATE BURRS, MLLD FLASH, PRDTRUSIINS, GR GATE BURRS SHALL NDT EXCEED $0.1016 M M$ PER SIDE.

| DIM | MILLIMETERS |  |  |
| :---: | :---: | :---: | :---: |
|  | MIN. | NIM. | MAX. |
| A | 0.80 | 0.95 | 1.10 |
| A1 | --- | --- | 0.10 |
| A3 | 0.20 REF |  |  |
| b | 0.10 | 0.20 | 0.30 |
| $\subset$ | 0.10 | --- | 0.25 |
| D | 1.80 | 2.00 | 2.20 |
| E | 2.00 | 2.10 | 2.20 |
| E1 | 1.15 | 1.25 | 1.35 |
| e | 0.65 BSC |  |  |
| L | 0.10 | 0.15 | 0.30 |

## GENERIC MARKING

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

XXX = Specific Device Code
$\mathrm{M}=$ Date Code

- = Pb-Free Package
(Note: Microdot may be in either location)


PIN 1. BASE
2. EMITTER
. BASE
4. COLLECTOR
5. COLLECTOR

STYLE 6:
$\begin{array}{lc}\text { TYLE 6: } & \text { STYLE 7: } \\ \text { PIN 1. EMITTER } 2 & \text { PIN 1. BASE } \\ \text { 2. BASE } 2 & \text { 2. EMITTER } \\ \text { 3. EMITTER 1 } & \text { 3. BASE } \\ \text { 4. COLLECTOR } & \text { 4. COLLECTOR } \\ \text { 5. COLLECTOR 2/BASE } 1 & \text { 5. COLLECTOR }\end{array}$
STYLE 2 :
PIN 1. ANODE
2. EMITTER
3. BASE
4. COLLECTOR

STYLE 3:
STYLE 3:
PIN 1. ANODE 1
2. $N / C$
2. N/C
3. ANODE
4. CATHODE 2
5. CATHODE 1

## STYLE 8

## PIN 1. CATHODE

2. COLLECTOR
3. $\mathrm{N} / \mathrm{C}$
4. BASE
. EMITTER

STYLE 5:
STYLE 4:
2. DRAIN $1 / 2$

PIN 1. CATHODE
$\begin{array}{ll}\text { 2. DRAIN } 1 / 2 & \text { 2. COMMON ANODE } \\ \text { 3. SOURCE } 1 & \text { 3. }\end{array}$
3. SOURCE 1 3. CATHODE 2
4. GATE 1 4. CATHODE 3
5. GATE 2

## STYLE 9:

PIN 1. ANODE
2. CATHODE
3. ANODE
4. ANODE
5. ANODE

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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| :--- | :--- | :--- |

DESCRIPTION: $\quad$ SC-88A (SC-70-5/SOT-353)
PAGE 1 OF 1

[^1]

## UDFN6, 1.2x1.0, 0.4P CASE 517AA <br> ISSUE D

DATE 03 SEP 2010

## NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.25 AND 0.30 mm FROM TERMINAL
4. COPLANARITY APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.

| MILLIMETERS |  |  |
| :---: | :---: | :---: |
| DIM | MIN | MAX |
| A | 0.45 | 0.55 |
| A1 | 0.00 | 0.05 |
| A3 | 0.127 |  |
| REF |  |  |
| b | 0.15 | 0.25 |
| D | 1.20 |  |
| BSC |  |  |
| E | 1.00 BSC |  |
| e | 0.40 BSC |  |
| L | 0.30 | 0.40 |
| L1 | 0.00 | 0.15 |
| L2 | 0.40 | 0.50 |

## GENERIC <br> MARKING DIAGRAM*



X = Specific Device Code
M = Date Code
*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " $\quad$ ", may or may not be present.

## MOUNTING FOOTPRINT*


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

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| ---: | :--- | :--- | :--- |
| DESCRIPTION: | 6 PIN UDFN, 1.2X1.0, 0.4P | PAGE 1 OF 1 |

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UDFN6, 1.45x1.0, 0.5P CASE 517AQ

ISSUE O
DATE 15 MAY 2008


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
CONTROLLING DIMENSION: MILLIMETERS
2. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 mm FROM THE TERMINAL TIP.


DETAIL B OPTIONAL CONSTRUCTIONS

## MOUNTING 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*


X = Specific Device Code
M = Date Code
*This information is generic. Please refer to device data sheet for actual part marking. $\mathrm{Pb}-$ Free indicator, "G" or microdot " $\quad$ ", may or may not be present.

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| ---: | :--- | :--- | :--- |
| DESCRIPTION: | UDFN6, 1.45x1.0, 0.5P | PAGE 1 OF 1 |

[^3]UDFN6, 1x1, 0.35P
CASE 517BX
ISSUE O
DATE 18 MAY 2011

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

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

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| ---: | :--- | :--- | :--- |
| DESCRIPTION: | UDFN6, 1x1, 0.35P |  | PAGE 1 OF 1 |

[^4]
## SOT-953 1.00x0.80x0.37, 0.35P <br> CASE 527AE <br> ISSUE F

DATE 17 JAN 2024

NDTES

1. DIMENSIUNING AND TZLERANCING PER ASME Y14.5M, 2018,
2. CZNTRDLLING DIMENSIDN: MILLIMETERS,
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS पF THE BASE MATERIAL
4. DIMENSIDNS D AND E DI NDT INCLUDE MDLD FLASH, PRITRUSIINS, IR GATE BURRS.


SIDE VIEW


RECDMMENDED MIUNTING FOUTPRINT
*For additional information on our Pb-Free strategy and soldering details, please download the ZN Semiconductor Soldering and Mounting Techniques Reference Manual, SaLDERRM/D.

MARKING DIAGRAM*


X = Specific Device Code
M = Month Code
*This information is generic. Please refer to device data sheet for actual part marking. $\mathrm{Pb}-\mathrm{Free}$ indicator, " G " or microdot " P ", may or may not be present. Some products may not follow the Generic Marking.

| MILLIMETERS |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| DIM | MIN | NDM | MAX |  |
| A | 0.34 | 0.37 | 0.40 |  |
| $b$ | 0.10 | 0.15 | 0.20 |  |
| C | 0.07 | 0.12 | 0.17 |  |
| D | 0.95 | 1.00 | 1.05 |  |
| $E$ | 0.75 | 0.80 | 0.85 |  |
| $e$ | 0.35 BSC |  |  |  |
| $H$ | 0.95 | 1.00 | 1.05 |  |
| $L$ | 0.125 | 0.175 | 0.225 |  |
| L2 | 0.05 | 0.10 | 0.15 |  |
| L3 | 0.075 (REF) |  |  |  |

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