

# SN74F08 QUADRUPLE 2-INPUT POSITIVE-AND GATE

SDFS038A – D2932, MARCH 1987 – REVISED OCTOBER 1993

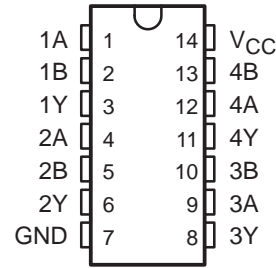
- Package Options Include Plastic Small-Outline Packages and Standard Plastic 300-mil DIPs

## description

The SN74F08 contains four independent 2-input AND gates. It performs the Boolean functions  $Y = A \cdot B$  or  $Y = \overline{A} + \overline{B}$  in positive logic.

The SN74F08 is characterized for operation from 0°C to 70°C.

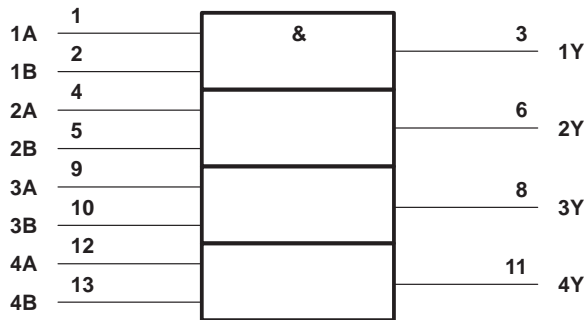
**D OR N PACKAGE  
(TOP VIEW)**



**FUNCTION TABLE  
(each gate)**

INPUTS		OUTPUT
A	B	Y
H	H	H
L	X	L
X	L	L

## logic symbol†



† This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

## logic diagram, each gate (positive logic)‡



## absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, $V_{CC}$	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1)	–1.2 V to 7 V
Input current range	–30 mA to 5 mA
Voltage range applied to any output in the high state	–0.5 V to $V_{CC}$
Current into any output in the low state	40 mA
Operating free-air temperature range	0°C to 70°C
Storage temperature range	–65°C to 150°C

‡ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTE 1: The input voltage ratings may be exceeded provided the input current ratings are observed.

# SN74F08

## QUADRUPLE 2-INPUT POSITIVE-AND GATE

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### recommended operating conditions

		MIN	NOM	MAX	UNIT
$V_{CC}$	Supply voltage	4.5	5	5.5	V
$V_{IH}$	High-level input voltage	2			V
$V_{IL}$	Low-level input voltage			0.8	V
$I_{IK}$	Input clamp current			-18	mA
$I_{OH}$	High-level output current			-1	mA
$I_{OL}$	Low-level output current			20	mA
$T_A$	Operating free-air temperature	0		70	°C

### electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

PARAMETER	TEST CONDITIONS		MIN	TYP†	MAX	UNIT
$V_{IK}$	$V_{CC} = 4.5\text{ V}$ ,	$I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$	$V_{CC} = 4.5\text{ V}$ ,	$I_{OH} = -1\text{ mA}$	2.5	3.4		V
	$V_{CC} = 4.75\text{ V}$ ,	$I_{OH} = -1\text{ mA}$	2.7			
$V_{OL}$	$V_{CC} = 4.5\text{ V}$ ,	$I_{OL} = 20\text{ mA}$		0.3	0.5	V
$I_I$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 7\text{ V}$			0.1	mA
$I_{IH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 2.7\text{ V}$			20	μA
$I_{IL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 0.5\text{ V}$			-0.6	mA
$I_{OS}‡$	$V_{CC} = 5.5\text{ V}$ ,	$V_O = 0$	-60		-150	mA
$I_{CCH}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 4.5\text{ V}$		5.5	8.3	mA
$I_{CCL}$	$V_{CC} = 5.5\text{ V}$ ,	$V_I = 0$		8.6	12.9	mA

† All typical values are at  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$ .

‡ Not more than one output should be shorted at a time, and the duration of the short circuit should not exceed one second.

### switching characteristics (see Note 2)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_L = 500\ \Omega$ , $T_A = 25^\circ\text{C}$			$V_{CC} = 4.5\text{ V to }5.5\text{ V}$ , $C_L = 50\text{ pF}$ , $R_L = 500\ \Omega$ , $T_A = \text{MIN to MAX}§$		UNIT
			MIN	TYP	MAX	MIN	MAX	
$t_{PLH}$	A or B	Y	2.2	3.8	5.6	2.2	6.6	ns
$t_{PHL}$			1.7	3.6	5.3	1.7	6.3	

§ For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions.

NOTE 2: Load circuits and waveforms are shown in Section 1.

**PACKAGING INFORMATION**

Orderable part number	Status (1)	Material type (2)	Package   Pins	Package qty   Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
<a href="#">SN74F08D</a>	Obsolete	Production	SOIC (D)   14	-	-	Call TI	Call TI	0 to 70	F08
<a href="#">SN74F08DBR</a>	Active	Production	SSOP (DB)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
SN74F08DBR.A	Active	Production	SSOP (DB)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
<a href="#">SN74F08DR</a>	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
SN74F08DR.A	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
SN74F08DRE4	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
SN74F08DRG4	Active	Production	SOIC (D)   14	2500   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	F08
<a href="#">SN74F08N</a>	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74F08N
SN74F08N.A	Active	Production	PDIP (N)   14	25   TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN74F08N
<a href="#">SN74F08NSR</a>	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74F08
SN74F08NSR.A	Active	Production	SOP (NS)   14	2000   LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	74F08

<sup>(1)</sup> **Status:** For more details on status, see our [product life cycle](#).

<sup>(2)</sup> **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

<sup>(3)</sup> **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

<sup>(4)</sup> **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

<sup>(5)</sup> **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

<sup>(6)</sup> **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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**TAPE AND REEL INFORMATION**

**QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
SN74F08DBR	SSOP	DB	14	2000	330.0	16.4	8.35	6.6	2.4	12.0	16.0	Q1
SN74F08DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
SN74F08NSR	SOP	NS	14	2000	330.0	16.4	8.1	10.4	2.5	12.0	16.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74F08DBR	SSOP	DB	14	2000	353.0	353.0	32.0
SN74F08DR	SOIC	D	14	2500	353.0	353.0	32.0
SN74F08NSR	SOP	NS	14	2000	353.0	353.0	32.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
SN74F08N	N	PDIP	14	25	506	13.97	11230	4.32
SN74F08N.A	N	PDIP	14	25	506	13.97	11230	4.32

D0014A



# PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4220718/A 09/2016

NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.43 mm, per side.
5. Reference JEDEC registration MS-012, variation AB.



# EXAMPLE BOARD LAYOUT

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE  
SCALE:8X



SOLDER MASK DETAILS

4220718/A 09/2016

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

D0014A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE:8X

4220718/A 09/2016

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

## MECHANICAL DATA

NS (R-PDSO-G\*\*)

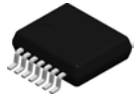
PLASTIC SMALL-OUTLINE PACKAGE

14-PINS SHOWN



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Body dimensions do not include mold flash or protrusion, not to exceed 0,15.

# DB0014A



# PACKAGE OUTLINE

## SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



### NOTES:

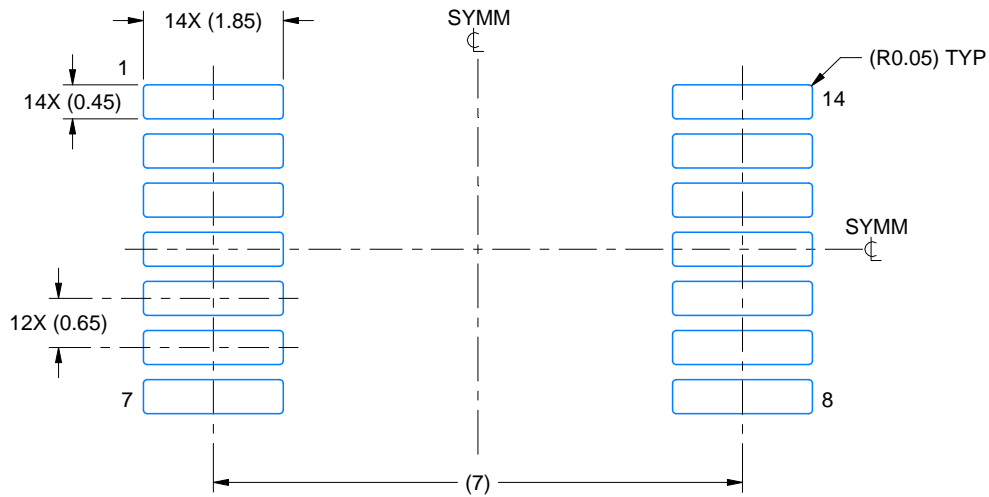
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.15 mm per side.
4. Reference JEDEC registration MO-150.

# EXAMPLE BOARD LAYOUT

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



LAND PATTERN EXAMPLE  
EXPOSED METAL SHOWN  
SCALE: 10X



4220762/A 05/2024

NOTES: (continued)

5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DB0014A

SSOP - 2 mm max height

SMALL OUTLINE PACKAGE



SOLDER PASTE EXAMPLE  
BASED ON 0.125 mm THICK STENCIL  
SCALE: 10X

4220762/A 05/2024

NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

N (R-PDIP-T\*\*)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - $\triangle C$  Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - $\triangle D$  The 20 pin end lead shoulder width is a vendor option, either half or full width.

4040049/E 12/2002

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