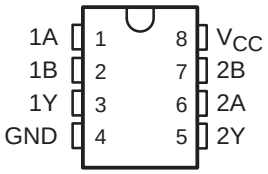
SLRS024 – DECEMBER 1976 – REVISED MAY 1990

PERIPHERAL DRIVERS FOR HIGH-VOLTAGE HIGH-CURRENT DRIVER APPLICATIONS

- **Characterized for Use to 300 mA**
- **High-Voltage Outputs**
- **No Output Latch-Up at 55 V (After Conducting 300 mA)**
- **Medium-Speed Switching**
- **Circuit Flexibility for Varied Applications and Choice of Logic Function**
- **TTL-Compatible Diode-Clamped Inputs**
- **Standard Supply Voltages**
- **Plastic DIP (P) With Copper Lead Frame Provides Cooler Operation and Improved Reliability**

D OR P PACKAGE
(TOP VIEW)



SUMMARY OF SERIES SN75471

DEVICE	LOGIC OF COMPLETE CIRCUIT	PACKAGES
SN75471	AND	D, P
SN75472	NAND	D, P
SN75473	OR	D, P

description

Series SN75471 dual peripheral drivers are functionally interchangeable with series SN75451B and series SN75461 peripheral drivers, but are designed for use in systems that require higher breakdown voltages than either of those series can provide at the expense of slightly slower switching speeds than series 75451B (limits are the same as series SN75461). Typical applications include high-speed logic buffers, power drivers, relay drivers, lamp drivers, MOS drivers, line drivers, and memory drivers.

The SN75471, SN75472, and SN75473 are dual peripheral AND, NAND, and OR drivers, respectively, (assuming positive logic), with the output of the logic gates internally connected to the bases of the npn output transistors.

Series SN75471 drivers are characterized for operation from 0°C to 70°C.

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

Supply voltage, V_{CC} (see Note 1) . . . . . 7 V
Input voltage, V_I . . . . . 5.5 V
Inter-emitter voltage (see Note 2) . . . . . 5.5 V
Off-state output voltage, V_O . . . . . 70 V
Continuous collector or output current (see Note 3) . . . . . 400 mA
Peak collector or output current ($t_w \leq 10$ ms, duty cycle $\leq 50\%$, see Note 3) . . . . . 500 mA
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range, T_A . . . . . 0°C to 70°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

NOTES: 1. Voltage values are with respect to the network GND, unless otherwise specified.
2. This is the voltage between two emitters, A and B.
3. Both halves of these dual circuits may conduct rated current simultaneously; however, power dissipation averaged over a short time interval must fall within the continuous dissipation rating.

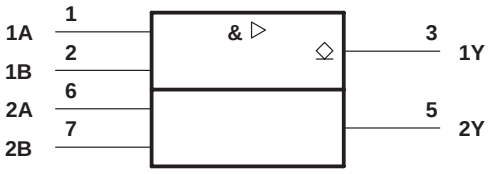
DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
D	725 mW	5.8 mW/°C	464 mW
P	1000 mW	8.0 mW/°C	640 mW

recommended operating conditions

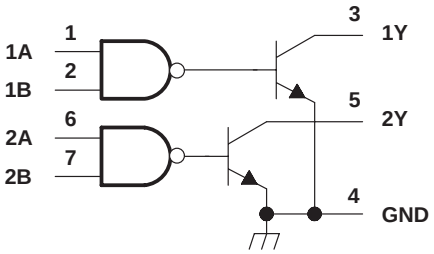
	MIN	NOM	MAX	UNIT
Supply voltage, V_{CC}	4.75	5	5.25	V
High-level input voltage, V_{IH}	2			V
Low-level input voltage, V_{IL}			0.8	V
Operating free-air temperature, T_A	0		70	°C

logic symbol†



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

logic diagram (positive logic)

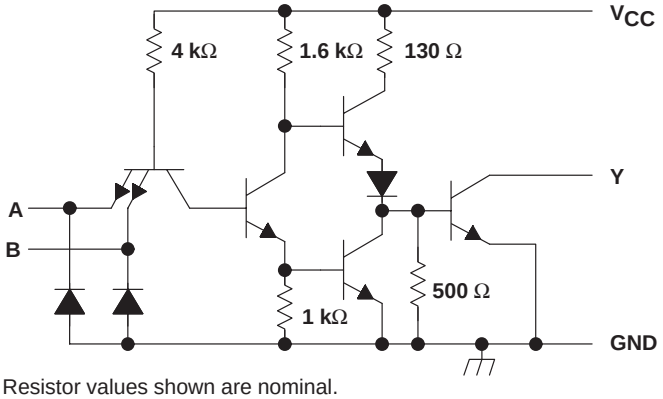


SN75471 FUNCTION TABLE (each driver)

A	B	Y
L	L	L (on state)
L	H	L (on state)
H	L	L (on state)
H	H	H (off state)

positive logic: $Y = AB$ or $\overline{A} + \overline{B}$

SN75471 schematic (each driver)



Resistor values shown are nominal.

electrical characteristics over recommended operating free-air temperature range

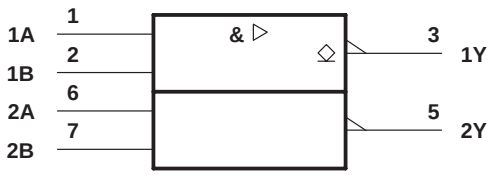
PARAMETER		TEST CONDITIONS	SN75471			UNIT
			MIN	TYP‡	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 4.75 V, I_I = –12 mA		–1.2	–1.5	V
I_{OH}	High-level output current	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{OH} = 70 V			100	μA
V_{OL}	Low-level output voltage	V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 100 mA		0.25	0.4	V
		V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 300 mA		0.5	0.7	
I_I	Input current at maximum input voltage	V_{CC} = 5.25 V, V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = 5.25 V, V_I = 2.4 V			40	μA
I_{IL}	Low-level input current	V_{CC} = 5.25 V, V_I = 0.4 V		–1	–1.6	mA
I_{CCH}	Supply current, outputs high	V_{CC} = 5.25 V, V_I = 5 V		7	11	mA
I_{CCL}	Supply current, outputs low	V_{CC} = 5.25 V, V_I = 0		52	65	mA

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

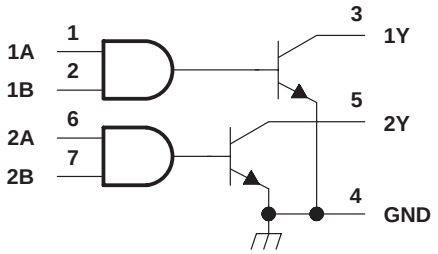
PARAMETER		TEST CONDITIONS	SN75471			UNIT
			MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	$I_O \approx$ 200 mA, C_L = 15 pF, R_L = 50 Ω, See Figure 1		30	55	ns
t_{PHL}	Propagation delay time, high-to-low-level output			25	40	
t_{TLH}	Transition time, low-to-high-level output			8	20	
t_{THL}	Transition time, high-to-low-level output			10	20	
V_{OH}	High-level output voltage after switching	V_S = 55 V, $I_O \approx$ 300 mA, See Figure 2	V_S–18			mV

logic symbol†



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

logic diagram (positive logic)

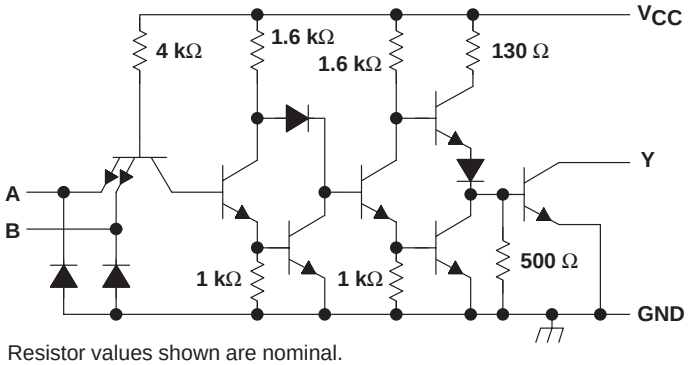


SN75472 FUNCTION TABLE (each driver)

A	B	Y
L	L	H (off state)
L	H	H (off state)
H	L	H (off state)
H	H	L (on state)

positive logic:
$Y = \overline{AB}$ or $\overline{A} + \overline{B}$

SN75472 schematic (each driver)



Resistor values shown are nominal.

electrical characteristics over recommended operating free-air temperature range

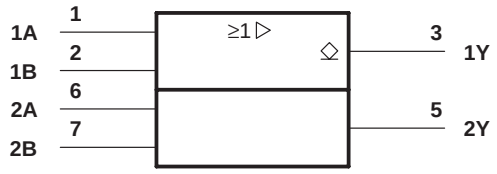
PARAMETER		TEST CONDITIONS	SN75472			UNIT
			MIN	TYP‡	MAX	
V_{IK}	Input clamp voltage	V_{CC} = 4.75 V, I_I = –12 mA		–1.2	–1.5	V
I_{OH}	High-level output current	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{OH} = 70 V			100	μA
V_{OL}	Low-level output voltage	V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 100 mA		0.25	0.4	V
		V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 300 mA		0.5	0.7	
I_I	Input current at maximum input voltage	V_{CC} = 5.25 V, V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = 5.25 V, V_I = 2.4 V			40	μA
I_{IL}	Low-level input current	V_{CC} = 5.25 V, V_I = 0.4 V		–1	–1.6	mA
I_{CCH}	Supply current, outputs high	V_{CC} = 5.25 V, V_I = 5 V		13	17	mA
I_{CCL}	Supply current, outputs low	V_{CC} = 5.25 V, V_I = 0		61	76	mA

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

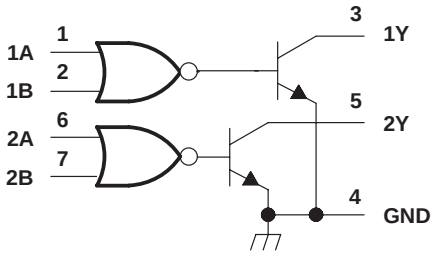
PARAMETER		TEST CONDITIONS	SN75472			UNIT
			MIN	TYP	MAX	
t_{PLH}	Propagation delay time, low-to-high-level output	$I_O \approx$ 200 mA, R_L = 50 Ω, C_L = 15 pF, See Figure 1		45	65	ns
t_{PHL}	Propagation delay time, high-to-low-level output			30	50	
t_{TLH}	Transition time, low-to-high-level output			13	25	
t_{THL}	Transition time, high-to-low-level output			10	20	
V_{OH}	High-level output voltage after switching	V_S = 55 V, $I_O \approx$ 300 mA, See Figure 2	V_S–18			mV

logic symbol†



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

logic diagram (positive logic)

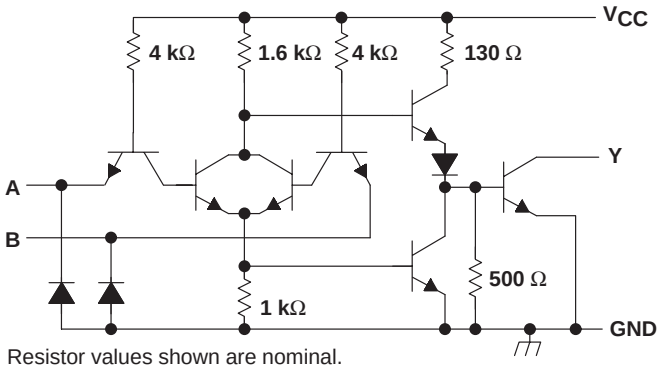


FUNCTION TABLE (each driver)

A	B	Y
L	L	L (on state)
L	H	H (off state)
H	L	H (off state)
H	H	H (off state)

positive logic:
$Y = A + B$ or $\overline{A}\,\overline{B}$

schematic (each driver)



Resistor values shown are nominal.

electrical characteristics over recommended operating free-air temperature range

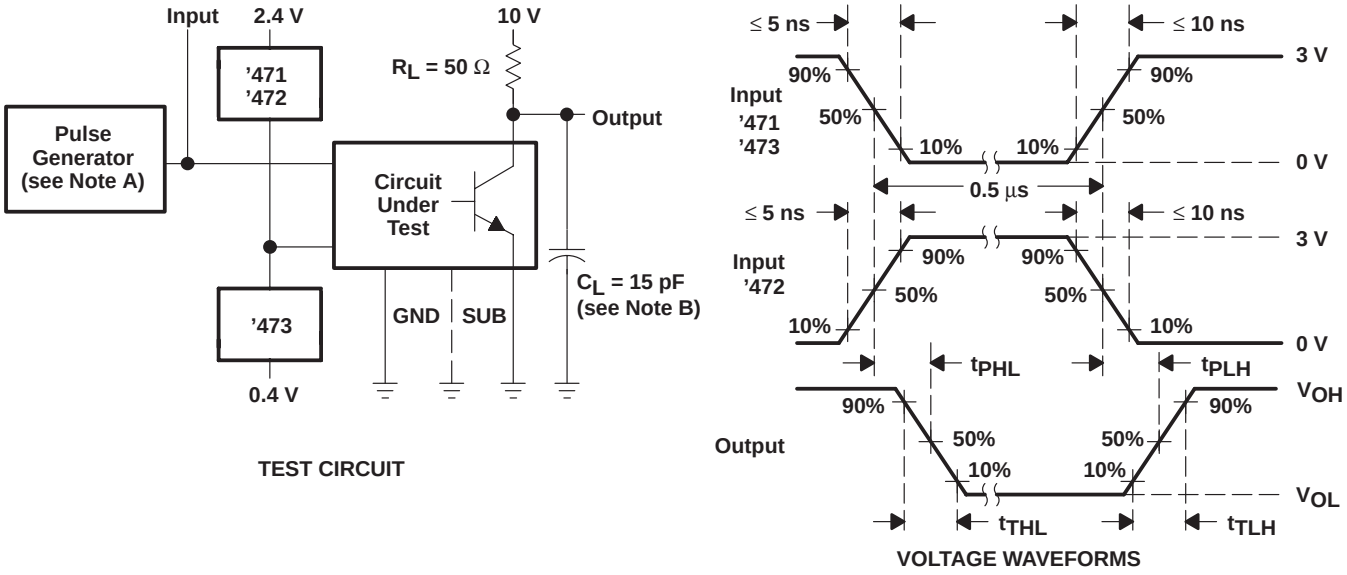
PARAMETER		TEST CONDITIONS	SN75473 MIN	SN75473 TYP‡	SN75473 MAX	UNIT
V_{IK}	Input clamp voltage	V_{CC} = 4.75 V, I_I = –12 mA		–1.2	–1.5	V
I_{OH}	High-level output current	V_{CC} = 4.75 V, V_{IH} = 2 V, V_{OH} = 70 V			100	µA
V_{OL}	Low-level output voltage	V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 100 mA		0.25	0.4	V
		V_{CC} = 4.75 V, V_{IL} = 0.8 V, I_{OL} = 300 mA		0.5	0.7	
I_I	Input current at maximum input voltage	V_{CC} = 5.25 V, V_I = 5.5 V			1	mA
I_{IH}	High-level input current	V_{CC} = 5.25 V, V_I = 2.4 V			40	µA
I_{IL}	Low-level input current	V_{CC} = 5.25 V, V_I = 0.4 V		–1	–1.6	mA
I_{CCH}	Supply current, outputs high	V_{CC} = 5.25 V, V_I = 5 V		8	11	mA
I_{CCL}	Supply current, outputs low	V_{CC} = 5.25 V, V_I = 0		58	76	mA

‡ All typical values are at V_{CC} = 5 V, T_A = 25°C.

switching characteristics, V_{CC} = 5 V, T_A = 25°C

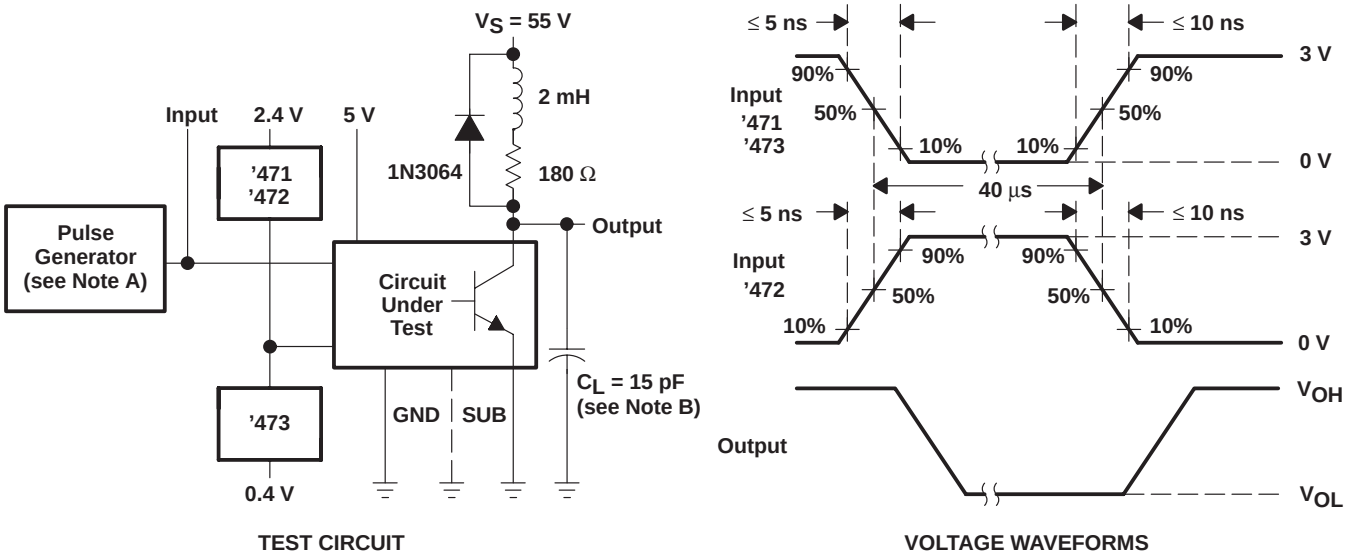
PARAMETER		TEST CONDITIONS	SN75473 MIN	SN75473 TYP	SN75473 MAX	UNIT
t_{PLH}	Propagation delay time, low-to-high-level output	$I_O \approx$ 200 mA, R_L = 50 Ω, C_L = 15 pF, See Figure 1		30	55	ns
t_{PHL}	Propagation delay time, high-to-low-level output			25	40	
t_{TLH}	Transition time, low-to-high-level output			8	25	
t_{THL}	Transition time, high-to-low-level output			10	25	
V_{OH}	High-level output voltage after switching	V_S = 55 V, $I_O \approx$ 300 mA, See Figure 2	V_S–18			mV

PARAMETER MEASUREMENT INFORMATION



NOTES: A. The pulse generator has the following characteristics: PRR ≤ 1 MHz, Z_O ≈ 50 Ω.
B. C_L includes probe and jig capacitance.

Figure 1. Switching Times



NOTES: A. The pulse generator has the following characteristics: PRR ≤ 12.5 kHz, Z_O ≈ 50 Ω.
B. C_L includes probe and jig capacitance.

Figure 2. Latch-Up Test

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)
SN75471D	Active	Production	SOIC (D) | 8	75 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75471
SN75471DR	Active	Production	SOIC (D) | 8	2500 | LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75471
SN75471P	Active	Production	PDIP (P) | 8	50 | TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN75471P
SN75472D	Active	Production	SOIC (D) | 8	75 | TUBE	Yes	NIPDAU	Level-1-260C-UNLIM	0 to 70	75472
SN75472P	Active	Production	PDIP (P) | 8	50 | TUBE	Yes	NIPDAU	N/A for Pkg Type	0 to 70	SN75472P

(1) **Status:** For more details on status, see our product life cycle.

(2) **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.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **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.

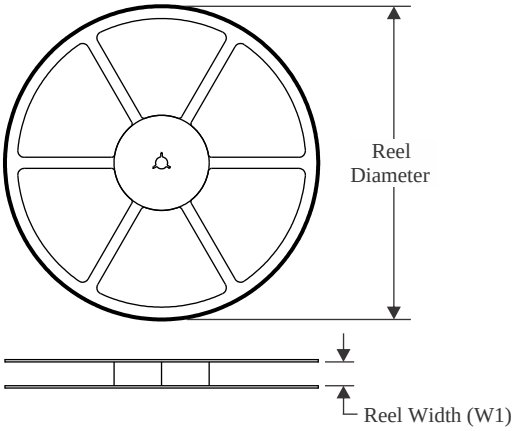
(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will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

(6) **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.

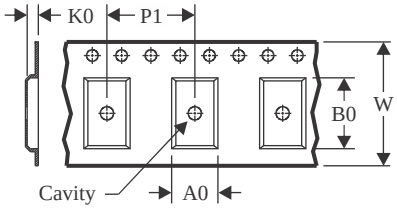
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

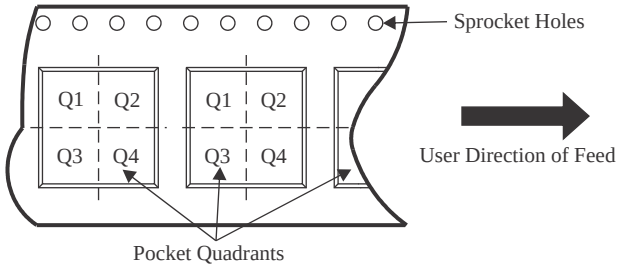


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

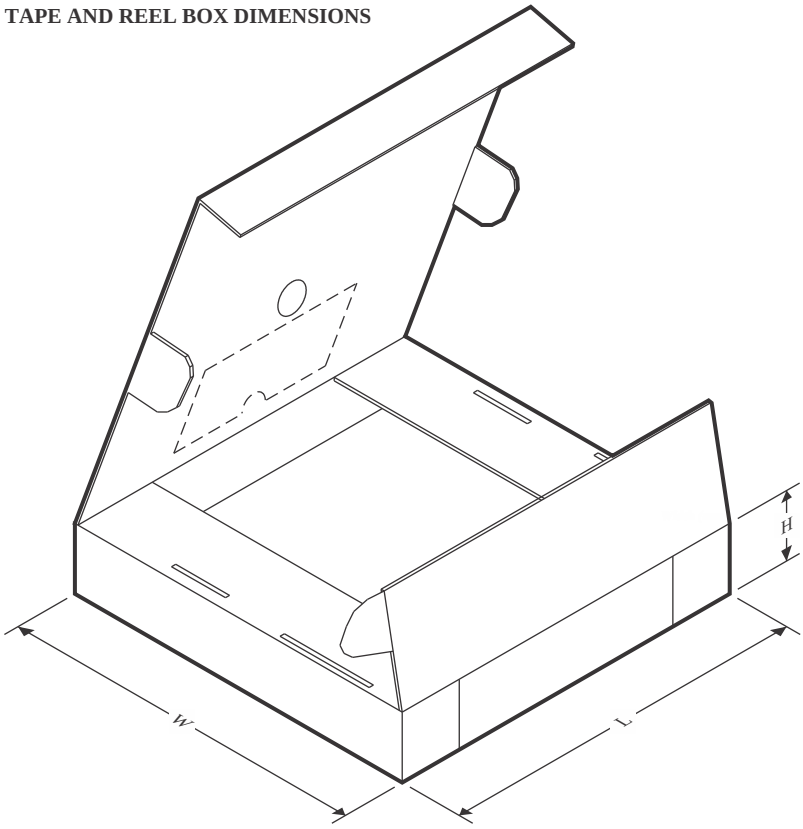
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
SN75471DR	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

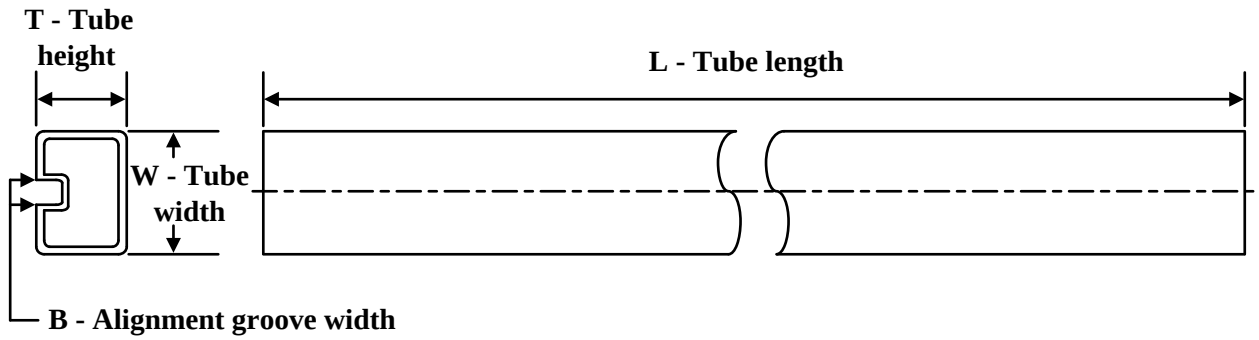
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

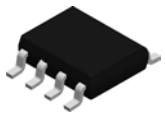
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN75471DR	SOIC	D	8	2500	340.5	338.1	20.6

TUBE



*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (µm)	B (mm)
SN75471D	D	SOIC	8	75	507	8	3940	4.32
SN75471P	P	PDIP	8	50	506	13.97	11230	4.32
SN75472D	D	SOIC	8	75	507	8	3940	4.32
SN75472P	P	PDIP	8	50	506	13.97	11230	4.32

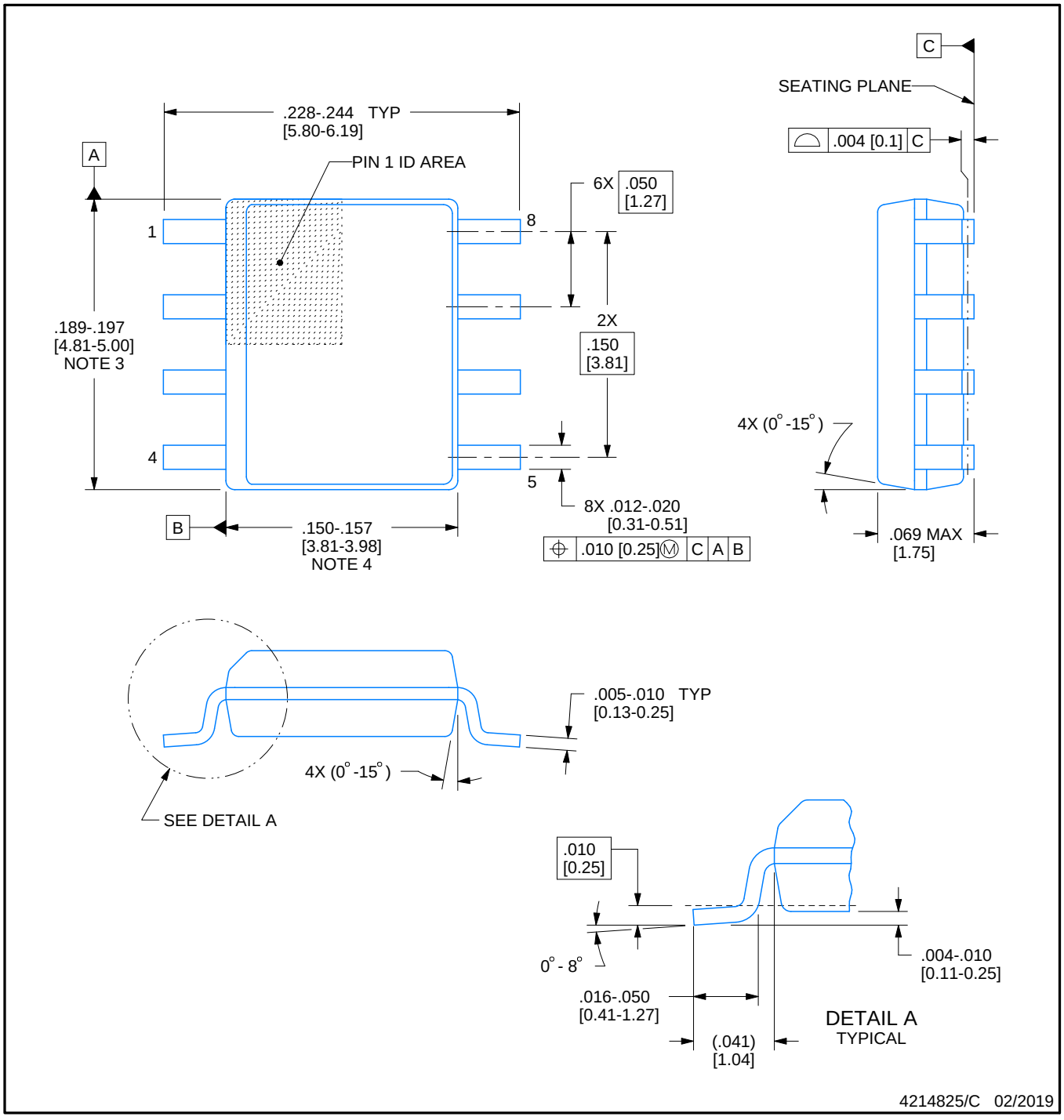


PACKAGE OUTLINE

D0008A

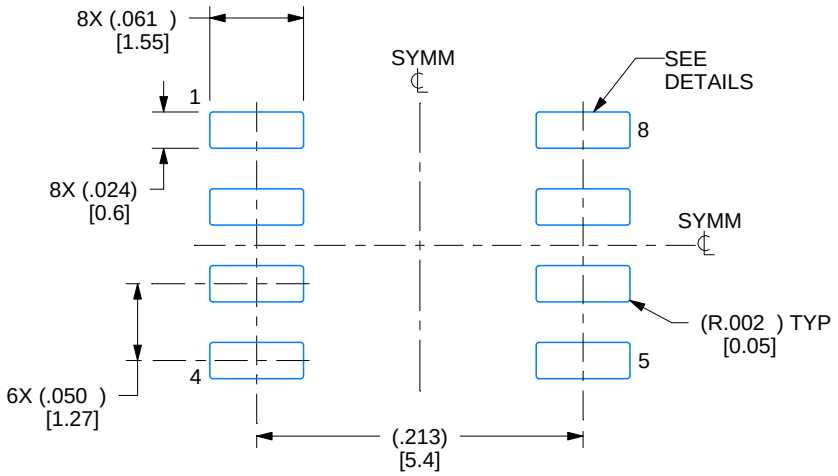
SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT

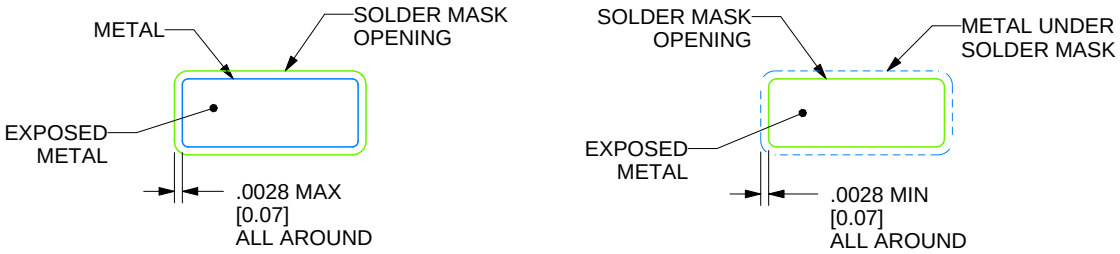


NOTES:

1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. 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 .006 [0.15] per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

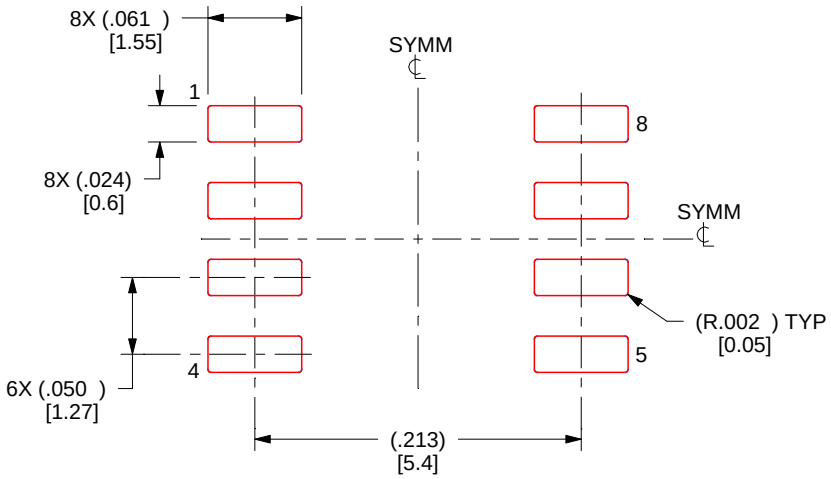
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



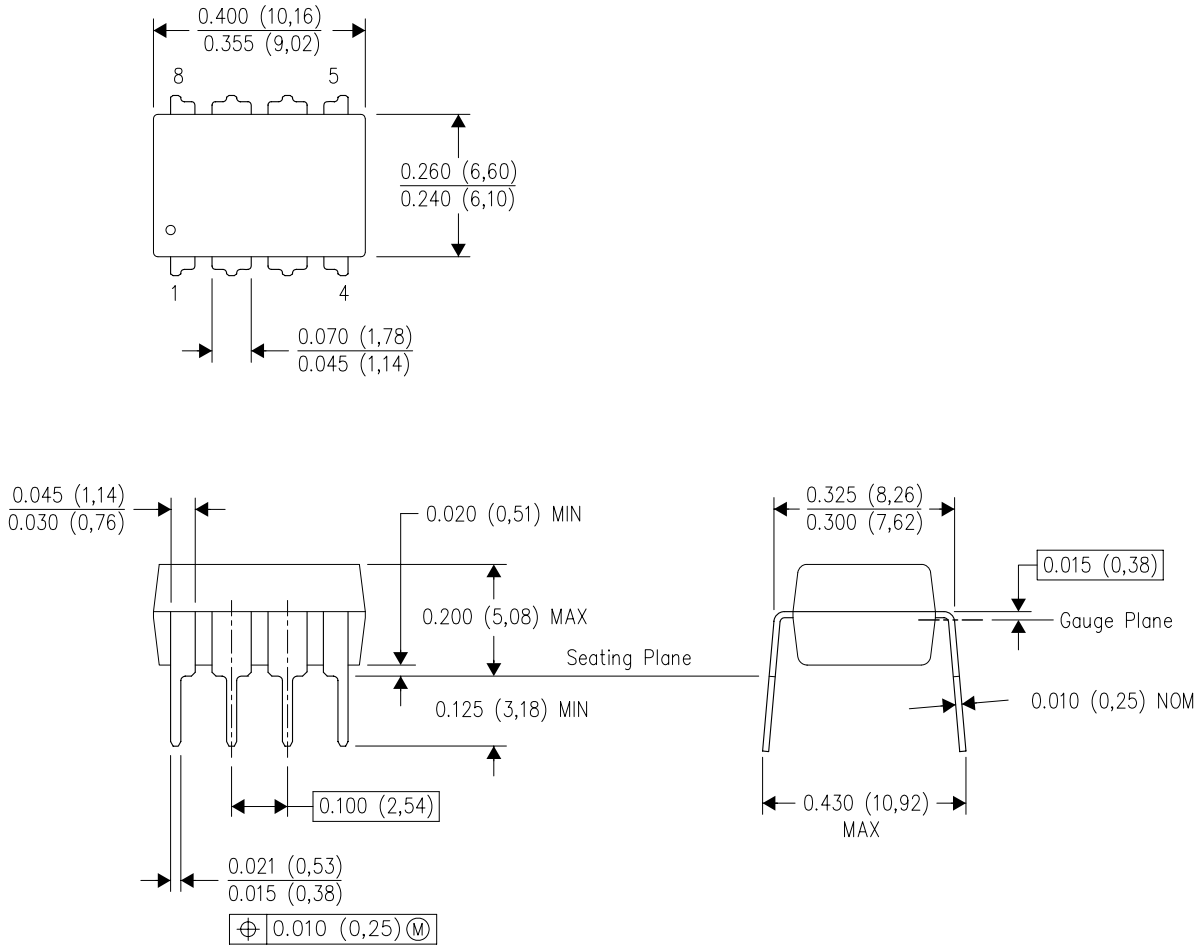
SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

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.

P (R–PDIP–T8) PLASTIC DUAL–IN–LINE PACKAGE



NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001 variation BA.

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