

## FEATURES

- Meets or Exceeds the Requirements of IBM® 360/370 Input/Output Interface Specification for 4.5-Mb/s Operation
- Single 5-V Supply
- Uncommitted Emitter-Follower Output Structure for Party-Line Operation
- Driver Output Short-Circuit Protection
- Driver Input/Receiver Output Compatible With TTL
- Receiver Input Resistance . . . 7.4 k $\Omega$  to 20 k $\Omega$
- Ratio Specification for Propagation Delay Time, Low to High/High to Low

## DESCRIPTION/ ORDERING INFORMATION

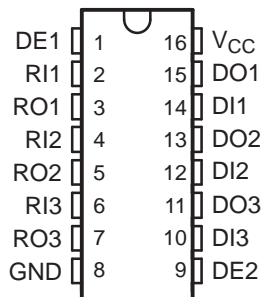
The SN751730 triple line driver/receiver is specifically designed to meet the input/output interface specifications for IBM System 360/370. It also is compatible with standard TTL logic and supply voltage levels.

The low-impedance emitter-follower driver outputs of the SN751730 drive terminated lines, such as coaxial cable or twisted pair. Having the outputs uncommitted allows wired-OR logic to be performed in party-line applications. Output short-circuit protection is provided by an internal clamping network that turns on when the output voltage drops below approximately 2.5 V.

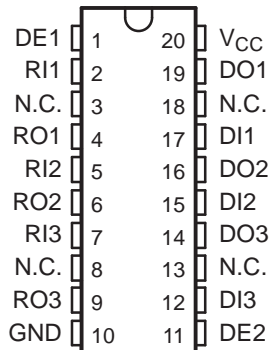
An open line affects the receiver input as does a low-level input voltage.

All the driver inputs and receiver outputs are in conventional TTL configuration and the gating can be used during power-up and power-down sequences to ensure that no noise is introduced to the line by pulling either DE1 or DE2 to a low level.

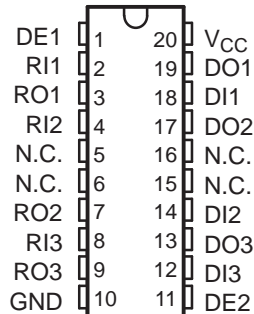
**D OR N PACKAGE  
(TOP VIEW)**



**DW PACKAGE  
(TOP VIEW)**



**NS PACKAGE  
(TOP VIEW)**



N.C. — No internal connection



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# SN751730 TRIPLE LINE DRIVER/RECEIVER

SLLS062E – MAY 1990 – REVISED AUGUST 2007

## ORDERING INFORMATION

T <sub>A</sub>	PACKAGE <sup>(1)(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 70°C	PDIP – N	Tube	SN751730N	SN751730N
	SOIC – D	Tube	SN751730D	SN751730
		Tape and reel	SN751730DR	
	SOIC – DW	Tube	SN751730DW	SN751730
		Tape and reel	SN751730DWR	
	SOP – NS	Tape and reel	SN751730NSR	SN751730

(1) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

(2) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at [www.ti.com](http://www.ti.com).

## FUNCTION TABLES

### EACH DRIVER

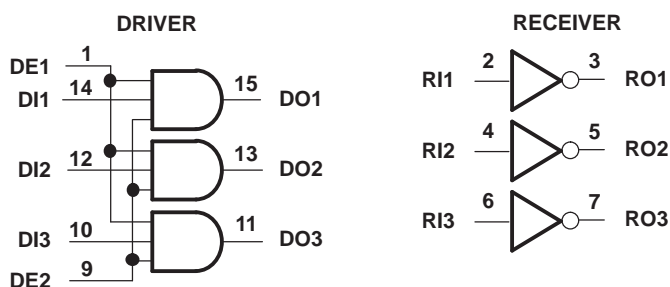
INPUTS			OUTPUT DO
DI	DE1	DE2	
L	X	X	L
X	L	X	L
X	X	L	L
H	H	H	H

### EACH DRIVER<sup>(1)</sup>

INPUT RI	OUTPUT RO
L	H
H	L
Open	H

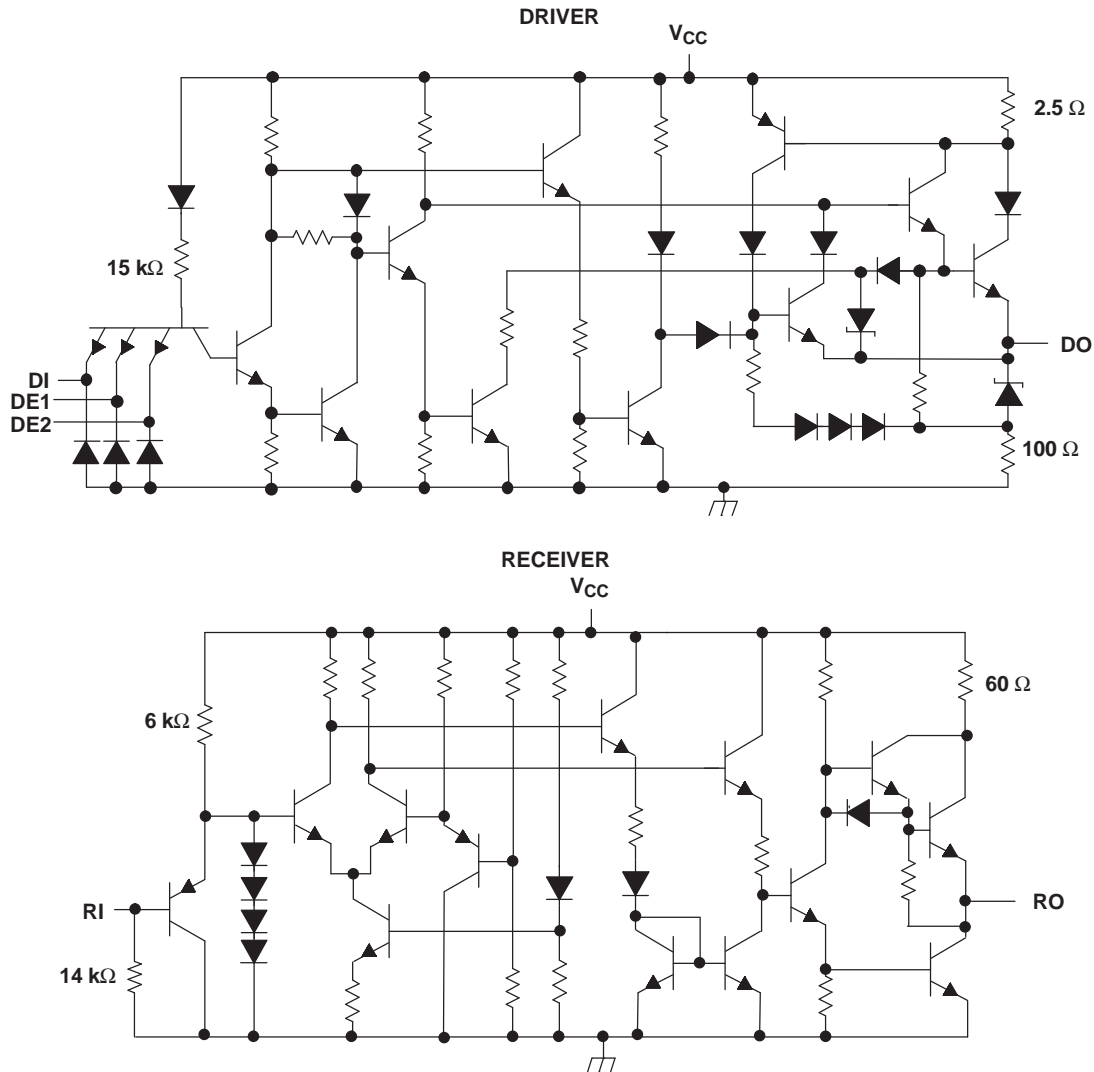
(1) H = high level, L = low level, X = irrelevant

## LOGIC DIAGRAM (POSITIVE LOGIC)



Pin numbers shown are for the D and N package only.

# EQUIVALENT SCHEMATICS OF DRIVER AND RECEIVER<sup>(1)</sup>



(1) All resistor values are nominal.

# SN751730

## TRIPLE LINE DRIVER/RECEIVER

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### Absolute Maximum Ratings<sup>(1)</sup>

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

			MIN	MAX	UNIT
V <sub>CC</sub>	Supply voltage <sup>(2)</sup>			7	V
V <sub>I</sub>	Input voltage range	Driver	–0.5	7	V
		Receiver	–0.5	7	V
V <sub>O</sub>	Output voltage range	Driver	–0.5	7	V
	Enable input voltage range		–0.5	7	V
θ <sub>JA</sub>	Package thermal impedance <sup>(3)</sup>	D package		73	°C/W
		DW package		58	
		N package		67	
		NS package		60	
T <sub>J</sub>	Operating virtual junction temperature			150	°C
	Lead temperature 1,6 mm (1/16 inch) from case for 10 s			260	°C
T <sub>stg</sub>	Storage temperature range		–65	150	°C/W

- (1) 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.
- (2) All voltage values are with respect to network ground terminal.
- (3) The package thermal impedance is calculated in accordance with JESD 51-7.

### Recommended Operating Conditions

			MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage		4.75	5	5.25	V
V <sub>IH</sub>	High-level input voltage	Driver, Enable	2			V
		Receiver	1.55			
V <sub>IL</sub>	Low-level input voltage	Driver, Enable			0.8	V
		Receiver			1.15	
T <sub>A</sub>	Operating free-air temperature		0		70	°C

## DRIVER SECTION

### Electrical Characteristics

over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted)

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
$V_{IK}$	Input clamp voltage	$V_{CC} = 4.75\text{ V}$ ,	$I_{IL} = -18\text{ mA}$		-1.5	V
$V_{OH}$	High-level output voltage	$V_{CC} = 4.75\text{ V}$ , $I_{OH} = -59.3\text{ mA}$	$V_{IH} = 2\text{ V}$ , $T_A = 25^\circ\text{C}$	3.11		V
		$V_{CC} = 5.25\text{ V}$ , $I_{OH} = -78.1\text{ mA}$	$V_{IH} = 2\text{ V}$ ,		4.1	
		$V_{CC} = 4.75\text{ V}$ , $R_L = 51.4\ \Omega$	$V_{IH} = 2\text{ V}$ ,	3.05		
		$V_{CC} = 5.25\text{ V}$ , $R_L = 56.9\ \Omega$	$V_{IH} = 2\text{ V}$ ,		4.2	
$V_{ODH}$	Differential high-level output voltage	$R_L = 46.3\ \Omega$ or $56.9\ \Omega$			0.5	V
$V_{OL}$	Low-level output voltage	$V_{CC} = 5.25\text{ V}$ , $V_{IL} = 0.8\text{ V}$ , $V_{IH} = 4.5\text{ V}$	$I_{OL} = -0.24\text{ mA}$		0.15	V
			$R_L = 56.9\ \Omega$		0.15	
$I_{IH}$	High-level input current	$V_{CC} = 5.25\text{ V}$ ,	$V_{IH} = 2.7\text{ V}$		20	$\mu\text{A}$
					60	
$I_{IL}$	Low-level input current	$V_{CC} = 5.25\text{ V}$ ,	$V_{IH} = 0.4\text{ V}$		-400	$\mu\text{A}$
					-1200	
$I_{OH}$	High-level output current	$V_{CC} = 4.75\text{ V}$ , $V_{OH} = 5\text{ V}$	$V_{IL} = 0$		100	$\mu\text{A}$
			$V_{IH} = 4.5\text{ V}$		100	
$I_{OS}$	Short-circuit output current <sup>(1)</sup>	$V_{CC} = 5.25\text{ V}$	$V_{IH} = 4.5\text{ V}$		-30	mA
$I_{CCH}$	Supply current (total package)	$V_{CC} = 5.25\text{ V}$ , No load	$V_{I(D)} = 4.5\text{ V}$ , $V_{I(R)} = 0$		47	mA
$I_{CCL}$			$V_{I(D)} = 0$ , $V_{I(R)} = 4.5\text{ V}$		80	

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

### Switching Characteristics

$V_{CC} = 5\text{ V} \pm 5\%$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
$t_{PLH}$	Propagation delay time, low- to high-level output	$R_L = 47.5\ \Omega$ , See <a href="#">Figure 1</a>		6.5	12	18.5	ns
$t_{PHL}$	Propagation delay time, high- to low-level output			6.5	12	18.5	ns
$\Delta t_{pd}$	Differential propagation delay time <sup>(1)</sup>					10	ns
$t_r$	Output rise time	$V_{CC} = 5\text{ V}$ , $R_L = 47.5\ \Omega$ , See <a href="#">Figure 1</a>	$V_O = 0.15\text{ V}$ to $3.05\text{ V}$ , $C_L = 10.2\text{ pF}$ ,	5	10		ns
$t_f$	Output fall time			5	13		ns
SR	Slew rate	$V_O = 1\text{ V}$ to $3\text{ V}$ average, $R_L = 47.5\ \Omega$ , See <a href="#">Figure 1</a>	$C_L = 10.2\text{ pF}$ ,			0.65	V/ns

(1)  $\Delta t_{pd} = |t_{PLH} - t_{PHL}|$

## RECEIVER SECTION

### Electrical Characteristics

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

PARAMETER		TEST CONDITIONS		MIN	MAX	UNIT
$V_{OH}$	High-level output voltage	$V_{CC} = 4.75\text{ V}$ , $I_{OH} = -400\text{ }\mu\text{A}$	$V_I = 1.15\text{ V}$ ,	2.7		V
$V_{OL}$	Low-level output voltage	$V_{CC} = 4.75\text{ V}$ , $V_{IH} = 1.55\text{ V}$	$I_{OL} = 8\text{ mA}$		0.5	V
			$I_{OL} = 4\text{ mA}$		0.4	
$r_i$	Input resistance	$V_{CC} = 0$ ,	$V_I = 0.15\text{ V to } 3.9\text{ V}$	7.4	20	k $\Omega$
$I_{IH}$	High-level input current	$V_{CC} = 4.75\text{ V}$ ,	$V_{IH} = 3.11\text{ V}$		0.42	mA
$I_{IL}$	Low-level input current	$V_{CC} = 5.25\text{ V}$ ,	$V_{IL} = 0.15\text{ V}$	-0.24	0.04	mA
$I_{OS}^{(1)}$	Short-circuit output current	$V_{CC} = 5.25\text{ V}$ ,	$V_{IL} = 0$	-20	-100	mA
$I_{CCH}$	Supply current (total package)	$V_{CC} = 5.25\text{ V}$ , No load	$V_{I(D)} = 4.5\text{ V}$ , $V_{I(R)} = 0$		47	mA
$I_{CCL}$			$V_{I(D)} = 0$ , $V_{I(R)} = 4.5\text{ V}$		80	

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

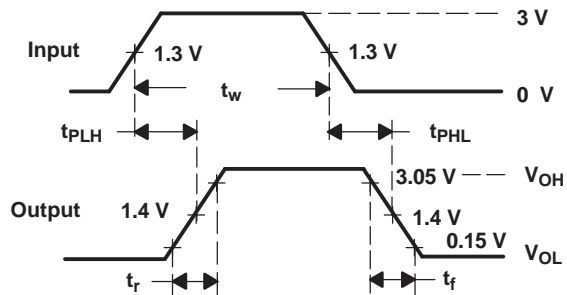
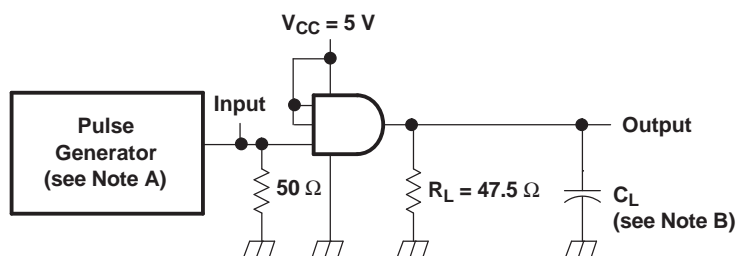
### Switching Characteristics

$V_{CC} = 5\text{ V} + 5\%$ ,  $T_A = 25^\circ\text{C}$

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$t_{PLH}$	Propagation delay time, low- to high-level output	$R_L = 2\text{ k}\Omega$ , $C_L = 15\text{ pF}$ , See <a href="#">Figure 2</a>	7.5	12	19.5	ns
$t_{PHL}$	Propagation delay time, high- to low-level output		7.5	12	19.5	ns
$\Delta t_{pd}^{(1)}$	Differential propagation delay time				10	ns

(1)  $\Delta t_{pd} = |t_{PLH} - t_{PHL}|$

## PARAMETER MEASUREMENT INFORMATION

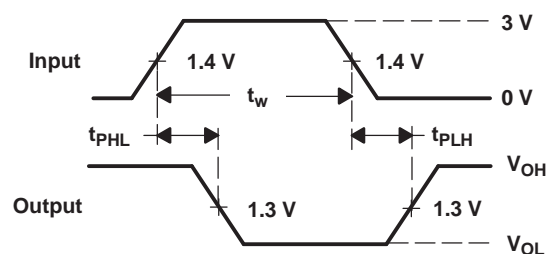
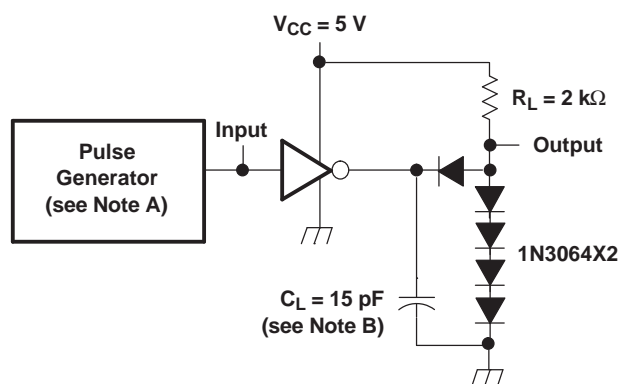


### TEST CIRCUIT

### VOLTAGE WAVEFORMS

NOTES: A. The pulse generator has the following characteristics:  $Z_O \approx 50 \Omega$ ,  $t_w \leq 500$  ns,  $PRR \leq 1$  MHz,  $t_f \leq 6$  ns,  $t_r \leq 15$  ns.  
B.  $C_L$  includes probe and jig capacitance.

Figure 1. Driver Test Circuit and Voltage Waveforms



### TEST CIRCUIT

### VOLTAGE WAVEFORMS

NOTES: A. The pulse generator has the following characteristics:  $Z_O \approx 50 \Omega$ ,  $t_w \leq 500$  ns,  $PRR \leq 1$  MHz,  $t_f \leq 10$  ns,  $t_r \leq 10$  ns.  
B.  $C_L$  includes probe and jig capacitance.

Figure 2. Receiver Test Circuit and Voltage Waveforms

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
SN751730D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN751730DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN751730DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	
SN751730N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	
SN751730NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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

16 PINS SHOWN

## PLASTIC DUAL-IN-LINE PACKAGE



PINS ** DIM	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS-001 VARIATION	AA	BB	AC	AD



4040049/E 12/2002

NOTES:

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

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



NOTES:

- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- C. Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- D. Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AC.

D (R-PDSO-G16)

PLASTIC SMALL OUTLINE



- NOTES:
- A. All linear dimensions are in millimeters.
  - B. This drawing is subject to change without notice.
  - C. Publication IPC-7351 is recommended for alternate designs.
  - D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
  - E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.

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### Products

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Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
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