

# SN74ALS29861, SN74ALS29862 10-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

SDAS097B – D2915, JANUARY 1986 – REVISED AUGUST 1988

- Functionally Equivalent to AM29861 and AM29862
- Choice of True or Inverting Logic
- Power-Up High-Impedance State
- Package Options include Plastic Small Outline Packages, Plastic Chip Carriers, and Standard Plastic DIPs

## description

These 10-bit bus transceivers are designed for asynchronous two-way communication between data buses. The control function implementation allows for maximum flexibility in timing.

These devices allow data transmission from the A bus to the B bus or from the B bus to the A bus depending upon the logic levels at the enable inputs ( $\overline{\text{GBA}}$  and  $\overline{\text{GAB}}$ ).

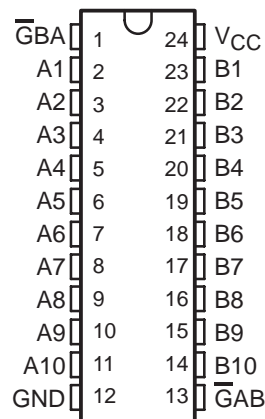
The enable inputs can be used to disable the device so that the buses are effectively isolated.

The SN74' family is characterized for operation from 0°C to 70°C.

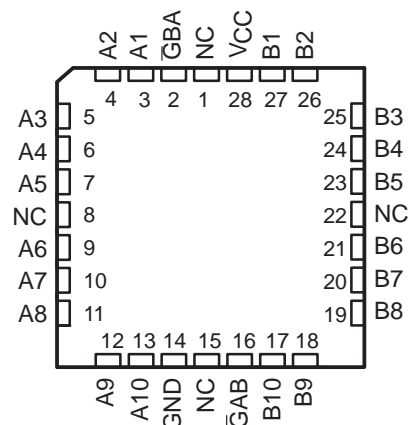
FUNCTION TABLE

INPUTS		OPERATION	
$\overline{\text{GAB}}$	$\overline{\text{GBA}}$	ALS29861	ALS29862
L	H	A to B	$\overline{\text{A}}$ to B
H	L	B to A	$\overline{\text{B}}$ to A
H	H	Isolation	Isolation
L	L	Latch A and B (A = B)	Latch A and B (A = $\overline{\text{B}}$ )

DW OR NT PACKAGE  
(TOP VIEW)



FN PACKAGE  
(TOP VIEW)

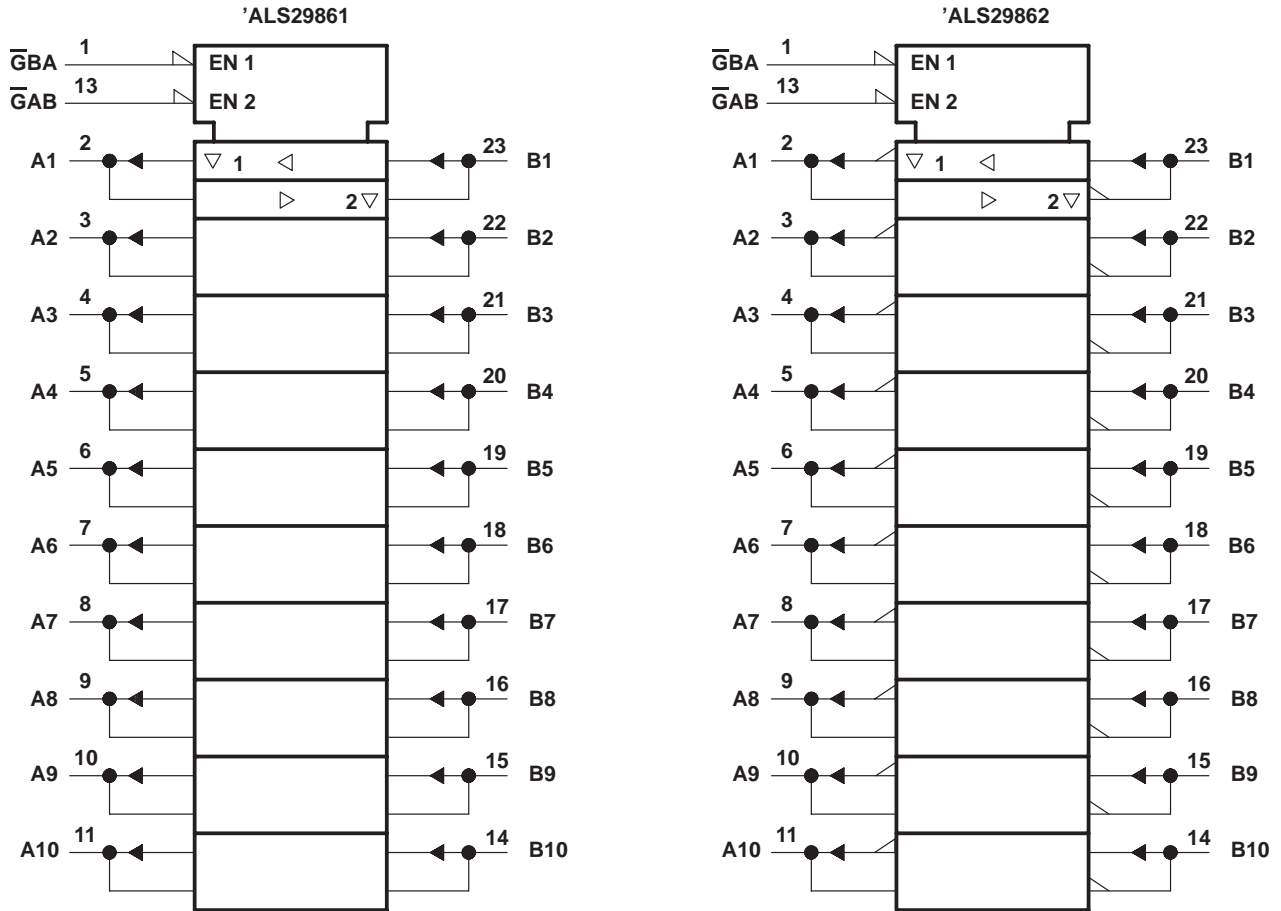


NC – No internal connection

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## logic symbols†



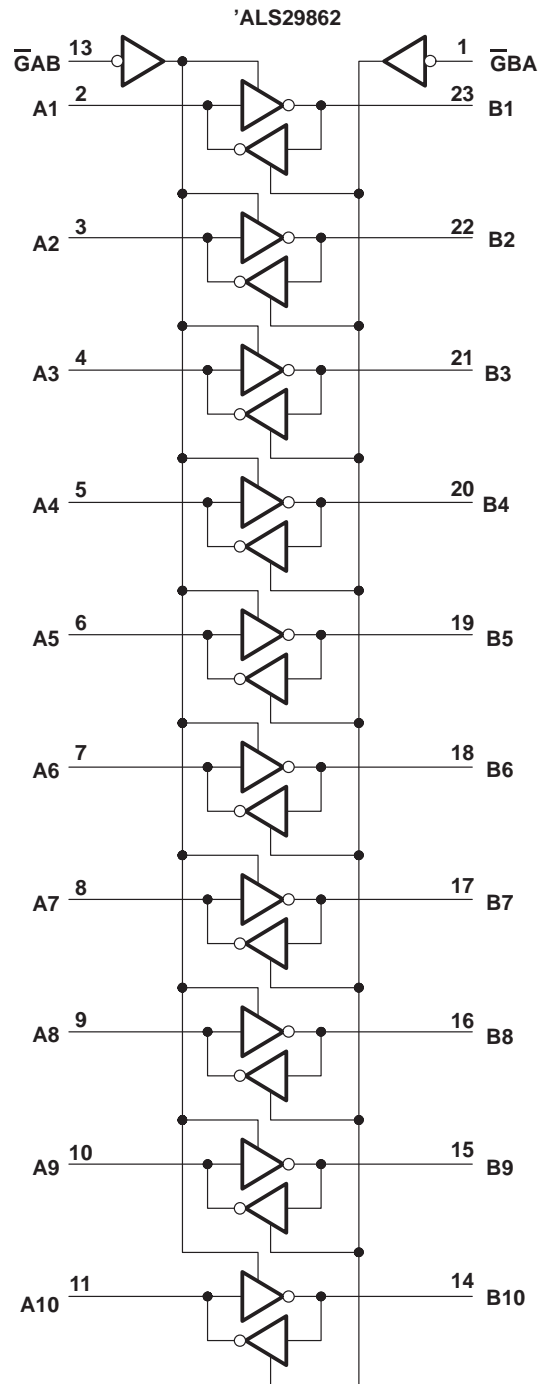
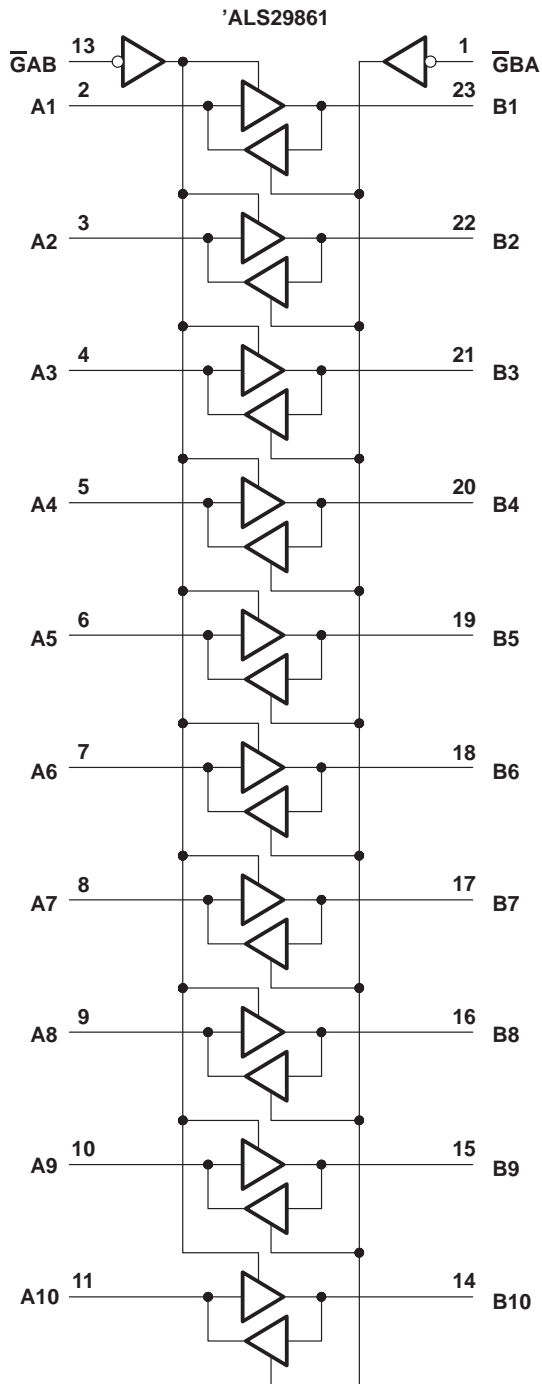
† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

‡ Pin numbers shown are for DW and NT packages.

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## logic diagrams



Pin numbers shown are for DW and NT packages.

# SN74ALS29861, SN74ALS29862

## 10-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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

Supply voltage, $V_{CC}$	7 V
Input voltage: All inputs and I/O ports	5.5 V
Operating free-air temperature range	0°C to 70°C
Storage temperature range	-65°C to 150°C

### recommended operating conditions

	MIN	NOM	MAX	UNIT
$V_{CC}$ Supply voltage	4.75	5	5.25	V
$V_{IH}$ High-level input Voltage	2			V
$V_{IL}$ Low-level input Voltage			0.8	V
$I_{OH}$ High-level output current			-24	mA
$I_{OL}$ Low-level output current			48	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
$V_{IK}$		$V_{CC} = 4.75\text{ V}$ , $I_I = -18\text{ mA}$			-1.2	V
$V_{OH}$		$V_{CC} = 4.75\text{ V}$ , $I_{OH} = -15\text{ mA}$	2.4			V
		$V_{CC} = 4.75\text{ V}$ , $I_{OH} = -24\text{ mA}$	2			
$V_{OL}$		$V_{CC} = 4.75\text{ V}$ , $I_{OL} = 48\text{ mA}$		0.35	0.5	V
$I_I$		$V_{CC} = 5.25\text{ V}$ , $V_I = 5.5\text{ V}$			0.1	mA
$I_{IH}$	Control inputs	$V_{CC} = 5.25\text{ V}$ , $V_I = 2.7\text{ V}$			20	$\mu\text{A}$
	A or B ports‡				20	
$I_{IL}$	Control inputs	$V_{CC} = 5.25\text{ V}$ , $V_I = 0.4\text{ V}$			-0.1	mA
	A or B ports‡				-0.1	
$I_{OS}$ §		$V_{CC} = 5.25\text{ V}$ , $V_O = 0\text{ V}$	-75		-250	mA
$I_{CC}$	'ALS29861	$V_{CC} = 5.25\text{ V}$		40	65	mA
	'ALS29862			40	65	

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

‡ For I/O ports, the parameters  $I_{IH}$  and  $I_{IL}$  include the off-state output current.

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



# SN74ALS29861, SN74ALS29862 10-BIT BUS TRANSCEIVERS WITH 3-STATE OUTPUTS

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## SN74ALS29861 switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS See Figure 1	V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C			V <sub>CC</sub> = 4.75 V to 5.25 V, T <sub>A</sub> = 0°C to 70°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 300 pF	8	11		15		ns
t <sub>PHL</sub>				11	14		15		
t <sub>PLH</sub>			C <sub>L</sub> = 50 pF	4.8	6		8		
t <sub>PHL</sub>				5.2	6.2		8		
t <sub>PZH</sub>	$\overline{\text{GAB}}$ or $\overline{\text{GBA}}$	A or B	C <sub>L</sub> = 300 pF	11	17		20		ns
t <sub>PZL</sub>				17	21		23		
t <sub>PZH</sub>			C <sub>L</sub> = 50 pF	6.5	12		15		
t <sub>PZL</sub>				9.5	12		15		
t <sub>PHZ</sub>	$\overline{\text{GAB}}$ or $\overline{\text{GBA}}$	A or B	C <sub>L</sub> = 50 pF	11.2	16		17		ns
t <sub>PLZ</sub>				4.5	9		12		
t <sub>PHZ</sub>			C <sub>L</sub> = 5 pF	3.5	8		9		
t <sub>PLZ</sub>				3.5	8		9		

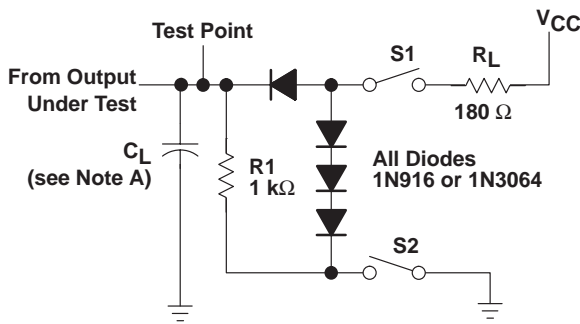
## SN74ALS29862 switching characteristics

PARAMETER	FROM (INPUT)	TO (OUTPUT)	TEST CONDITIONS See Figure 1	V <sub>CC</sub> = 5 V, T <sub>A</sub> = 25°C			V <sub>CC</sub> = 4.75 V to 5.25 V, T <sub>A</sub> = 0°C to 70°C		UNIT
				MIN	TYP	MAX	MIN	MAX	
t <sub>PLH</sub>	A or B	B or A	C <sub>L</sub> = 300 pF	7.3	10		14		ns
t <sub>PHL</sub>				10.5	12.9		14		
t <sub>PLH</sub>			C <sub>L</sub> = 50 pF	4	5.2		7		
t <sub>PHL</sub>				4.9	5.9		7.5		
t <sub>PZH</sub>	$\overline{\text{GAB}}$ or $\overline{\text{GBA}}$	A or B	C <sub>L</sub> = 300 pF	11	17		20		ns
t <sub>PZL</sub>				17	21		23		
t <sub>PZH</sub>			C <sub>L</sub> = 50 pF	6.5	12		15		
t <sub>PZL</sub>				9.5	12		15		
t <sub>PHZ</sub>	$\overline{\text{GAB}}$ or $\overline{\text{GBA}}$	A or B	C <sub>L</sub> = 50 pF	11.2	16		17		ns
t <sub>PLZ</sub>				4.5	9		12		
t <sub>PHZ</sub>			C <sub>L</sub> = 5 pF	3.5	8		9		
t <sub>PLZ</sub>				3.5	8		9		

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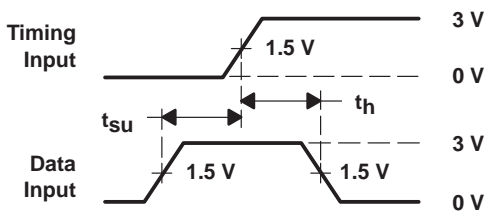
## PARAMETER MEASUREMENT INFORMATION



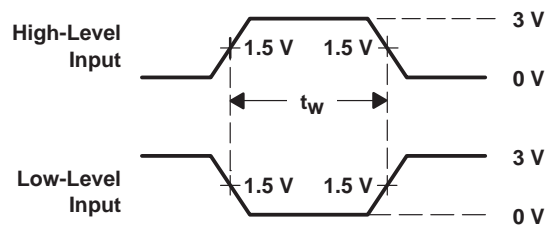
LOAD CIRCUIT

SWITCH POSITION TABLE

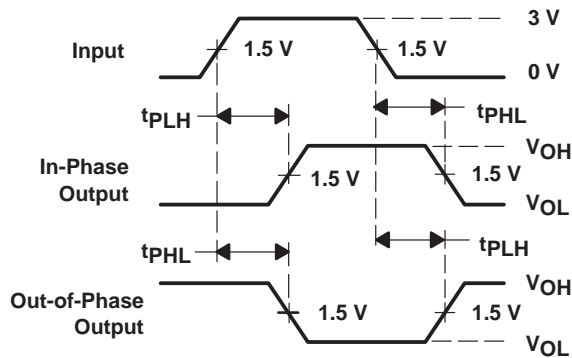
TEST	S1	S2
$t_{PLH}$	Closed	Closed
$t_{PHL}$	Closed	Closed
$t_{PZH}$	Open	Closed
$t_{PZL}$	Closed	Open
$t_{PHZ}$	Closed	Closed
$t_{PLZ}$	Closed	Closed



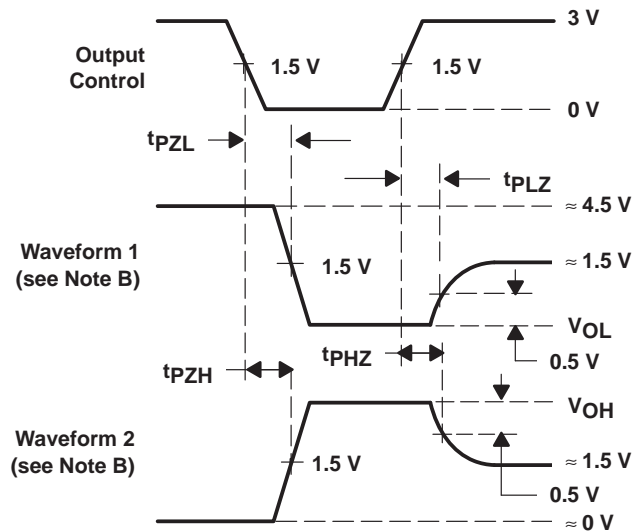
VOLTAGE WAVEFORMS  
SETUP AND HOLD TIMES



VOLTAGE WAVEFORMS  
PULSE DURATIONS



VOLTAGE WAVEFORMS  
PROPAGATION DELAY TIMES



VOLTAGE WAVEFORMS  
ENABLE AND DISABLE TIMES, 3-STATE OUTPUTS

NOTES: A.  $C_L$  includes probe and jig capacitance.

B. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control. Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.

C. All input pulses are supplied by generators having the following characteristics: PRR  $\leq$  10 MHz,  $Z_O = 50 \Omega$ ,  $t_r \leq 2.5$  ns,  $t_f \leq 2.5$  ns.

Figure 1

**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>
SN74ALS29861DW	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI
SN74ALS29861DWR	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI
SN74ALS29861DWR	OBSOLETE	SOIC	DW	24		TBD	Call TI	Call TI
SN74ALS29861NT	OBSOLETE	PDIP	NT	24		TBD	Call TI	Call TI
SN74ALS29861NT	OBSOLETE	PDIP	NT	24		TBD	Call TI	Call TI

<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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DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>	Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
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Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
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