- 10KH Compatible
- ECL and TTL Control Inputs
- P-N-P inputs Reduce DC Loading
- Flow-Through Architectures Optimizes PCB Layout
- Center Pin V<sub>CC</sub>, V<sub>EE</sub> and GND Configurations Minimize High-Speed Switching Noise
- ESD Protection Exceeds 2000 V Per MIL-STD-883C, Method 3015
- Package Options Include "Small Outline"
   Packages and Standard Plastic 300-mil DIPs

#### description

These octal TTL-to-ECL translators are designed to provide efficient translation between a TTL signal environment and a 10KH ECL signal environment. The designer has a choice of inverting ('5542) or true ('5543) outputs. Two pins,  $\overline{OE}1$  and  $\overline{OE}2$ , are provided for output enable control. These control inputs are negative ANDed together, with  $\overline{OE}1$  being ECL compatible and  $\overline{OE}2$  being TTL compatible. This offers the choice of controlling the outputs of the device from either a TTL or ECL signal environment. The outputs, when disabled, go to a normal ECL logic low level.

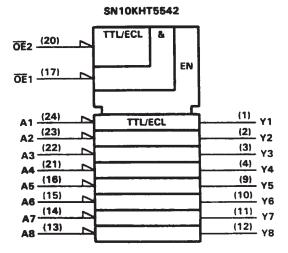
The SN10KHT5542 and SN10KHT5543 are characterized for operation from 0°C to 75°C.

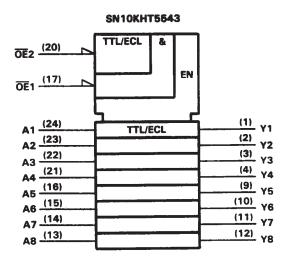
#### **DW OR NT PACKAGE** (TOP VIEW) U 24 A1 Y2 ∏2 23 A2 Y3 **□**3 22 A3 21 A4 20 OE2 (TTL) GND []5 GND ☐6 19 VCC 18 VEE GND 07 17 OE1 (ECL) GND 8 16 A5 Y5 **∏**9 15 A6 Y6 **□**10 14 🗌 A7 Y7 ∏11 Y8 ∐12 13 A8

#### **FUNCTION TABLE**

OUTPUT				PUT
ŌĒ1	ŌE2	Α	'5542	′5543
Н	Х	Х	L	L
×	н	Х	L	L
L	L	L	н	L
L	L	н	L	н

#### logic symbols †





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

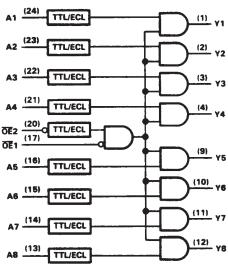


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#### logic diagrams (positive logic)

#### SN10KHT5542 A1 (24) TTL/ECL A2 (23) O TTL/ECL (2) Y2 A3 (22) O TTL/ECL (<u>3)</u> y3 A4 (21) O TTL/ECL (4) ŌĒ2 (20) TTL/ECL (17) (9) - Y5 AS (16) TTL/ECL (10) Y6 A6 (15) C TTL/ECL (11) Y7 TTL/ECL (12) Y8 TTL/ECL

## SN10KHT5543



## absolute maximum ratings over operating ambient temperature range (unless otherwise noted)†

Supply voltage range, VCC0.5 V to 7 V
Supply voltage range, VEE8 V to 0 V
Input voltage range (TTL) (See Note 1)
Input voltage range (ECL)
Input current range (TTL)
Operating ambient temperature range 0°C to 75°C
Storage temperature range65 °C to 150 °C

<sup>†</sup>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.

### recommended operating conditions (see Note 2)

			MIN	NOM MAX	UNIT
Vcc	TTL supply voltage		4.5	5.0 5.5	V
VEE	ECL supply voltage	-4.94	-5.2 -5.46	V	
VIH	TTL high-level input voltage				٧
		0°C	-1170	-840	
ViH	ECL high-level input voltage <sup>‡</sup>	25°C	-1130	-810	m∨
		75°C	- 1070	- 735	٦
VIL	TTL low-level input voltage			0.8	V
		0°C	-1950	- 1480	
VIL	ECL low-level input voltage‡	25°C	-1950	- 1480	mV
16	•	- 1950	- 1450		
İIK	TTL input clamp current			18	mA
TA	Operating ambient temperature (see Note 3)		0	75	°C

<sup>&</sup>lt;sup>‡</sup> The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels and temperature only.

NOTES: 2. If unused, OE1 should be tied directly to -2 V.

<sup>3:</sup> Each 10KH series circuit has been designed to meet the dc specifications shown in the electrical characteristics table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board, and transverse air flow greater than 500 linear ft/min is maintained.



#### electrical characteristics over recommended operating ambient temperature range (unless otherwise noted) (see Note 2)

	PARAMETER		TEST CONDITIONS		MIN	TYP <sup>†</sup> MAX	UNIT	
VIK	A inputs and OE2	$V_{CC} = 4.5 \text{ V},$	$V_{EE} = -4.94 \text{ V},  I_{I} = -18 \text{ mA}$			-1.2	٧	
11	A inputs and OE2	$V_{CC} = 5.5 V,$	$V_{EE} = -5.46 \text{ V},  V_{I} = 7 \text{ V}$			0.1	mA	
	A inputs and OE2	$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = 2.7 \text{ V}$			20		
١.		$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = -840 \text{ mV}$	0°C		350	] [	
۱н	OE1 only	$V_{CC} = 5.5 V$ .	$V_{EE} = -5.46 \text{ V},  V_{I} = -810 \text{ mV}$	25°C		350	μΑ	
ļ		$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = -735 \text{ mV}$	75°C		350	]	
	A inputs and OE2	$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = 0.5 \text{ V}$			- 500		
١.	OE1 only	V <sub>CC</sub> = 5.5 V,	V <sub>EE</sub> = -5.46 V, V <sub>I</sub> = -1950 mV	0°C	0.5			
4L				25°C	0.5		μА	
				75°C	0.5			
			V <sub>EE</sub> = -5.2 V, ±5%, See Note 3	0°C	- 1020	-840		
VOH <sup>‡</sup>		$V_{CC} = 4.5 V$		25°C	-980	-810	m∨	
				75 °C	-920	-735		
				0°C	- 1950	- 1630		
VOL <sup>‡</sup>		$V_{CC} = 4.5 V$	V <sub>EE</sub> = -5.2 V, ±5%, See Note 3	25°C	- 1950	- 1630	m∨	
				75°C	- 1950	1600		
Іссн		$V_{CC} = 5.5 V$ ,	V <sub>EE</sub> = -5.46 V			15 22	mA	
ICCL		$V_{CC} = 5.5 \text{ V},$	VEE = -5.46 V			17 25	mA	
IEE		V <sub>CC</sub> = 5.5 V,	V <sub>EE</sub> = -5.46 V			-78 -111	mA	
Ci		V <sub>CC</sub> = 5 V.	V <sub>EE</sub> = -5.2 V, f = 10 MHz			5	pF	

### switching characteristics over recommended ranges of operating ambient temperature and supply voltage (unless otherwise noted) (see Note 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	MIN	TYP <sup>†</sup>	MAX	UNIT
tPLH	A A	V	0.1	1.7	3.7	
tpHL	Any A	· · · · · · · · · · · · · · · · · · ·	0.1	1.6	3.3	ns
tPLH .	OF (501)		0.8	2.8	5	ns
tpHL tpHL	OE1 (ECL)	Ť	0.4	2.3	4.5	
tPLH	OF0 (771)	V	0.8	3	5.3	
tpHL tpHL	OE2 (TTL)	Y	0.6	2.5	4.7	ns
t <sub>r</sub>		V		1.5		
tf	1	l <sup>Y</sup>	1.5			ns

NOTES: 2. Each 10KH series circuit has been designed to meet the dc specifications shown in the electrical characteristics table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear ft/min is maintained.

- 3. Outputs are terminated through a 50- $\Omega$  resistor to -2 V.
- 4. Load circuit and switching waveforms are shown in Section 1.



 $<sup>^{\</sup>dagger}$  All typical values are at V<sub>CC</sub> = 5 V, V<sub>EE</sub> = -5.2 V, T<sub>A</sub> = 25 °C.  $^{\ddagger}$  The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels and temperature only.

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# electrical characteristics over recommended operating ambient temperature range (unless otherwise noted) (see Note 2)

	PARAMETER TEST CONDITIONS						TYP <sup>†</sup>	MAX	UNIT	
VIK	A inputs and OE2	$V_{CC} = 4.5 \text{ V},$	$V_{EE} = -4.94 \text{ V},  I_{I} = -$	18 mA				-1.2	V	
l <sub>l</sub>	A inputs and OE2	$V_{CC} = 5.5 V,$	$V_{EE} = -5.46 \text{ V},  V_{I} = 7$	' V				0.1	mA	
	A inputs and OE2	$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = 2$	2.7 V				20		
		$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = -6.46 \text{ V}$	-840 mV	0°C			350	μΑ	
'IH	OE1 only	$V_{CC} = 5.5 V$	$V_{EE} = -5.46 \text{ V},  V_{!} = -6.46 \text{ V}$	-810 mV	25°C			350	μ.,	
		V <sub>CC</sub> = 5.5 V,	$V_{EE} = -5.46 \text{ V},  V_{I} = -6.46 \text{ V}$	~ 735 mV	75°C			350		
	A inputs and OE2	$V_{CC} = 5.5 V$ ,	$V_{EE} = -5.46 \text{ V},  V_{I} = 0$	).5 V				- 500	_  '	
	OE1 only	V <sub>CC</sub> = 5.5 V,			0°C	0.5			μА	
IIL.			$V_{EE} = -5.46 \text{ V},  V_{I} = -6.46 \text{ V}$	$V_{\parallel} = -1950 \text{ mV}$	25°C	0.5	-		μ	
					75°C	0.5				
					0°C	- 1020		-840		
VoH <sup>‡</sup>		$V_{CC} = 4.5 V$	$V_{EE} = -5.2 \text{ V, } \pm 5\%, \text{ Sec}$	: 5%, See Note 3	25°C	- 980		-810	mV	
					75°C	-920		-735		
			<u> </u>		0°C	- 1950	•	- 1630		
V <sub>OL</sub> ‡		$V_{CC} = 4.5 V$	$V_{EE} = -5.2 \text{ V, } \pm 5\%, \text{ Sec}$	Note 3	25°C	C -1950		- 1630	m∨	
"-					75°C	- 1950		- 1600		
ІССН		$V_{CC} = 5.5 V$ ,	VEE = -5.46 V				17	25	mA	
ICCL		V <sub>CC</sub> = 5.5 V,	V <sub>EE</sub> = -5.46 V				15	22	mA	
1EE		V <sub>CC</sub> = 5.5 V,	V <sub>EE</sub> = -5.46 V				- 7 <b>7</b>	-111	mA	
C,		V <sub>CC</sub> = 5 V.	$V_{EE} = -5.2 \text{ V},  f = 10$	) MHz			5		ρF	

# switching characteristics over recommended ranges of operating ambient temperature and supply voltage (unless otherwise noted) (see Note 4)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	MIN	TYP	MAX	UNIT
tPLH		V	0.1	1.5	3	
<sup>†</sup> PHL	Any A	1	0.1	1.5	3.3	ns
<sup>t</sup> PLH			0.6	2.2	4.3	
tPHL	OE1 (ECL)	Y	0.5	2.4	4.3	ns
tPLH .			0.7	2.2	4.4	
tPHL	OE2 (TTL)	Y	0.5	2.6	4.7	ns
te		.,		1.5		ns
t <sub>f</sub>	1	l Y		1.5		

 $<sup>^{\</sup>dagger}$  All typical values are at VCC = 5 V, VEE = -5.2 V, TA = 25 °C.

NOTES: 2. Each 10KH series circuit has been designed to meet the dc specifications shown in the electrical characteristics table after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 linear ft/min is maintained.

- 3. Outputs are terminated through a 50- $\Omega$  resistor to -2 V.
- 4. Load circuit and voltage waveforms are shown in Section 1.

<sup>\*</sup>The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for logic voltage levels and temperature only.



## PACKAGE OPTION ADDENDUM

10-Dec-2020

#### PACKAGING INFORMATION

Orderable Device	Status	Package Type	Package Drawing	Pins	Package Qty	Eco Plan	Lead finish/ Ball material	MSL Peak Temp	Op Temp (°C)	Device Marking (4/5)	Samples
							(6)				
SN10KHT5543DW	ACTIVE	SOIC	DW	24	25	RoHS & Green	NIPDAU	Level-1-260C-UNLIM	0 to 70	10KHT5543	Samples

(1) 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.

(2) RoHS: TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (CI) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

- (3) MSL, Peak Temp. The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.
- (4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.
- (5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.
- (6) Lead finish/Ball material Orderable Devices 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.

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DW (R-PDSO-G24)

## PLASTIC SMALL OUTLINE



NOTES: A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.

- B. This drawing is subject to change without notice.
- C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
- D. Falls within JEDEC MS-013 variation AD.



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