

SN74HSTL162822

14-BIT TO 28-BIT HSTL-TO-LVTTL MEMORY ADDRESS LATCH

SCES091A – DECEMBER 1996 – REVISED APRIL 1997

- Member of the Texas Instruments Widebus™ Family
- Inputs Meet JEDEC HSTL Standard JESD8-6
- All Outputs Have Equivalent 25-Ω Series Resistors
- Packaged in Plastic Thin Shrink Small-Outline Package

description

This 14-bit to 28-bit D-type latch is designed for 3.15-V to 3.45-V V_{CC} operation. HSTL levels are expected on the inputs. LVTTL levels are driven on the Q outputs.

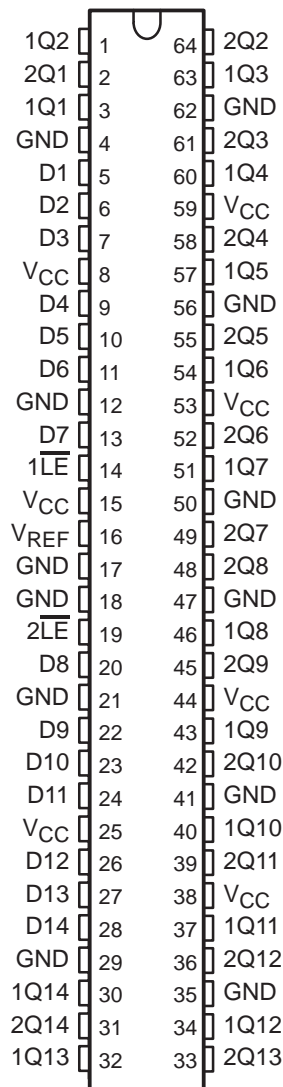
All outputs are designed to sink up to 12 mA and include 25-Ω series resistors to reduce overshoot and undershoot.

The SN74HSTL162822 is particularly suitable for driving an address bus to two banks of memory. Each bank of 14 outputs is controlled with its own latch-enable (\overline{LE}) input.

Each of the 14 data (D) inputs is tied to the inputs of two D-type latches, which provide true data at the outputs. While \overline{LE} is low, the outputs (Q) of the corresponding 14 latches follow the D inputs. When \overline{LE} is taken high, the Q outputs are latched at the levels set up at the D inputs.

The SN74HSTL162822 is characterized for operation from -40°C to 90°C.

**DGG PACKAGE
(TOP VIEW)**



FUNCTION TABLE

INPUTS		OUTPUT
\overline{LE}	D	Q
L	H	H
L	L	L
H	X	Q_0^\dagger

† Output level before the indicated steady-state input conditions were established



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

Widebus is a trademark of Texas Instruments Incorporated.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

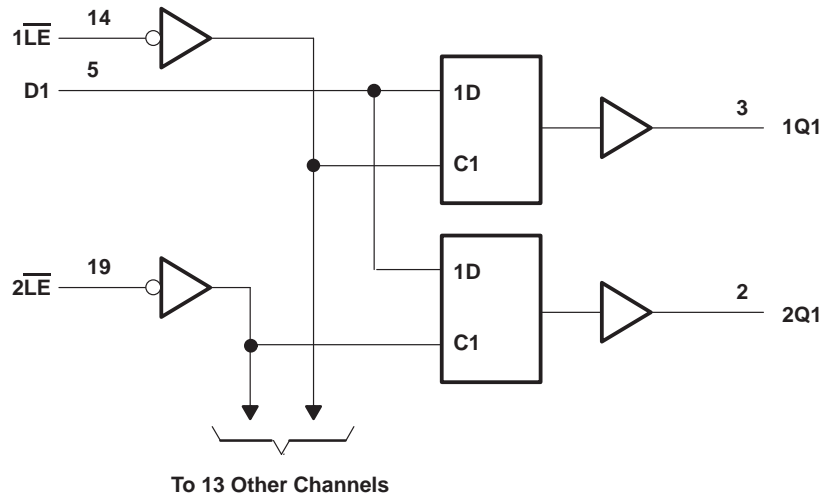
Copyright © 1997, Texas Instruments Incorporated

SN74HSTL162822

14-BIT TO 28-BIT HSTL-TO-LVTTL MEMORY ADDRESS LATCH

SCES091A – DECEMBER 1996 – REVISED APRIL 1997

logic diagram (positive logic)



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

Supply voltage range, V_{CC}	.....	-0.5 V to 4.6 V
Input voltage range, V_I (see Note 1)	.....	-0.5 V to $V_{CC} + 0.5$ V
Output voltage range, V_O (see Note 1)	.....	-0.5 V to $V_{CC} + 0.5$ V
Input clamp current, I_{IK} ($V_I < 0$)	.....	-50 mA
Output clamp current, I_{OK} ($V_O < 0$ or $V_O > V_{CC}$) (see Note 2)	± 50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	± 50 mA
Continuous current through each V_{CC} or GND	± 100 mA
Package thermal impedance, θ_{JA} (see Note 3)	.....	74°C/W
Storage temperature range, T_{stg}	.....	-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.

- NOTES: 1. The input and output negative-voltage ratings may be exceeded if the input and output clamp-current ratings are observed.
 2. This current flows only when the output is in the high state and $V_O > V_{CC}$.
 3. The package thermal impedance is calculated in accordance with EIA/JEDEC Std JESD51.

recommended operating conditions (see Note 4)

		MIN	NOM	MAX	UNIT
V_{CC}	Supply voltage	3.15		3.45	V
V_{REF}	Reference voltage	0.68	0.75	0.9	V
V_I	Input voltage	0		1.5	V
V_{IH}	High-level input voltage	All pins		$V_{REF} + 100$ mV	V
V_{IL}	Low-level input voltage	All pins		$V_{REF} - 100$ mV	V
I_{OH}	High-level output current			-12	mA
I_{OL}	Low-level output current			12	
T_A	Operating free-air temperature	-40		90	°C

NOTE 4: Unused inputs must be held high or low to prevent them from floating.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN74HSTL162822

14-BIT TO 28-BIT HSTL-TO-LVTTL MEMORY ADDRESS LATCH

SCES091A – DECEMBER 1996 – REVISED APRIL 1997

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

PARAMETER		TEST CONDITIONS	MIN	TYP†	MAX	UNIT
V_{IK}		$V_{CC} = 3.15\text{ V}$, $I_I = -18\text{ mA}$			-1.2	V
V_{OH}		$V_{CC} = 3.15\text{ V}$, $I_{OH} = -12\text{ mA}$	2.2			V
V_{OL}		$V_{CC} = 3.15\text{ V}$, $I_{OL} = 12\text{ mA}$			0.8	V
I_I	Control inputs	$V_{CC} = 3.45\text{ V}$	$V_I = 0\text{ or }1.5\text{ V}$		5	μA
	Data inputs		$V_I = 0\text{ or }1.5\text{ V}$		5	
	V_{REF}		$V_{REF} = 0.68\text{ V or }0.9\text{ V}$		90	
I_{CC}		$V_{CC} = 3.45\text{ V}$, $V_I = 0\text{ or }1.5\text{ V}$	50	100		mA
C_i	Control inputs	$V_{CC} = 0\text{ or }3.3\text{ V}$,	$V_I = 0\text{ or }3.3\text{ V}$		2	pF
	Data inputs	$V_{CC} = 0\text{ or }3.3\text{ V}$,	$V_I = 0\text{ or }3.3\text{ V}$		2	
C_o	Outputs	$V_{CC} = 0$,	$V_O = 0$		4	pF

† All typical values are at $V_{CC} = 3.3\text{ V}$, $T_A = 25^\circ\text{C}$.

timing requirements over recommended ranges of supply voltage and operating free-air temperature (unless otherwise noted) (see Figure 1)

		$V_{CC} = 3.3\text{ V}$ $\pm 0.15\text{ V}$		UNIT
		MIN	MAX	
t_w	Pulse duration, \overline{LE} low	3		ns
t_{su}	Setup time, D before $\overline{LE}\uparrow$	2		ns
t_h	Hold time, D after $\overline{LE}\uparrow$	1		ns

switching characteristics over recommended operating free-air temperature range, $V_{REF} = 0.75\text{ V}$

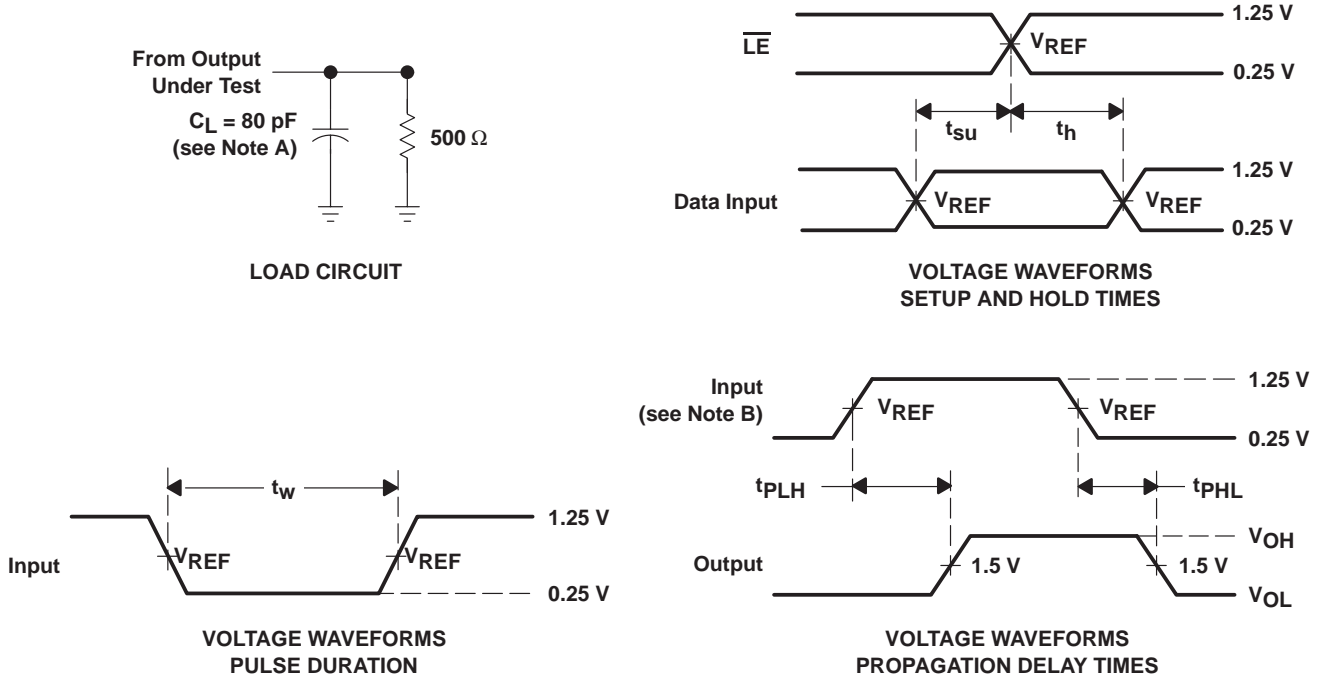
PARAMETER	FROM (INPUT)	TO (OUTPUT)	$V_{CC} = 3.3\text{ V}$ $\pm 0.15\text{ V}$		UNIT
			MIN	MAX	
t_{pd}	D	Q	1.6	5	ns
	\overline{LE}		1.7	5.7	

SN74HSTL162822

14-BIT TO 28-BIT HSTL-TO-LVTTL MEMORY ADDRESS LATCH

SCES091A – DECEMBER 1996 – REVISED APRIL 1997

PARAMETER MEASUREMENT INFORMATION



- NOTES:
- A. C_L includes probe and jig capacitance.
 - B. All input pulses are supplied by generators having the following characteristics: $PRR \leq 10$ MHz, $Z_O = 50 \Omega$, $t_r \leq 1$ ns, $t_f \leq 1$ ns.
 - C. The outputs are measured one at a time with one transition per measurement.
 - D. t_{PHL} and t_{PLH} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74HSTL162822DGGRE4	ACTIVE	TSSOP	DGG	64	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74HSTL162822DGGRG4	ACTIVE	TSSOP	DGG	64	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
SN74HSTL162822DGGR	ACTIVE	TSSOP	DGG	64	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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⁾ 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)

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

Important Information and Disclaimer:The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

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
SN74HSTL162822DGGR	TSSOP	DGG	64	2000	330.0	24.4	8.4	17.3	1.7	12.0	24.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74HSTL162822DGGR	TSSOP	DGG	64	2000	346.0	346.0	41.0

DGG (R-PDSO-G**)

PLASTIC SMALL-OUTLINE PACKAGE

48 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 protrusion not to exceed 0,15.
 D. Falls within JEDEC MO-153

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products

Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
RF/IF and ZigBee® Solutions	www.ti.com/lprf

Applications

Audio	www.ti.com/audio
Automotive	www.ti.com/automotive
Broadband	www.ti.com/broadband
Digital Control	www.ti.com/digitalcontrol
Medical	www.ti.com/medical
Military	www.ti.com/military
Optical Networking	www.ti.com/opticalnetwork
Security	www.ti.com/security
Telephony	www.ti.com/telephony
Video & Imaging	www.ti.com/video
Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265
Copyright © 2008, Texas Instruments Incorporated