

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

- 2-V to 5.5-V V_{CC} Operation
- Typical V_{OLP} (Output Ground Bounce) <0.8 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Typical V_{OHV} (Output V_{OH} Undershoot) >2.3 V at $V_{CC} = 3.3$ V, $T_A = 25^\circ\text{C}$
- Support Mixed-Mode Voltage Operation on All Ports
- Latch-Up Performance Exceeds 250 mA Per JESD 17
- ESD Protection Exceeds JESD 22
 - 2000-V Human-Body Model (A114-A)
 - 200-V Machine Model (A115-A)
 - 1000-V Charged-Device Model (C101)

description

The 'LV573A devices are octal transparent D-type latches designed for 2-V to 5.5-V V_{CC} operation.

These devices feature 3-state outputs designed specifically for driving highly capacitive or relatively low-impedance loads. This device is particularly suitable for implementing buffer registers, I/O ports, bidirectional bus drivers, and working registers.

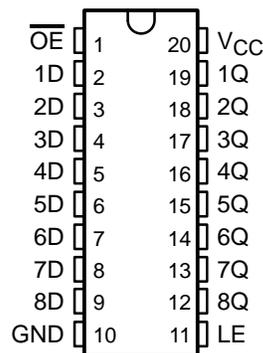
While the latch-enable (LE) input is high, the Q outputs follow the data (D) inputs. When LE is taken low, the Q outputs are latched at the logic levels set up at the D inputs.

A buffered output-enable (\overline{OE}) input can be used to place the eight outputs in either a normal logic state (high or low logic levels) or high-impedance state. In the high-impedance state, the outputs neither load nor drive the bus lines significantly. The high-impedance state and increased drive provide the capability to drive bus lines without need for interface or pullup components.

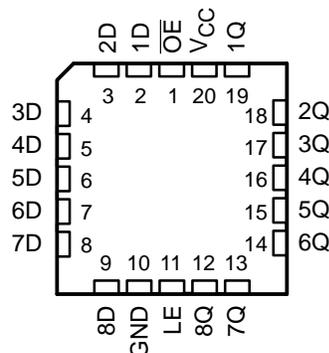
\overline{OE} does not affect the internal operations of the latches. Old data can be retained or new data can be entered while the outputs are in the high-impedance state.

To ensure the high-impedance state during power up or power down, \overline{OE} should be tied to V_{CC} through a pullup resistor; the minimum value of the resistor is determined by the current-sinking capability of the driver.

SN54LV573A . . . J OR W PACKAGE
SN74LV573A . . . DB, DGV, DW, NS, OR PW PACKAGE
(TOP VIEW)



SN54LV573A . . . FK PACKAGE
(TOP VIEW)



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.

UNLESS OTHERWISE NOTED this document contains PRODUCTION DATA information 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.

 **TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2001, Texas Instruments Incorporated

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

ORDERING INFORMATION

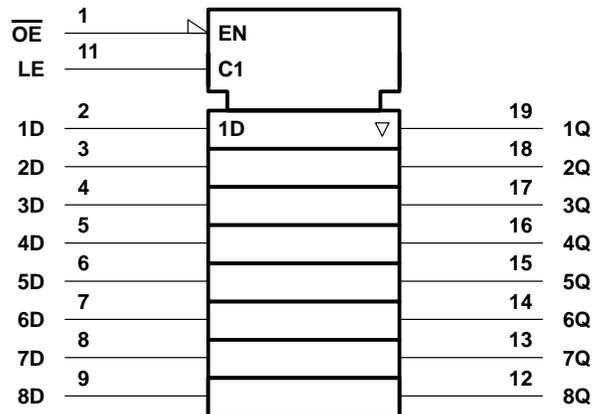
TA	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 85°C	SOIC – DW	Tube	SN74LV573ADW	LV573A
		Tape and reel	SN74LV573ADWR	
	SOP – NS	Tape and reel	SN74LV573ANSR	74LV573A
	SSOP – DB	Tape and reel	SN74LV573ADBR	LV573A
	TSSOP – PW	Tape and reel	SN74LV573APWR	LV573A
-55°C to 125°C	TVSOP – DGV	Tape and reel	SN74LV573ADGVR	LV573A
	CDIP – J	Tube	SNJ54LV573AJ	SNJ54LV573AJ
	CFP – W	Tube	SNJ54LV573AW	SNJ54LV573AW
	LCCC - FK	Tube	SNJ54LV573AFK	SNJ54LV573AFK

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

FUNCTION TABLE (each latch)

INPUTS			OUTPUT
\overline{OE}	LE	D	Q
L	H	H	H
L	H	L	L
L	L	X	Q ₀
H	X	X	Z

logic symbol‡



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

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

recommended operating conditions (see Note 4)

		SN54LV573A		SN74LV573A		UNIT	
		MIN	MAX	MIN	MAX		
V_{CC}	Supply voltage	2	5.5	2	5.5	V	
V_{IH}	High-level input voltage	$V_{CC} = 2\text{ V}$	1.5	1.5		V	
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	$V_{CC} \times 0.7$	$V_{CC} \times 0.7$			
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	$V_{CC} \times 0.7$	$V_{CC} \times 0.7$			
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$V_{CC} \times 0.7$	$V_{CC} \times 0.7$			
V_{IL}	Low-level input voltage	$V_{CC} = 2\text{ V}$	0.5		0.5	V	
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	$V_{CC} \times 0.3$		$V_{CC} \times 0.3$		
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	$V_{CC} \times 0.3$		$V_{CC} \times 0.3$		
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	$V_{CC} \times 0.3$		$V_{CC} \times 0.3$		
V_I	Input voltage	0	5.5	0	5.5	V	
V_O	Output voltage	High or low state	0	V_{CC}	0	V_{CC}	V
		3-state	0	5.5	0	5.5	
I_{OH}	High-level output current	$V_{CC} = 2\text{ V}$	-50		-50	μA	
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	-2		-2	mA	
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	-8		-8		
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	-16		-16		
I_{OL}	Low-level output current	$V_{CC} = 2\text{ V}$	50		50	μA	
		$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	2		2	mA	
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	8		8		
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	16		16		
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 2.3\text{ V to }2.7\text{ V}$	0	200	0	200	ns/V
		$V_{CC} = 3\text{ V to }3.6\text{ V}$	0	100	0	100	
		$V_{CC} = 4.5\text{ V to }5.5\text{ V}$	0	20	0	20	
T_A	Operating free-air temperature	-55	125	-40	85	$^{\circ}\text{C}$	

NOTE 4: All unused inputs of the device must be held at V_{CC} or GND to ensure proper device operation. Refer to the TI application report, *Implications of Slow or Floating CMOS Inputs*, literature number SCBA004.

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

PARAMETER	TEST CONDITIONS	V_{CC}	SN54LV573A			SN74LV573A			UNIT
			MIN	TYP	MAX	MIN	TYP	MAX	
V_{OH}	$I_{OH} = -50\ \mu\text{A}$	2 V to 5.5 V	$V_{CC}-0.1$			$V_{CC}-0.1$			V
	$I_{OH} = -2\ \text{mA}$	2.3 V	2			2			
	$I_{OH} = -8\ \text{mA}$	3 V	2.48			2.48			
	$I_{OH} = -16\ \text{mA}$	4.5 V	3.8			3.8			
V_{OL}	$I_{OL} = 50\ \mu\text{A}$	2 V to 5.5 V	0.1			0.1			V
	$I_{OL} = 2\ \text{mA}$	2.3 V	0.4			0.4			
	$I_{OL} = 8\ \text{mA}$	3 V	0.44			0.44			
	$I_{OL} = 16\ \text{mA}$	4.5 V	0.55			0.55			
I_I	$V_I = 5.5\text{ V or GND}$	0 to 5.5 V	± 1			± 1			μA
I_{OZ}	$V_O = V_{CC}\text{ or GND}$	5.5 V	± 5			± 5			μA
I_{CC}	$V_I = V_{CC}\text{ or GND, } I_O = 0$	5.5 V	20			20			μA
I_{off}	$V_I\text{ or }V_O = 0\text{ to }5.5\text{ V}$	0	5			5			μA
C_i	$V_I = V_{CC}\text{ or GND}$	3.3 V	1.8			1.8			pF

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

timing requirements over recommended operating free-air temperature range, $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER			$T_A = 25^\circ\text{C}$		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	6.5		6.5		6.5		ns
t_{su}	Setup time	Data before LE↓	5		5		5		ns
t_h	Hold time	Data after LE↓	2		2		2		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER			$T_A = 25^\circ\text{C}$		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	5		5		5		ns
t_{su}	Setup time	Data before LE↓	3.5		3.5		3.5		ns
t_h	Hold time	Data after LE↓	1.5		1.5		1.5		ns

timing requirements over recommended operating free-air temperature range, $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER			$T_A = 25^\circ\text{C}$		SN54LV573A		SN74LV573A		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
t_w	Pulse duration	LE high	5		5		5		ns
t_{su}	Setup time	Data before LE↓	3.5		3.5		3.5		ns
t_h	Hold time	Data after LE↓	1.5		1.5		1.5		ns

switching characteristics over recommended operating free-air temperature range, $V_{CC} = 2.5\text{ V} \pm 0.2\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV573A		SN74LV573A		UNIT		
				MIN	TYP	MAX	MIN	MAX	MIN	MAX			
t_{pd}	D	Q	$C_L = 15\text{ pF}$	8.9*	15.8*		1*	18*	1	18	ns		
	LE	Q		9.6*	16.2*		1*	19*	1	19			
t_{en}	\overline{OE}	Q		9.3*	16.2*		1*	19*	1	19			
t_{dis}	\overline{OE}	Q		6.7*	12.6*		1*	15*	1	15			
t_{pd}	D	Q		$C_L = 50\text{ pF}$	10.9	18.7		1	21	1		21	ns
	LE	Q			11.6	19.1		1	23	1		23	
t_{en}	\overline{OE}	Q	11.4		19		1	22	1	22			
t_{dis}	\overline{OE}	Q	8.6		17.3		1	19	1	19			
$t_{sk(o)}$						2				2			

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 3.3\text{ V} \pm 0.3\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV573A		SN74LV573A		UNIT	
				MIN	TYP	MAX	MIN	MAX	MIN	MAX		
t_{pd}	D	Q	$C_L = 15\text{ pF}$	6.2*	11*	1*	13*	1	13	ns		
	LE	Q		6.8*	11.9*	1*	14*	1	14			
t_{en}	\overline{OE}	Q		6.6*	11.5*	1*	13.5*	1	13.5			
t_{dis}	\overline{OE}	Q		4.9*	11*	1*	13*	1	13			
t_{pd}	D	Q		$C_L = 50\text{ pF}$	7.7	14.5	1	16.5	1		16.5	ns
	LE	Q			8.2	15.4	1	17.5	1		17.5	
t_{en}	\overline{OE}	Q	8		15	1	17	1	17			
t_{dis}	\overline{OE}	Q	6.2		14.5	1	16.5	1	16.5			
$t_{sk(o)}$						1.5			1.5			

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

switching characteristics over recommended operating free-air temperature range,
 $V_{CC} = 5\text{ V} \pm 0.5\text{ V}$ (unless otherwise noted) (see Figure 1)

PARAMETER	FROM (INPUT)	TO (OUTPUT)	LOAD CAPACITANCE	$T_A = 25^\circ\text{C}$			SN54LV573A		SN74LV573A		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
t_{pd}	D	Q	$C_L = 15\text{ pF}$	4.3*	6.8*	1*	8*	1	8	ns	
	LE	Q		4.7*	7.7*	1*	9*	1	9		
t_{en}	\overline{OE}	Q		4.7*	7.7*	1*	9*	1	9		
t_{dis}	\overline{OE}	Q		3.5*	7.7*	1*	9*	1	9		
t_{pd}	D	Q	$C_L = 50\text{ pF}$	5.3	8.8	1	10	1	10	ns	
	LE	Q		5.7	9.7	1	11	1	11		
t_{en}	\overline{OE}	Q		5.7	9.7	1	11	1	11		
t_{dis}	\overline{OE}	Q		4.2	9.7	1	11	1	11		
$t_{sk(o)}$						1			1		

* On products compliant to MIL-PRF-38535, this parameter is not production tested.

noise characteristics, $V_{CC} = 3.3\text{ V}$, $C_L = 50\text{ pF}$, $T_A = 25^\circ\text{C}$ (see Note 5)

PARAMETER		SN74LV573A			UNIT
		MIN	TYP	MAX	
$V_{OL(P)}$	Quiet output, maximum dynamic V_{OL}		0.6	0.8	V
$V_{OL(V)}$	Quiet output, minimum dynamic V_{OL}		-0.5	-0.8	V
$V_{OH(V)}$	Quiet output, minimum dynamic V_{OH}		2.9		V
$V_{IH(D)}$	High-level dynamic input voltage	2.31			V
$V_{IL(D)}$	Low-level dynamic input voltage		0.99		V

NOTE 5: Characteristics are for surface-mount packages only.

PRODUCT PREVIEW information concerns products in the formative or design phase of development. Characteristic data and other specifications are design goals. Texas Instruments reserves the right to change or discontinue these products without notice.



SN54LV573A, SN74LV573A
OCTAL TRANSPARENT D-TYPE LATCHES
WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

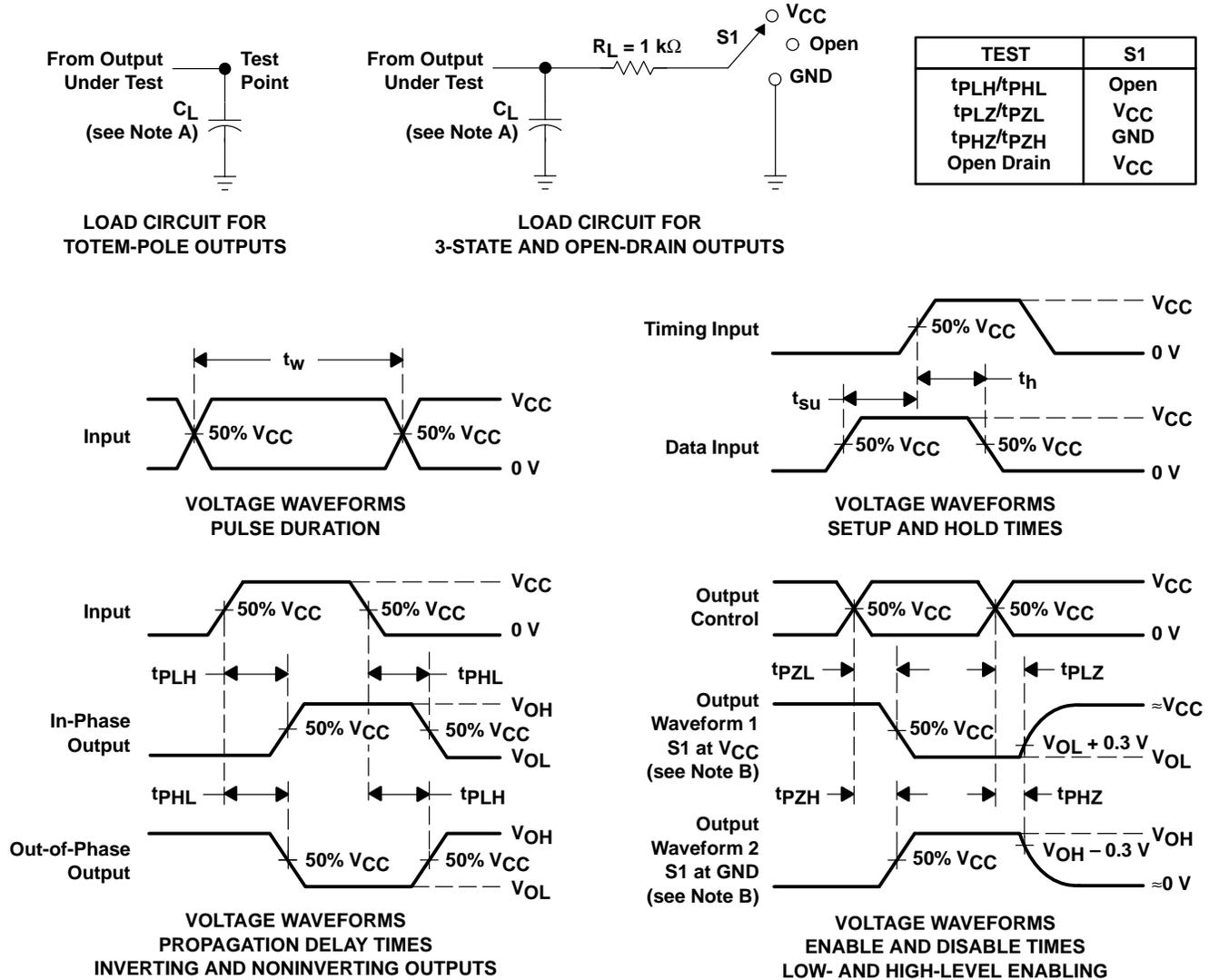
operating characteristics, $T_A = 25^\circ\text{C}$

PARAMETER			TEST CONDITIONS	V _{CC}	TYP	UNIT
C _{pd} Power dissipation capacitance	Outputs enabled	D to Q	C _L = 50 pF, f = 10 MHz	3.3 V	16	pF
				5 V	18	
		LE to Q		3.3 V	18.2	
				5 V	21.3	

SN54LV573A, SN74LV573A OCTAL TRANSPARENT D-TYPE LATCHES WITH 3-STATE OUTPUTS

SCLS411D – APRIL 1998 – REVISED JANUARY 2001

PARAMETER MEASUREMENT INFORMATION



- 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 $\leq 1\text{ MHz}$, $Z_O = 50\ \Omega$, $t_r \leq 3\text{ ns}$, $t_f \leq 3\text{ ns}$.
 - D. The outputs are measured one at a time with one input transition per measurement.
 - E. t_{PLZ} and t_{PHZ} are the same as t_{dis} .
 - F. t_{PZL} and t_{PZH} are the same as t_{en} .
 - G. t_{PHL} and t_{PLH} are the same as t_{pd} .

Figure 1. Load Circuit and Voltage Waveforms

IMPORTANT NOTICE

Texas Instruments and its subsidiaries (TI) reserve the right to make changes to their products or to discontinue any product or service without notice, and advise customers to obtain the latest version of relevant information to verify, before placing orders, that information being relied on is current and complete. All products are sold subject to the terms and conditions of sale supplied at the time of order acknowledgment, including those pertaining to warranty, patent infringement, and limitation of liability.

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

Customers are responsible for their applications using TI components.

In order to minimize risks associated with the customer's applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards.

TI assumes no liability for applications assistance or customer product design. TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right of TI covering or relating to any combination, machine, or process in which such products or services might be or are used. TI's publication of information regarding any third party's products or services does not constitute TI's approval, license, warranty or endorsement thereof.

Reproduction of 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. Representation or reproduction of this information with alteration voids all warranties provided for an associated TI product or service, is an unfair and deceptive business practice, and TI is not responsible nor liable for any such use.

Resale of TI's 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, is an unfair and deceptive business practice, and TI is not responsible nor liable for any such use.

Also see: [Standard Terms and Conditions of Sale for Semiconductor Products](http://www.ti.com/sc/docs/stdterms.htm). www.ti.com/sc/docs/stdterms.htm

Mailing Address:

Texas Instruments
Post Office Box 655303
Dallas, Texas 75265