

# SN54AHC595, SN74AHC595 8-BIT SHIFT REGISTERS WITH 3-STATE OUTPUT REGISTERS

SCLS373I – MAY 1997 – REVISED JUNE 2004

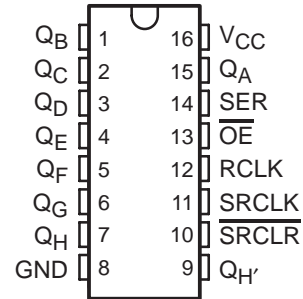
- Operating Range 2-V to 5.5-V  $V_{CC}$
- 8-Bit Serial-In, Parallel-Out Shift
- Shift Register Has Direct Clear
- Latch-Up Performance Exceeds 100 mA Per JESD 78, Class II
- ESD Protection Exceeds JESD 22
  - 2000-V Human-Body Model (A114-A)
  - 200-V Machine Model (A115-A)
  - 1000-V Charged-Device Model (C101)

## description/ordering information

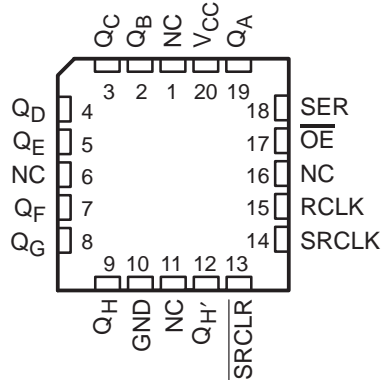
The 'AHC595 devices contain an 8-bit serial-in, parallel-out shift register that feeds an 8-bit D-type storage register. The storage register has parallel 3-state outputs. Separate clocks are provided for both the shift and storage registers. The shift register has a direct overriding clear (SRCLR) input, serial (SER) input, and a serial output for cascading. When the output-enable (OE) input is high, all outputs, except  $Q_H$ , are in the high-impedance state.

Both the shift-register clock (SRCLK) and storage-register clock (RCLK) are positive-edge triggered. If both clocks are connected together, the shift register always is one clock pulse ahead of the storage register.

SN54AHC595 . . . J OR W PACKAGE  
SN74AHC595 . . . D, DB, N, NS, OR PW PACKAGE  
(TOP VIEW)



SN54AHC595 . . . FK PACKAGE  
(TOP VIEW)



NC – No internal connection

## ORDERING INFORMATION

$T_A$	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 85°C	PDIP – N	Tube	SN74AHC595N	SN74AHC595N
	SOIC – D	Tube	SN74AHC595D	AHC595
		Tape and reel	SN74AHC595DR	
	SOP – NS	Tape and reel	SN74AHC595NSR	AHC595
	SSOP – DB	Tape and reel	SN74AHC595DBR	HA595
TSSOP – PW	Tube	SN74AHC595PW	HA595	
	Tape and reel	SN74AHC595PWR		
–55°C to 125°C	CDIP – J	Tube	SNJ54AHC959J	SNJ54AHC595J
	CFP – W	Tube	SNJ54AHC595W	SNJ54AHC595W
	LCCC – FK	Tube	SNJ54AHC595FK	SNJ54AHC595FK

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



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 © 2004, Texas Instruments Incorporated

**SN54AHC595, SN74AHC595**  
**8-BIT SHIFT REGISTERS**  
**WITH 3-STATE OUTPUT REGISTERS**

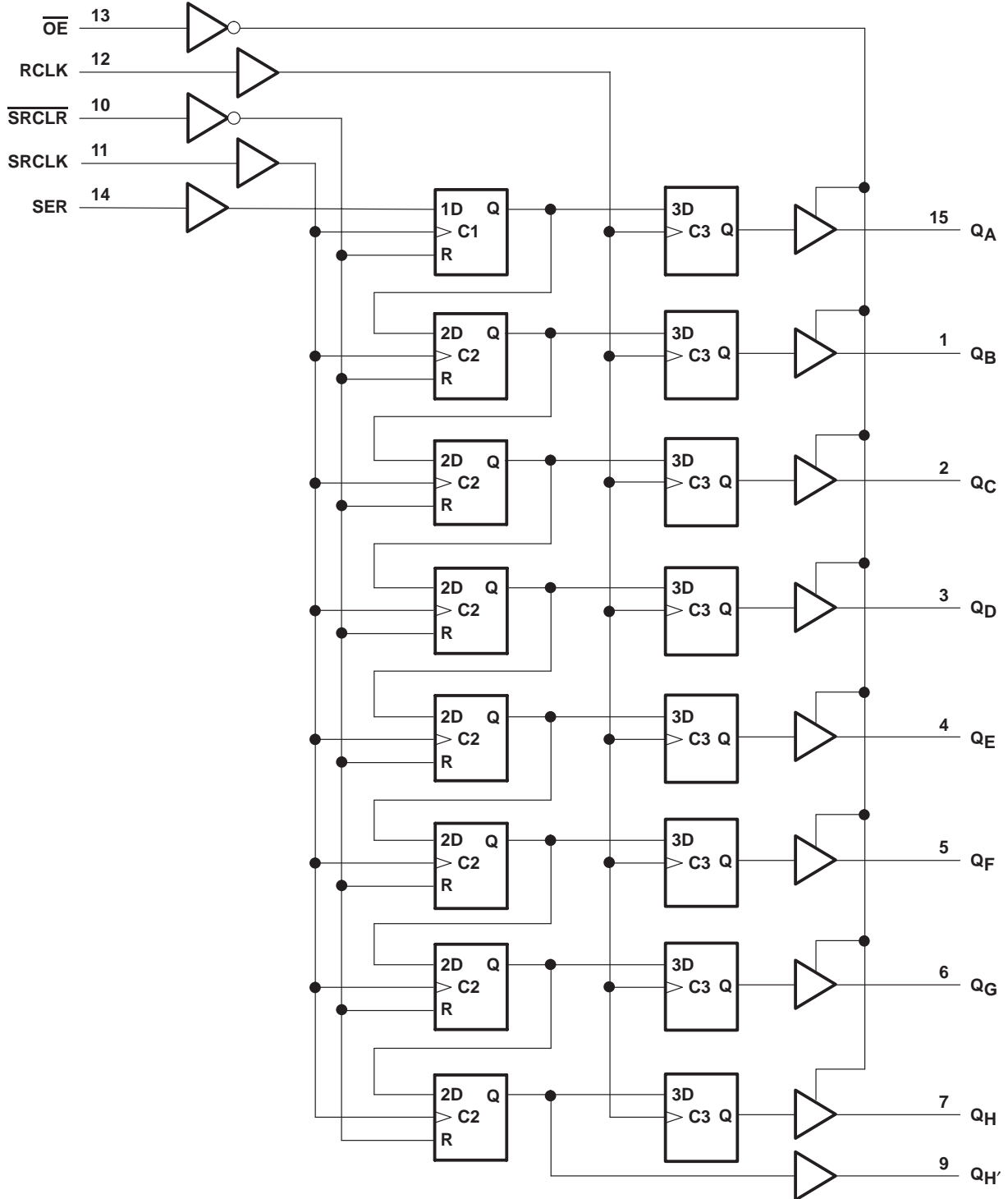
SCLS373I – MAY 1997 – REVISED JUNE 2004

FUNCTION TABLE

INPUTS					FUNCTION
SER	SRCLK	SRCLR	RCLK	OE	
X	X	X	X	H	Outputs Q <sub>A</sub> –Q <sub>H</sub> are disabled.
X	X	X	X	L	Outputs Q <sub>A</sub> –Q <sub>H</sub> are enabled.
X	X	L	X	X	Shift register is cleared.
L	↑	H	X	X	First stage of the shift register goes low. Other stages store the data of previous stage, respectively.
H	↑	H	X	X	First stage of the shift register goes high. Other stages store the data of previous stage, respectively.
X	X	X	↑	X	Shift-register data is stored into the storage register.

**SN54AHC595, SN74AHC595**  
**8-BIT SHIFT REGISTERS**  
**WITH 3-STATE OUTPUT REGISTERS**  
SCLS373I – MAY 1997 – REVISED JUNE 2004

logic diagram (positive logic)

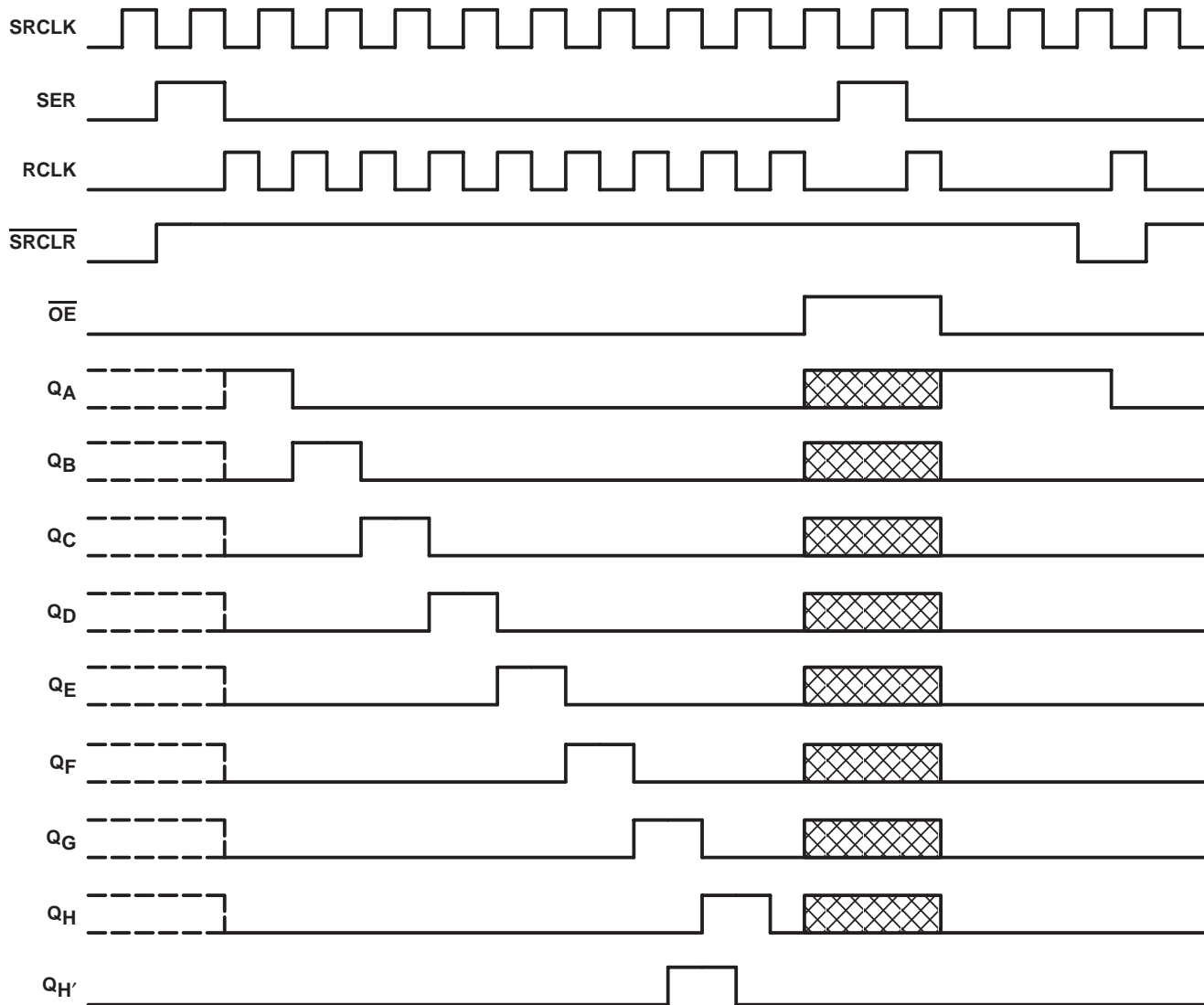


Pin numbers shown are for the D, DB, J, N, NS, PW, and W packages.

# SN54AHC595, SN74AHC595 8-BIT SHIFT REGISTERS WITH 3-STATE OUTPUT REGISTERS

SCLS3731 – MAY 1997 – REVISED JUNE 2004

## timing diagram



NOTE:  implies that the output is in 3-State mode.

**SN54AHC595, SN74AHC595**  
**8-BIT SHIFT REGISTERS**  
**WITH 3-STATE OUTPUT REGISTERS**  
SCLS373I – MAY 1997 – REVISED JUNE 2004

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

Supply voltage range, $V_{CC}$ .....	–0.5 V to 7 V
Input voltage range, $V_I$ (see Note 1) .....	–0.5 V to 7 V
Output voltage range, $V_O$ (see Note 1) .....	–0.5 V to $V_{CC} + 0.5$ V
Input clamp current, $I_{IK}$ ( $V_I < 0$ ) .....	–20 mA
Output clamp current, $I_{OK}$ ( $V_O < 0$ or $V_O > V_{CC}$ ) .....	±20 mA
Continuous output current, $I_O$ ( $V_O = 0$ to $V_{CC}$ ) .....	±25 mA
Continuous current through $V_{CC}$ or GND .....	±75 mA
Package thermal impedance, $\theta_{JA}$ (see Note 2): D package .....	73°C/W
DB package .....	82°C/W
N package .....	67°C/W
NS package .....	64°C/W
PW package .....	108°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 voltage ratings may be exceeded if the input and output current ratings are observed.  
2. The package thermal impedance is calculated in accordance with JESD 51-7.

**recommended operating conditions (see Note 3)**

		SN54AHC595		SN74AHC595		UNIT
		MIN	MAX	MIN	MAX	
$V_{CC}$	Supply voltage	2	5.5	2	5.5	V
$V_{IH}$	High-level input voltage	$V_{CC} = 2$ V		1.5	1.5	V
		$V_{CC} = 3$ V		2.1	2.1	
		$V_{CC} = 5.5$ V		3.85	3.85	
$V_{IL}$	Low-level input voltage	$V_{CC} = 2$ V		0.5	0.5	V
		$V_{CC} = 3$ V		0.9	0.9	
		$V_{CC} = 5.5$ V		1.65	1.65	
$V_I$	Input voltage	0	5.5	0	5.5	V
$V_O$	Output voltage	0	$V_{CC}$	0	$V_{CC}$	V
$I_{OH}$	High-level output current	$V_{CC} = 2$ V		–50	–50	µA
		$V_{CC} = 3.3$ V ± 0.3 V		–4	–4	mA
		$V_{CC} = 5$ V ± 0.5 V		–8	–8	
$I_{OL}$	Low-level output current	$V_{CC} = 2$ V		50	50	µA
		$V_{CC} = 3.3$ V ± 0.3 V		4	4	mA
		$V_{CC} = 5$ V ± 0.5 V		8	8	
$\Delta t/\Delta v$	Input transition rise or fall rate	$V_{CC} = 3.3$ V ± 0.3 V		100	100	ns/V
		$V_{CC} = 5$ V ± 0.5 V		20	20	
$T_A$	Operating free-air temperature	–55	125	–40	85	°C

NOTE 3: 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.

# SN54AHC595, SN74AHC595 8-BIT SHIFT REGISTERS WITH 3-STATE OUTPUT REGISTERS

SCLS3731 – MAY 1997 – REVISED JUNE 2004

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

PARAMETER	TEST CONDITIONS		V <sub>CC</sub>	T <sub>A</sub> = 25°C			SN54AHC595		SN74AHC595		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
V <sub>OH</sub>	I <sub>OH</sub> = -50 μA		2 V	1.9	2		1.9		1.9	V	
			3 V	2.9	3		2.9		2.9		
			4.5 V	4.4	4.5		4.4		4.4		
	I <sub>OH</sub> = -4 mA		3 V	2.58			2.48		2.48		
			4.5 V	3.94			3.8		3.8		
V <sub>OL</sub>	I <sub>OL</sub> = 50 μA		2 V	0.1			0.1		0.1		V
			3 V	0.1			0.1		0.1		
			4.5 V	0.1			0.1		0.1		
	I <sub>OL</sub> = 4 mA		3 V	0.36			0.5		0.44		
			4.5 V	0.36			0.5		0.44		
I <sub>I</sub>	V <sub>I</sub> = 5.5 V or GND		0 V to 5.5 V		±0.1		±1*		±1		μA
I <sub>OZ</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, V <sub>O</sub> = V <sub>CC</sub> or GND, OE = V <sub>IH</sub> or V <sub>IL</sub>	Q <sub>A</sub> -Q <sub>H</sub>	5.5 V		±0.25		±2.5		±2.5		μA
I <sub>CC</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND, I <sub>O</sub> = 0		5.5 V		4		40		40		μA
C <sub>i</sub>	V <sub>I</sub> = V <sub>CC</sub> or GND		5 V		3		10		10		pF
C <sub>o</sub>	V <sub>O</sub> = V <sub>CC</sub> or GND		5 V		5.5						pF

\* On products compliant to MIL-PRF-38535, this parameter is not production tested at V<sub>CC</sub> = 0 V.

timing requirements over recommended operating free-air temperature range,  
V<sub>CC</sub> = 3.3 V ± 0.3 V (unless otherwise noted) (see Figure 1)

		T <sub>A</sub> = 25°C		SN54AHC595		SN74AHC595		UNIT
		MIN	MAX	MIN	MAX	MIN	MAX	
t <sub>w</sub>	Pulse duration	SRCLK high or low		5		5		ns
		RCLK high or low		5		5		
		SRCLR low		5		5		
t <sub>su</sub>	Setup time	SER before SRCLK↑		3.5		3.5		ns
		SRCLK↑ before RCLK↑†		8		8.5		
		SRCLR low before RCLK↑		8		9		
		SRCLR high (inactive) before SRCLK↑		3		3		
t <sub>h</sub>	Hold time	SER after SRCLK↑		1.5		1.5		ns

† This setup time allows the storage register to receive stable data from the shift register. The clocks can be tied together, in which case the shift register is one clock pulse ahead of the storage register.

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.



**SN54AHC595, SN74AHC595**  
**8-BIT SHIFT REGISTERS**  
**WITH 3-STATE OUTPUT REGISTERS**  
SCLS373I – MAY 1997 – REVISED JUNE 2004

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)

			$T_A = 25^\circ\text{C}$		SN54AHC595		SN74AHC595		UNIT
			MIN	MAX	MIN	MAX	MIN	MAX	
$t_w$	Pulse duration	SRCLK high or low	5		5		5		ns
		RCLK high or low	5		5		5		
		$\overline{\text{SRCLR}}$ low	5		5		5		
$t_{su}$	Setup time	SER before SRCLK $\uparrow$	3		3		3		ns
		SRCLK $\uparrow$ before RCLK $\uparrow$	5		5		5		
		$\overline{\text{SRCLR}}$ low before RCLK $\uparrow$	5		5		5		
		$\overline{\text{SRCLR}}$ high (inactive) before SRCLK $\uparrow$	2.5		2.5		2.5		
$t_h$	Hold time	SER after SRCLK $\uparrow$	2		2		2		ns

† This setup time allows the storage register to receive stable data from the shift register. The clocks can be tied together, in which case the shift register is one clock pulse ahead of the storage register.

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	$T_A = 25^\circ\text{C}$			SN54AHC595		SN74AHC595		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$f_{max}$			$C_L = 15\text{ pF}$	80*	120*		70*		70		MHz
			$C_L = 50\text{ pF}$	55	105		50		50		
$t_{PLH}$	RCLK	$Q_A-Q_H$	$C_L = 15\text{ pF}$	6*	11.9*		1*	13.5*	1	13.5	ns
$t_{PHL}$				6*	11.9*		1*	13.5*	1	13.5	
$t_{PLH}$	SRCLK	$Q_{H'}$	$C_L = 15\text{ pF}$	6.6*	13*		1*	15*	1	15	ns
$t_{PHL}$				6.6*	13*		1*	15*	1	15	
$t_{PHL}$	$\overline{\text{SRCLR}}$	$Q_{H'}$	$C_L = 15\text{ pF}$	6.2*	12.8*		1*	13.7*	1	13.7	ns
$t_{PZH}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 15\text{ pF}$	6*	11.5*		1*	13.5*	1	13.5	ns
$t_{PZL}$				7.8*	11.5*		1*	13.5*	1	13.5	
$t_{PLH}$	RCLK	$Q_A-Q_H$	$C_L = 50\text{ pF}$	7.9	15.4		1	17	1	17	ns
$t_{PHL}$				7.9	15.4		1	17	1	17	
$t_{PLH}$	SRCLK	$Q_{H'}$	$C_L = 50\text{ pF}$	9.2	16.5		1	18.5	1	18.5	ns
$t_{PHL}$				9.2	16.5		1	18.5	1	18.5	
$t_{PHL}$	$\overline{\text{SRCLR}}$	$Q_{H'}$	$C_L = 50\text{ pF}$	9	16.3		1	17.2	1	17.2	ns
$t_{PZH}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 50\text{ pF}$	7.8	15		1	17	1	17	ns
$t_{PZL}$				9.6	15		1	17	1	17	
$t_{PHZ}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 50\text{ pF}$	8.1	15.7		1	16.2	1	16.2	ns
$t_{PLZ}$				9.3	15.7		1	16.2	1	16.2	

\* 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.



# SN54AHC595, SN74AHC595 8-BIT SHIFT REGISTERS WITH 3-STATE OUTPUT REGISTERS

SCLS3731 – MAY 1997 – REVISED JUNE 2004

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	$T_A = 25^\circ\text{C}$			SN54AHC595		SN74AHC595		UNIT
				MIN	TYP	MAX	MIN	MAX	MIN	MAX	
$f_{\text{max}}$			$C_L = 15\text{ pF}$	135*	170*		115*		115		MHz
			$C_L = 50\text{ pF}$	95	140		85		85		
$t_{\text{PLH}}$	RCLK	$Q_A-Q_H$	$C_L = 15\text{ pF}$	4.3*	7.4*		1*	8.5*	1	8.5	ns
$t_{\text{PHL}}$				4.3*	7.4*		1*	8.5*	1	8.5	
$t_{\text{PLH}}$	SRCLK	$Q_H$	$C_L = 15\text{ pF}$	4.5*	8.2*		1*	9.4*	1	9.4	ns
$t_{\text{PHL}}$				4.5*	8.2*		1*	9.4*	1	9.4	
$t_{\text{PHL}}$	$\overline{\text{SRCLR}}$	$Q_H$	$C_L = 15\text{ pF}$	4.5*	8*		1*	9.1*	1	9.1	ns
$t_{\text{PZH}}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 15\text{ pF}$	4.3*	8.6*		1*	10*	1	10	ns
$t_{\text{PZL}}$				5.4*	8.6*		1*	10*	1	10	
$t_{\text{PLH}}$	RCLK	$Q_A-Q_H$	$C_L = 50\text{ pF}$	5.6	9.4		1	10.5	1	10.5	ns
$t_{\text{PHL}}$				5.6	9.4		1	10.5	1	10.5	
$t_{\text{PLH}}$	SRCLK	$Q_H$	$C_L = 50\text{ pF}$	6.4	10.2		1	11.4	1	11.4	ns
$t_{\text{PHL}}$				6.4	10.2		1	11.4	1	11.4	
$t_{\text{PHL}}$	$\overline{\text{SRCLR}}$	$Q_H$	$C_L = 50\text{ pF}$	6.4	10		1	11.1	1	11.1	ns
$t_{\text{PZH}}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 50\text{ pF}$	5.7	10.6		1	12	1	12	ns
$t_{\text{PZL}}$				6.8	10.6		1	12	1	12	
$t_{\text{PHZ}}$	$\overline{\text{OE}}$	$Q_A-Q_H$	$C_L = 50\text{ pF}$	3.5	10.3		1	11	1	11	ns
$t_{\text{PLZ}}$				3.4	10.3		1	11	1	11	

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

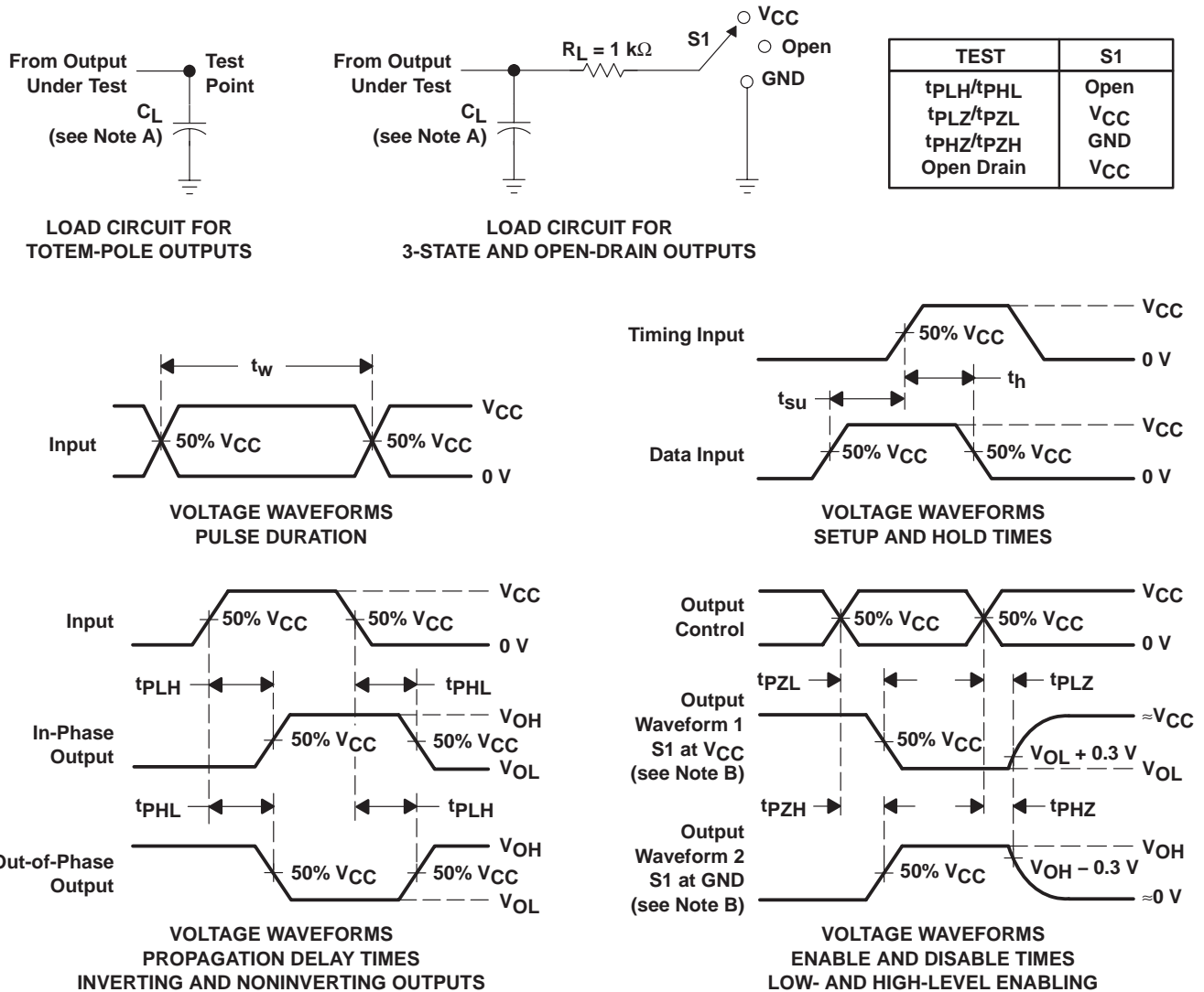
operating characteristics,  $V_{CC} = 5\text{ V}$ ,  $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
$C_{\text{pd}}$ Power dissipation capacitance	No load, $f = 1\text{ MHz}$	25.2	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.



**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. All parameters and waveforms are not applicable to all devices.

**Figure 1. Load 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)
SN74AHC595D	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
SN74AHC595DBR	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595DBRE4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595DBRG4	ACTIVE	SSOP	DB	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595DE4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
SN74AHC595DG4	ACTIVE	SOIC	D	16	40	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
SN74AHC595DR	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595DRE4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595DRG4	ACTIVE	SOIC	D	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595N	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	<a href="#">Purchase Samples</a>
SN74AHC595NE4	ACTIVE	PDIP	N	16	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type	<a href="#">Purchase Samples</a>
SN74AHC595PW	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595PWE4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595PWG4	ACTIVE	TSSOP	PW	16	90	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	<a href="#">Purchase Samples</a>
SN74AHC595PWR	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
SN74AHC595PWRE4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office
SN74AHC595PWRG4	ACTIVE	TSSOP	PW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	Contact TI Distributor or Sales Office

<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.

**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.

**OTHER QUALIFIED VERSIONS OF SN74AHC595 :**

- Automotive: [SN74AHC595-Q1](#)

NOTE: Qualified Version Definitions:

- Automotive - Q100 devices qualified for high-reliability automotive applications targeting zero defects

**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
SN74AHC595DBR	SSOP	DB	16	2000	330.0	16.4	8.2	6.6	2.5	12.0	16.0	Q1
SN74AHC595DR	SOIC	D	16	2500	330.0	16.4	6.5	10.3	2.1	8.0	16.0	Q1
SN74AHC595PWR	TSSOP	PW	16	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1
SN74AHC595PWR	TSSOP	PW	16	2000	330.0	12.4	7.0	5.6	1.6	8.0	12.0	Q1

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
SN74AHC595DBR	SSOP	DB	16	2000	346.0	346.0	33.0
SN74AHC595DR	SOIC	D	16	2500	346.0	346.0	33.0
SN74AHC595PWR	TSSOP	PW	16	2000	346.0	346.0	29.0
SN74AHC595PWR	TSSOP	PW	16	2000	364.0	364.0	27.0

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

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN

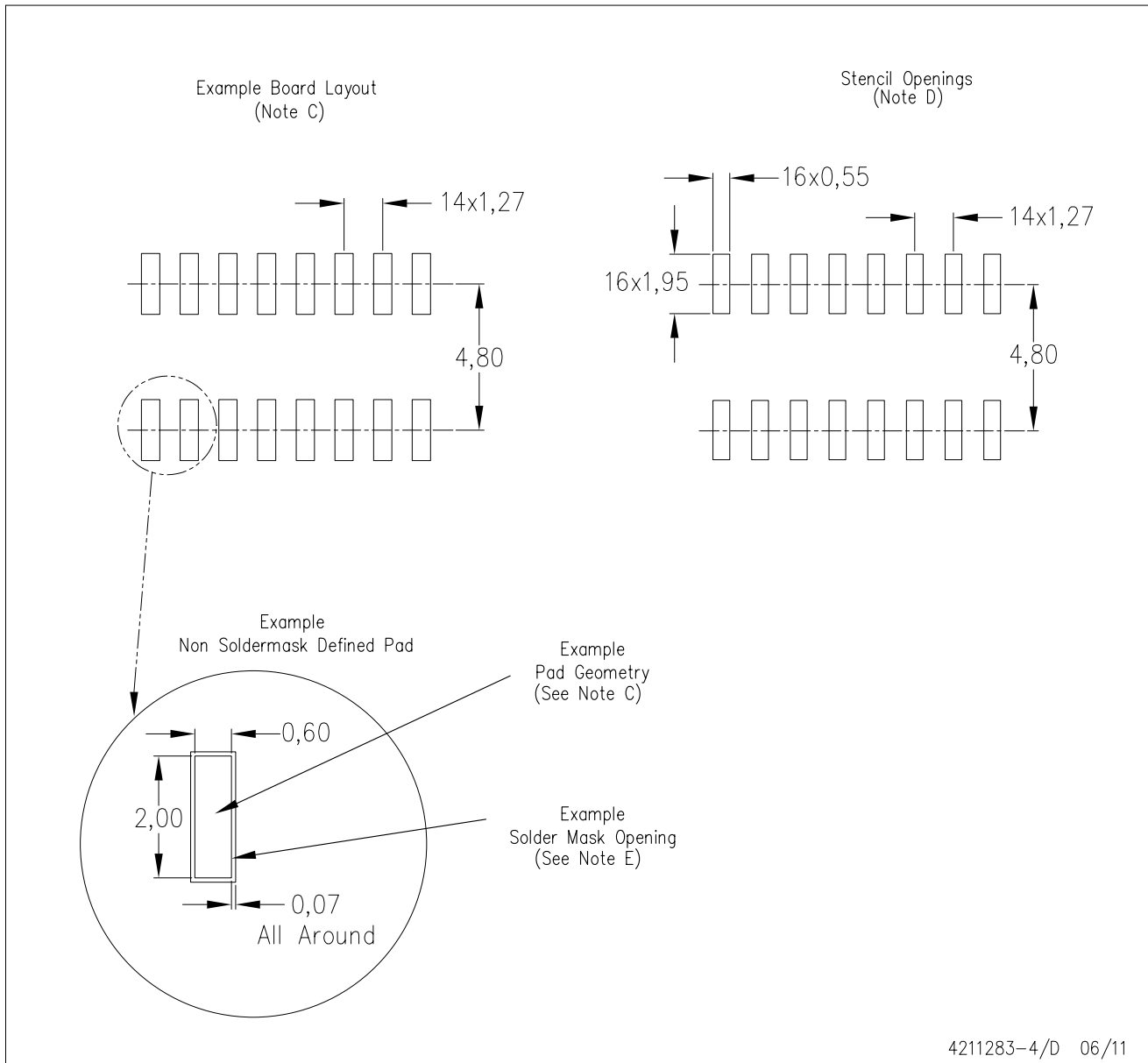


- NOTES:
- A. All linear dimensions are in inches (millimeters).
  - B. This drawing is subject to change without notice.
  - Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
  - The 20 pin end lead shoulder width is a vendor option, either half or full width.



D (R-PDSO-G16)

PLASTIC SMALL OUTLINE

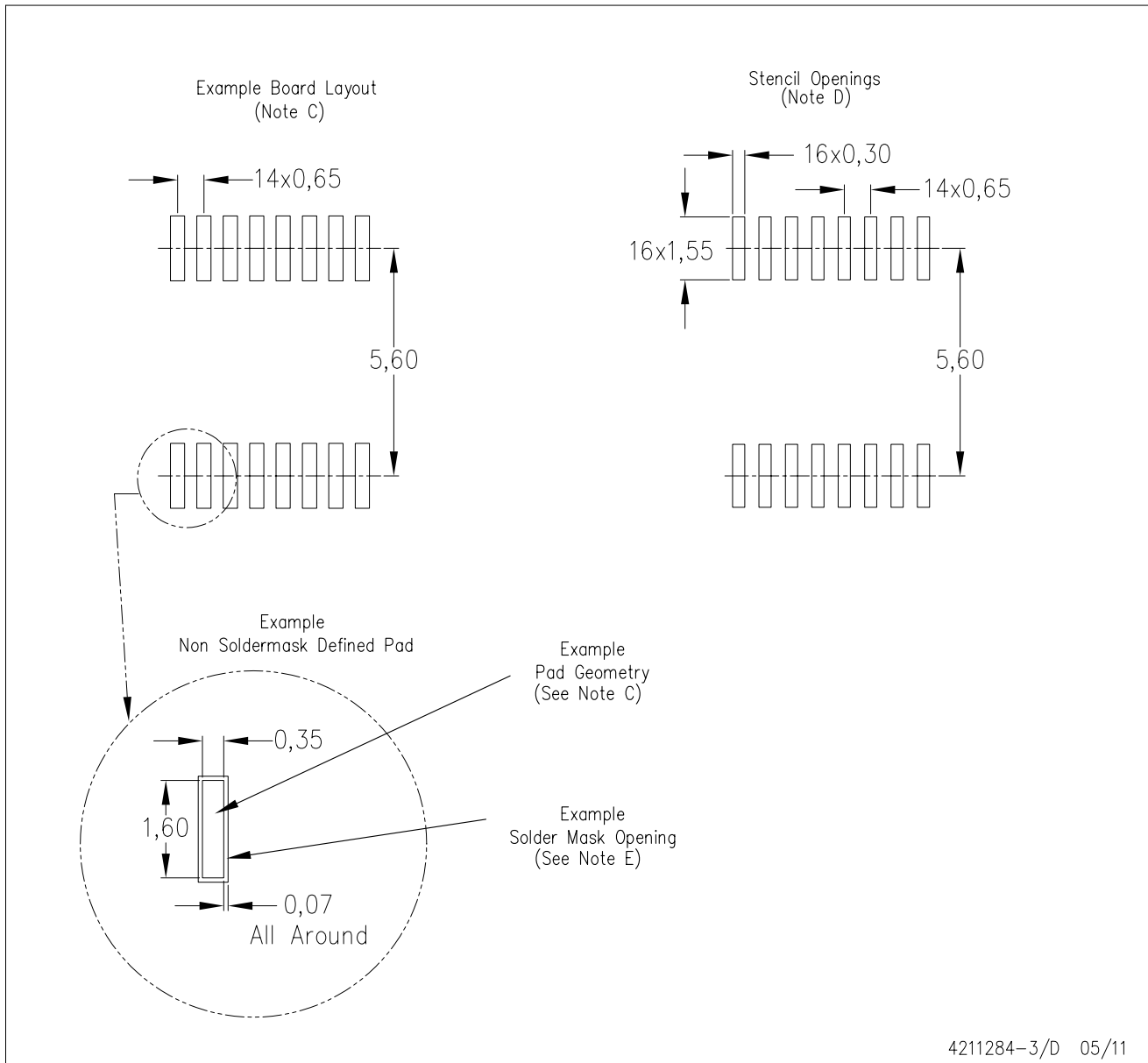


- NOTES:
- All linear dimensions are in millimeters.
  - This drawing is subject to change without notice.
  - Publication IPC-7351 is recommended for alternate designs.
  - Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact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



PW (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.



## 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

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
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>
Transportation and Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
Wireless	<a href="http://www.ti.com/wireless-apps">www.ti.com/wireless-apps</a>

TI E2E Community Home Page

[e2e.ti.com](http://e2e.ti.com)

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2011, Texas Instruments Incorporated