

# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A – APRIL 1985 – REVISED APRIL 1993

- Each Device Drives 32 Electrodes
- 90-V Output Voltage Swing Capability Using Ramped Supply
- 15-mA Output Source and Sink Current Capability
- High-Speed Serially-Shifted Data Input
- Totem-Pole Outputs
- Latches on All Driver Outputs

## description

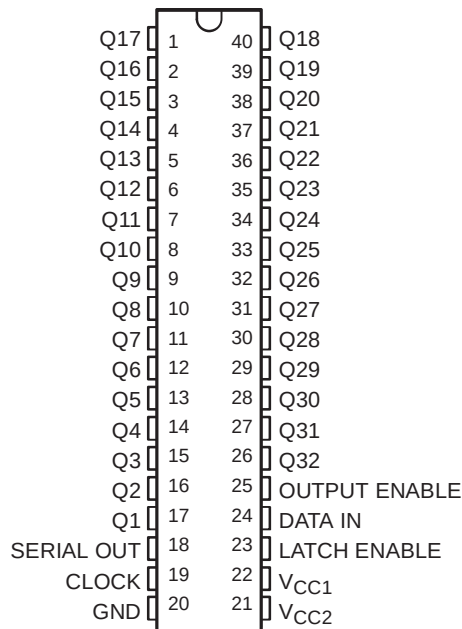
The SN65555, SN75555, SN65556, and SN75556 are monolithic BIDFET† integrated circuits designed to drive the column electrodes of an electroluminescent display. The SN65556 and SN75556 output sequence is reversed from the SN65555 and SN75555 for ease in printed-circuit-board layout.

The devices consist of a 32-bit shift register, 32 latches, and 32 output AND gates. Serial data is entered into the shift register on the low-to-high transition of CLOCK. When high, LATCH ENABLE transfers the shift register contents to the outputs of the 32 latches. When OUTPUT ENABLE is high, all Q outputs are enabled. Data must be loaded into the latches and OUTPUT ENABLE must be high before supply voltage  $V_{CC2}$  is ramped up.

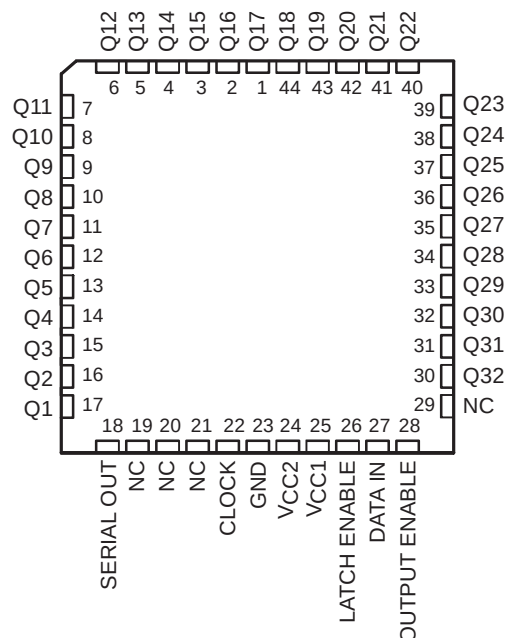
Serial data output from the shift register can be used to cascade shift registers. This output is not affected by LATCH ENABLE or OUTPUT ENABLE.

The SN65555 and SN65556 are characterized for operation from  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$ . The SN75555 and SN75556 are characterized for operation from  $0^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ .

SN75555 . . . N PACKAGE  
(TOP VIEW)



SN65555, SN75555 . . . FN PACKAGE  
(TOP VIEW)



NC – No internal connection

† BIDFET – Bipolar, double-diffused, N-channel and P-channel MOS transistors on same chip. This is a patented process.

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

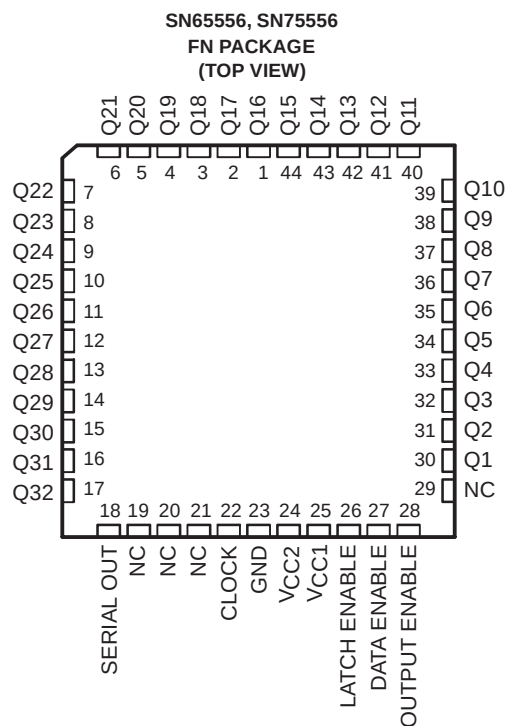
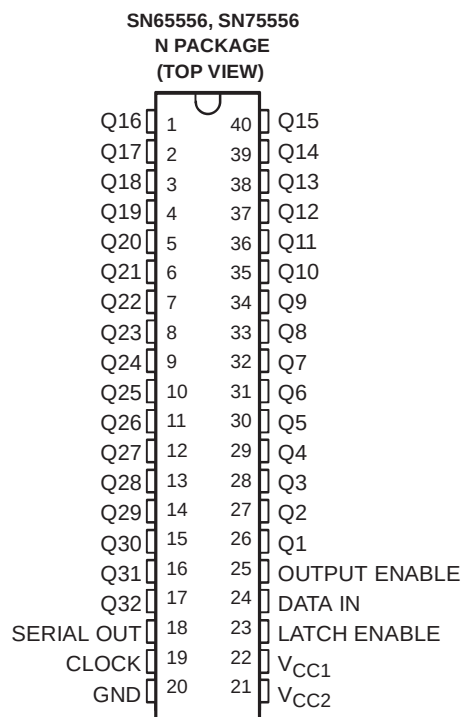
**TEXAS  
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 1993, Texas Instruments Incorporated

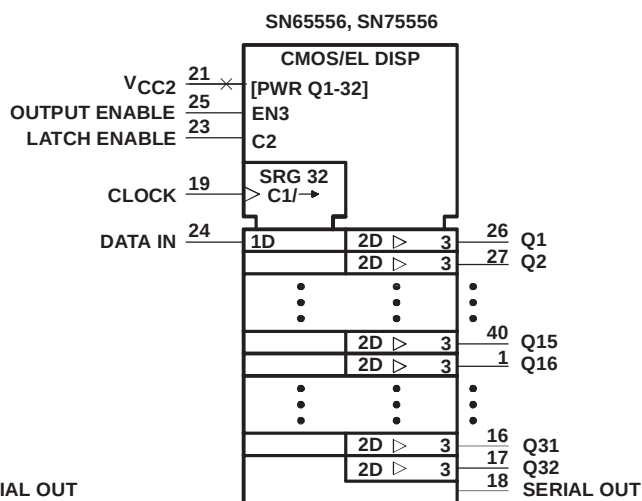
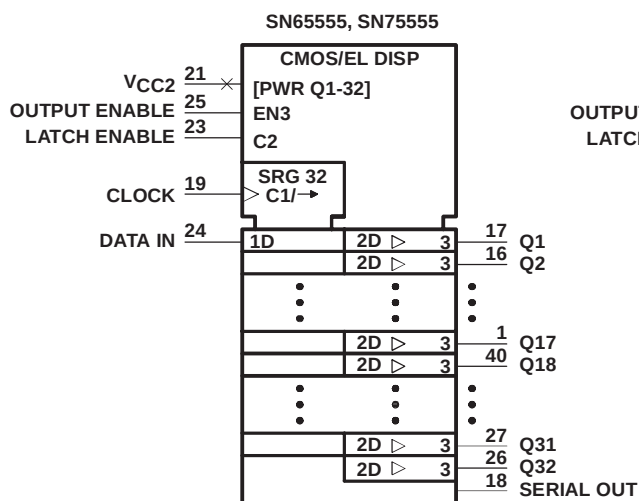
# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A—APRIL 1985—REVISED APRIL 1993



NC — No internal connection

## logic symbols†

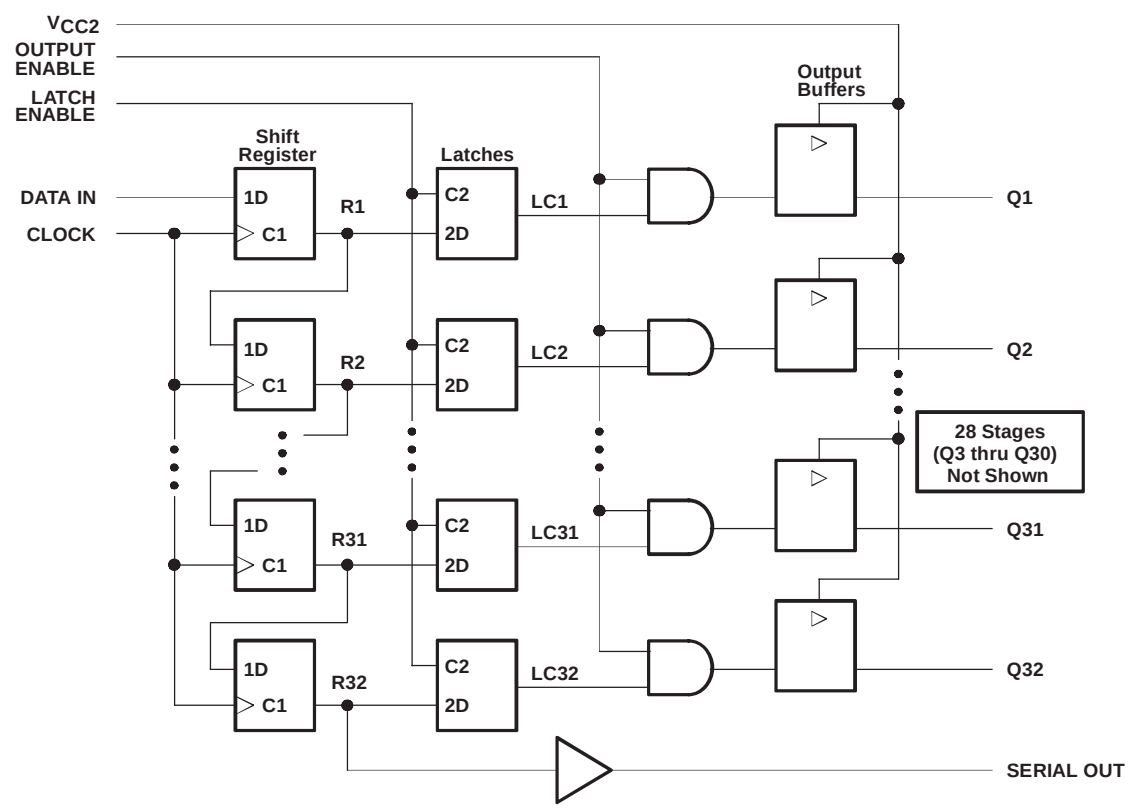


† These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.  
Pin numbers shown are for N packages.

# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A – APRIL 1985 – REVISED APRIL 1993

## logic diagram (positive logic)



FUNCTION TABLE

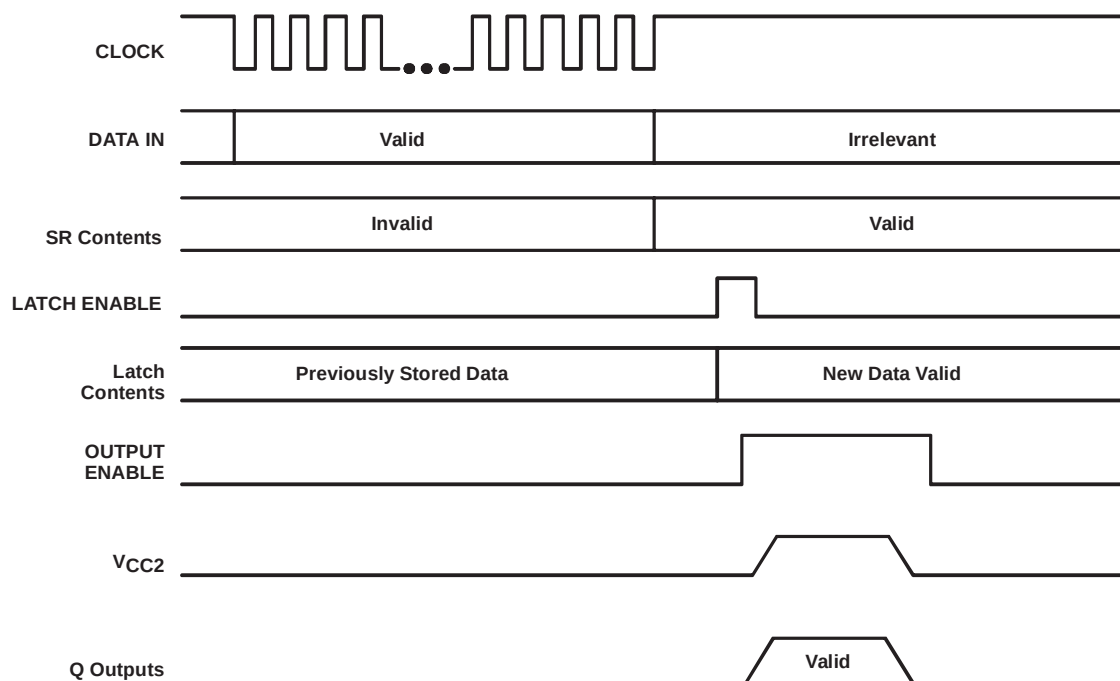
| FUNCTION         | CONTROL INPUTS |                 |                  | SHIFT REGISTER<br>R1 THRU R32 | LATCHES<br>LC1 THRU LC32       | OUTPUTS    |                                      |
|------------------|----------------|-----------------|------------------|-------------------------------|--------------------------------|------------|--------------------------------------|
|                  | CLOCK          | LATCH<br>ENABLE | OUTPUT<br>ENABLE |                               |                                | SERIAL     | Q1 THRU Q32                          |
| Load             | ↑              | X               | X                | Load and shift†               | Determined by<br>LATCH ENABLE‡ | R32<br>R32 | Determined by OUTPUT ENABLE          |
|                  | No↑            | X               | X                | No change                     |                                |            |                                      |
| Latch            | X              | L               | X                | As determined above           | Stored data                    | R32        | Determined by OUTPUT ENABLE          |
|                  | X              | H               | X                |                               | New data                       |            |                                      |
| Output<br>Enable | X              | X               | L                | As determined above           | Determined by<br>LATCH ENABLE‡ | R32        | All L<br>LC1 thru LC21, respectively |
|                  | X              | X               | H                |                               |                                | R32        |                                      |

H = high level, L = low level, X = irrelevant, ↑ = low-to-high-level transition.  
† R32 and the serial output take on the state of R31, R31 takes on the state of R30, . . . R2 takes on the state of R1, and R1 takes on the state of the data input.  
‡ New data enter the latches while LATCH ENABLE is high. These data are stored while LATCH ENABLE is low.

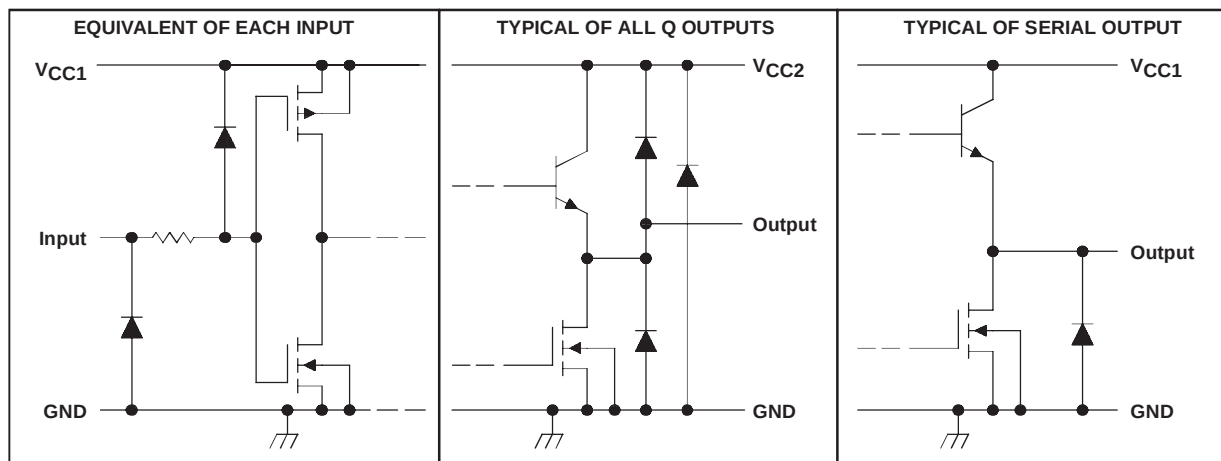
# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A—APRIL 1985—REVISED APRIL 1993

## typical operating sequence



## schematic of inputs and outputs



# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A – APRIL 1985 – REVISED APRIL 1993

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

|                                                                         |                              |
|-------------------------------------------------------------------------|------------------------------|
| Supply voltage, $V_{CC1}$ (see Note 1)                                  | 18 V                         |
| Supply voltage, $V_{CC2}$ (see Note 2)                                  | 90 V                         |
| Input voltage, $V_I$                                                    | $V_{CC1} + 0.3$ V            |
| Ground current                                                          | 700 mA                       |
| Continuous total power dissipation                                      | See Dissipation Rating Table |
| Operating free-air temperature range, $T_A$ : SN65555, SN65556          | –40°C to 85°C                |
| SN75555, SN75556                                                        | 0°C to 70°C                  |
| Storage temperature range, $T_{stg}$                                    | –65°C to 150°C               |
| Case temperature for 10 seconds: FN package                             | 260°C                        |
| Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: N package | 260°C                        |

NOTES: 1. Voltage values are with respect to network GND.

2. These devices have been designed to be used in applications in which the high-voltage supply,  $V_{CC2}$ , is switched to GND before changing the state of the outputs.

DISSIPATION RATING TABLE

| PACKAGE | $T_A = 25^\circ\text{C}$<br>POWER RATING | DERATING FACTOR<br>ABOVE $T_A = 25^\circ\text{C}$ | $T_A = 70^\circ\text{C}$<br>POWER RATING | $T_A = 85^\circ\text{C}$<br>POWER RATING |
|---------|------------------------------------------|---------------------------------------------------|------------------------------------------|------------------------------------------|
| FN      | 1700 mW                                  | 13.6 mW/°C                                        | 1088 mW                                  | 884 mW                                   |
| N       | 1250 mW                                  | 10.0 mW/°C                                        | 800 mW                                   | 650 mW                                   |

## recommended operating conditions

|                                                                |                                                 | MIN   | NOM | MAX  | UNIT |
|----------------------------------------------------------------|-------------------------------------------------|-------|-----|------|------|
| Supply voltage, $V_{CC1}$                                      |                                                 | 10.8  | 12  | 15   | V    |
| Supply voltage, $V_{CC2}$                                      |                                                 | 0     |     | 80   | V    |
| High-level input voltage, $V_{IH}$ (see Figure 1)              | $V_{CC1} = 10.8$ V                              | 8.1   |     | 11.1 | V    |
|                                                                | $V_{CC1} = 15$ V                                | 11.25 |     | 15.3 |      |
| Low-level input voltage, $V_{IL}$ (see Figure 1)               | $V_{CC1} = 10.8$ V                              | –0.3† |     | 2.7  | V    |
|                                                                | $V_{CC1} = 15$ V                                | –0.3† |     | 3.75 |      |
| High-level output current, $I_{OH}$                            |                                                 |       |     | –15  | mA   |
| Low-level output current, $I_{OL}$                             |                                                 |       |     | 15   | mA   |
| Output clamp current, $I_{OK}$                                 |                                                 |       |     | 20   | mA   |
| Clock frequency, $f_{clock}$                                   |                                                 | 0     |     | 6.25 | MHz  |
| Pulse duration, CLOCK high or low, $t_{W(CLK)}$ (see Figure 2) |                                                 | 80    |     |      | ns   |
| Pulse duration, LATCH ENABLE, $t_{W(LE)}$                      |                                                 | 80    |     |      | ns   |
| Setup time, $t_{su}$                                           | DATA IN before CLOCK ↑ (see Figure 2)           | 20    |     |      | ns   |
|                                                                | OUTPUT ENABLE before $V_{CC2}$ ↑ (see Figure 4) | 500   |     |      |      |
| Hold time, $t_h$                                               | DATA IN after CLOCK ↑ (see Figure 2)            | 80    |     |      | ns   |
|                                                                | OUTPUT ENABLE after $V_{CC2}$ ↑ (see Figure 4)  | 100   |     |      |      |
| Rate of rise for $V_{CC2}$ , $dv/dt$                           |                                                 |       |     | 80   | V/μs |
| Operating free-air temperature, $T_A$                          | SN65555, SN65556                                | –40   |     | 85   | °C   |
|                                                                | SN75555, SN75556                                | 0     |     | 85   |      |

† The algebraic convention, in which the least positive (most negative) value is designated as minimum, is used in this data sheet for logic voltage levels.



POST OFFICE BOX 655303 ■ DALLAS, TEXAS 75265

SN65555, SN65556, SN75555, SN75556  
ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A—APRIL 1985—REVISED APRIL 1993

electrical characteristics over recommended operating free-air temperature range,  $V_{CC1} = 12\text{ V}$ ,  $V_{CC2} = 80\text{ V}$

| PARAMETER |                               |            | TEST CONDITIONS                   | MIN  | MAX | UNIT          |
|-----------|-------------------------------|------------|-----------------------------------|------|-----|---------------|
| $V_{OH}$  | High-level output voltage     | Q outputs  | $I_O = -15\text{ mA}$             | 77   |     | V             |
|           |                               | SERIAL OUT | $I_O = -100\text{ }\mu\text{A}$   | 10.5 |     |               |
| $V_{OL}$  | Low-level output voltage      | Q outputs  | $I_{OL} = 15\text{ mA}$           |      | 8   | V             |
|           |                               | SERIAL OUT | $I_{OL} = 100\text{ }\mu\text{A}$ |      | 1   |               |
| $I_{IH}$  | High-level input current      |            | $V_I = 12\text{ V}$               |      | 1   | $\mu\text{A}$ |
| $I_{IL}$  | Low-level input current       |            | $V_I = 0$                         |      | -1  | $\mu\text{A}$ |
| $I_{CC1}$ | Supply current from $V_{CC1}$ |            |                                   |      | 2   | mA            |
| $I_{CC2}$ | Supply current from $V_{CC2}$ |            |                                   |      | 5   | mA            |

switching characteristics,  $V_{CC1} = 12\text{ V}$ ,  $T_A = 25^\circ\text{C}$

| PARAMETER        |                                                                  | TEST CONDITIONS                                                   |  | MIN | MAX | UNIT |
|------------------|------------------------------------------------------------------|-------------------------------------------------------------------|--|-----|-----|------|
| t <sub>PHL</sub> | Propagation delay time, high-to-low-level, SERIAL OUT from CLOCK | C <sub>L</sub> = 20 pF to GND, V <sub>CC2</sub> = 0, See Figure 3 |  | 140 |     | ns   |
| t <sub>PLH</sub> | Propagation delay time, low-to-high level, SERIAL OUT from CLOCK |                                                                   |  | 140 |     | ns   |
| t <sub>d</sub>   | Delay time, V <sub>CC2</sub> to Q outputs                        | dv/dt = 80 V/μs, See Figure 4                                     |  | 100 |     | ns   |

RECOMMENDED OPERATING CONDITIONS

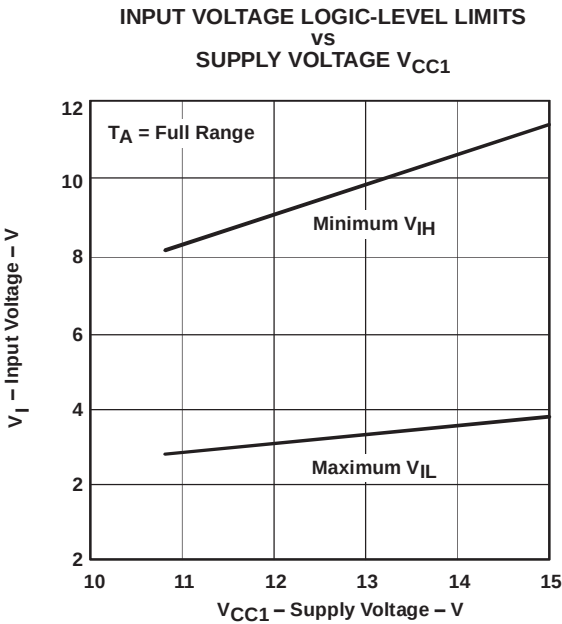


Figure 1

# SN65555, SN65556, SN75555, SN75556 ELECTROLUMINESCENT COLUMN DRIVERS

SLDS031A – APRIL 1985 – REVISED APRIL 1993

## PARAMETER MEASUREMENT INFORMATION

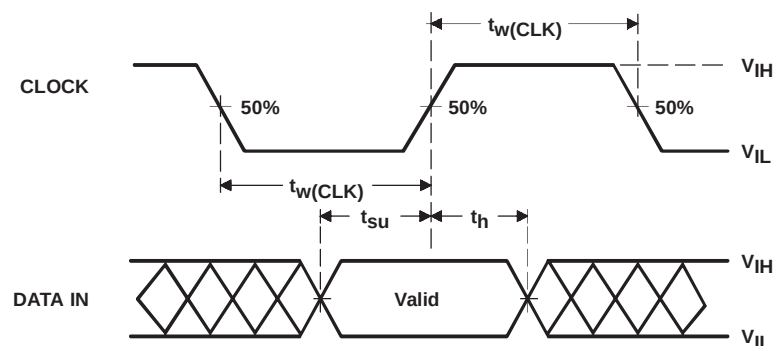


Figure 2. Input Timing Voltage Waveforms

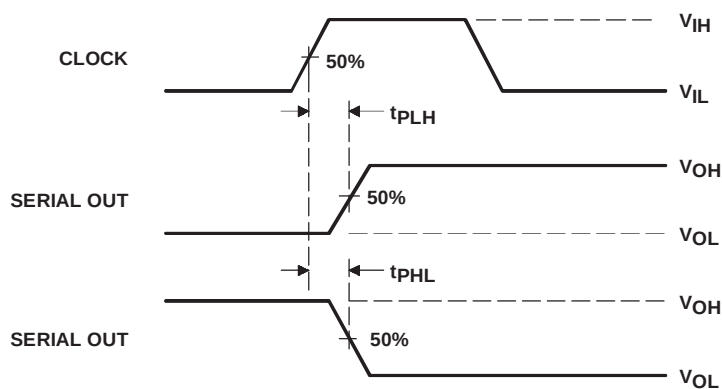


Figure 3. Voltage Waveforms for Propagation Delay Time, CLOCK to SERIAL OUT

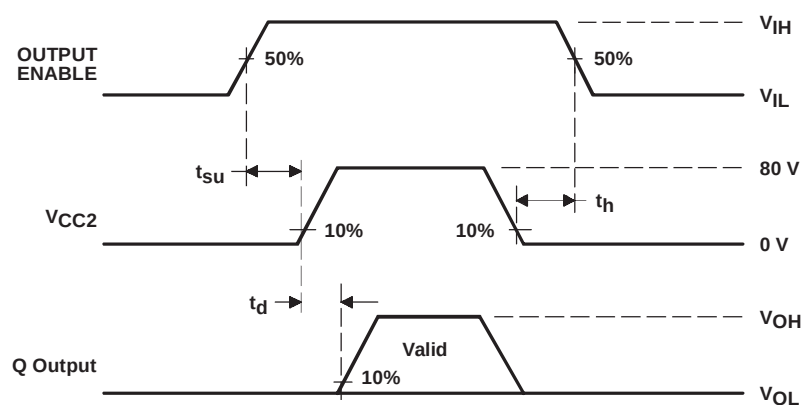


Figure 4. Voltage Waveforms for Delay Times,  $V_{CC2}$  to Q Outputs



POST OFFICE BOX 655303 ■ DALLAS, TEXAS 75265





## **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 acknowledgement, including those pertaining to warranty, patent infringement, and limitation of liability.

TI warrants performance of its semiconductor 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.

CERTAIN APPLICATIONS USING SEMICONDUCTOR PRODUCTS MAY INVOLVE POTENTIAL RISKS OF DEATH, PERSONAL INJURY, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE ("CRITICAL APPLICATIONS"). TI SEMICONDUCTOR PRODUCTS ARE NOT DESIGNED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. INCLUSION OF TI PRODUCTS IN SUCH APPLICATIONS IS UNDERSTOOD TO BE FULLY AT THE CUSTOMER'S RISK.

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 semiconductor 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, warranty or endorsement thereof.