

# SN65551, SN65552, SN75551, SN75552 ELECTROLUMINESCENT ROW DRIVERS

D2743, MARCH 1983—REVISED OCTOBER 1989

- Each Device Drives 32 Electrodes
- High-Voltage Open-Drain DMOS Outputs
- 50-mA Output Current Capability
- CMOS-Compatible Inputs
- Very Low Steady-State Power Consumption

## description

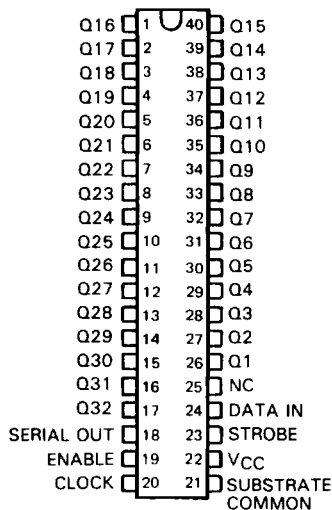
The SN65551, SN65552, SN75551, and SN75552 are monolithic BIFET<sup>†</sup> integrated circuits designed to drive the row electrodes of an electroluminescent display. All inputs are CMOS-compatible and all outputs are high-voltage open-drain DMOS transistors. The SN75552 output sequence is reversed from the SN75551 for ease in printed circuit board layout.

The devices consist of a 32-bit shift register, 32 AND gates, and 32 output OR gates. Typically, a composite row drive signal is externally generated by a high-voltage switching circuit and applied to the SUBSTRATE COMMON terminal. Serial data is entered into the shift register on the high-to-low transition of CLOCK. A high at the ENABLE input allows those outputs with a high in their associated register to be turned on causing the corresponding row to be connected to the composite row drive signal. When STROBE is low, all output transistors are turned on. The Serial Data output (SERIAL OUT) from the shift register may be used to cascade additional devices. This output is not affected by the ENABLE or STROBE inputs.

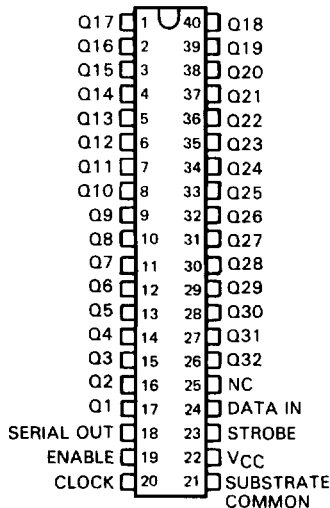
The SN65551 and SN65552 are characterized for operation from -40°C to 85°C. The SN75551 and SN75552 are characterized for operation from 0°C to 70°C.

N  
DUAL-IN-LINE-PACKAGES  
(TOP VIEW)

SN65551, SN75551



SN65552, SN75552



NC - No internal connection

<sup>†</sup> BIFET - Bipolar, double-diffused, N-channel and P-channel MOS transistors on same chip - patented process.

PRODUCTION DATA documents contain 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.

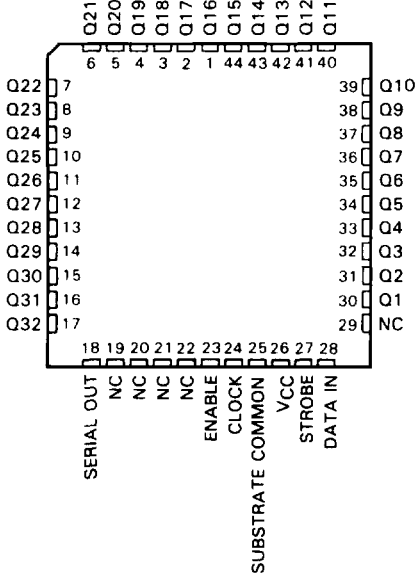
**TEXAS  
INSTRUMENTS**

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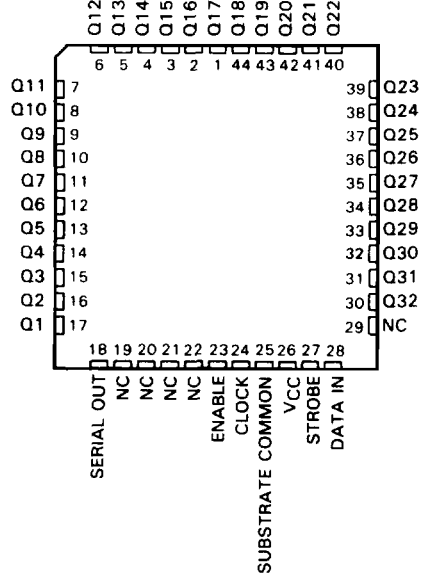
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# SN65551, SN65552, SN75551, SN75552 ELECTROLUMINESCENT ROW DRIVERS

SN65551, SN75551 . . . FN PACKAGE  
(TOP VIEW)



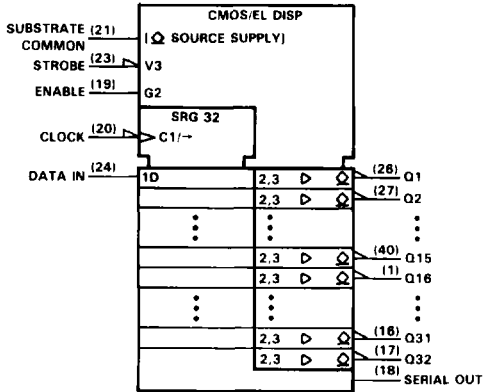
SN65552, SN75552 . . . FN PACKAGE  
(TOP VIEW)



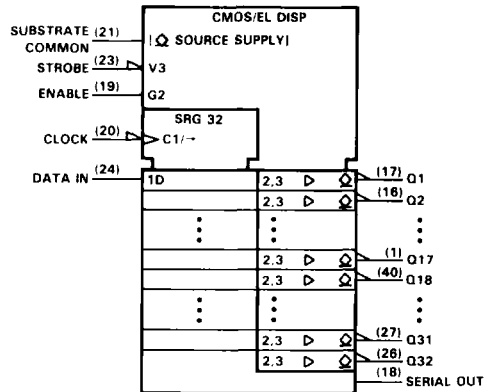
NC—No internal connection

## logic symbols†

SN65551, SN75551



SN65552, SN75552

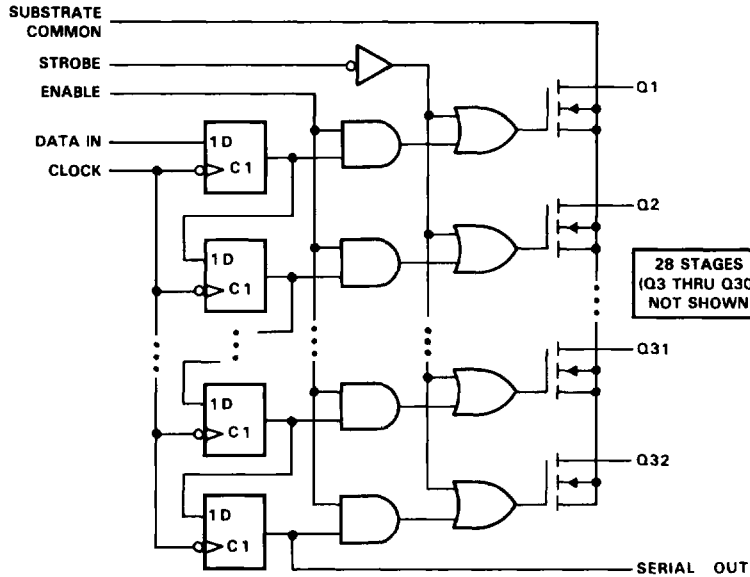


†These symbols are in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12. The symbol  $\triangle$  here indicates an n-channel open-drain output.

Pin numbers shown are for the N package

**SN65551, SN65552, SN75551, SN75552  
ELECTROLUMINESCENT ROW DRIVERS**

logic diagram (positive logic)



FUNCTION TABLE

FUNCTIONS	CONTROL INPUTS			SHIFT REGISTERS R1 THRU R32	OUTPUTS	
	CLOCK	ENABLE	STROBE		SERIAL	Q1 THRU Q32
LOAD	↓	X	X	Load and Shift <sup>†</sup>	R32	Determined by ENABLE and STROBE
	No ↓	X	X	No Change	R32	Determined by ENABLE and STROBE
ENABLE	X	L	H	As determined above	R32	All Q outputs off
	X	H	H	As determined above	R32	Determined by R1 through R32
STROBE	X	X	L	As determined above	R32	All Q outputs on

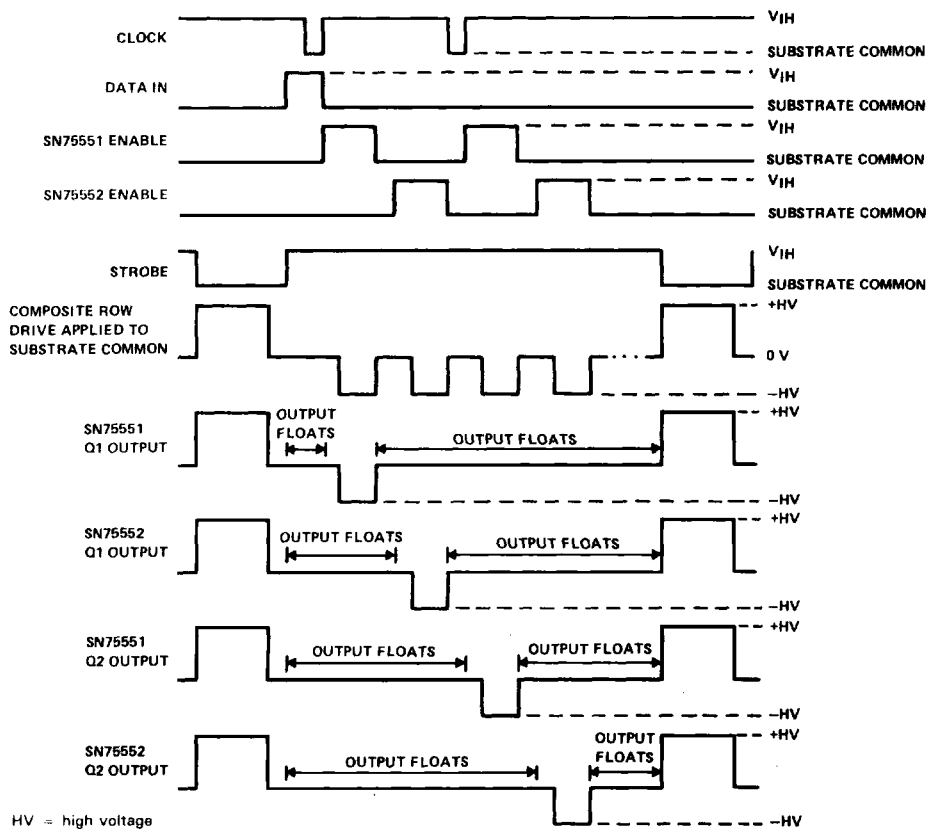
H = high level, L = low level, X = irrelevant, ↓ = high-to-low transition.

<sup>†</sup>Register R32 takes 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.



# SN65551, SN65552, SN75551, SN75552 ELECTROLUMINESCENT ROW DRIVERS

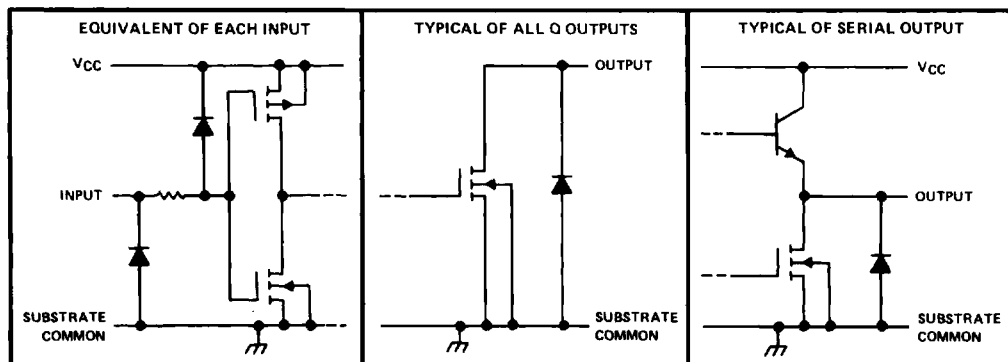
## typical operating sequence



NOTE: During operation CLOCK, DATA IN, ENABLE, and STROBE are referenced to the Composite Row Drive signal received at the SUBSTRATE COMMON pin of the device.

# SN65551, SN65552, SN75551, SN75552 ELECTROLUMINESCENT ROW DRIVERS

## schematic of inputs and outputs



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

Supply voltage, $V_{CC}$ (see Note 1)	18 V
Off-state Q output voltage, $V_{O(off)}$	225 V
Input voltage	$V_{CC} + 0.3$ V
Substrate common terminal current (see Note 2)	1.5 A
Continuous total power dissipation	See Dissipation Rating Table
Operating free-air temperature range: SN65551, SN65552	-40°C to 85°C
SN75551, SN75552	0°C to 70°C
Storage temperature range	-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 SUBSTRATE COMMON terminal.  
2. Duty cycle is limited by package dissipation.

DISSIPATION RATING TABLE

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

**TEXAS  
INSTRUMENTS**

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**SN65551, SN65552, SN75551, SN75552**  
**ELECTROLUMINESCENT ROW DRIVERS**

**recommended operating conditions**

		MIN	NOM	MAX	UNIT
V <sub>CC</sub>	Supply voltage	10.8	12	15	V
V <sub>IH</sub>	High-level input voltage (see Figure 1)	V <sub>CC</sub> = 10.8 V	8.1	11.1	V
		V <sub>CC</sub> = 15 V	11.25	15.3	
V <sub>IL</sub>	Low-level input voltage (see Figure 1)	V <sub>CC</sub> = 10.8 V	-0.3	2.7	V
		V <sub>CC</sub> = 15 V	-0.3	3.75	
V <sub>O(off)</sub>	Off-state Q output voltage	0		200	V
I <sub>O(on)</sub>	On-state output current, duty cycle ≤ 1%, (see Figures 2, 3, and 4)	V <sub>CC</sub> = 10.8 V, T <sub>A</sub> = 25 °C		50	mA
		V <sub>CC</sub> = 15 V, T <sub>A</sub> = 25 °C		80	
I <sub>OK</sub>	Output clamp current			-45	mA
f <sub>clock</sub>	Clock frequency	0		4	MHz
t <sub>w</sub>	Pulse duration, CLOCK high or low	125			ns
t <sub>su</sub>	Setup time, DATA IN before CLOCK (see Figure 5)	50			ns
t <sub>h</sub>	Hold time, DATA IN after CLOCK (see Figure 5)	100			ns
T <sub>A</sub>	Operating free-air temperature	SN65551, SN65552	-40	85	°C
		SN75551, SN75552	0	70	

**electrical characteristics over recommended operating free-air temperature range**

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
I <sub>O(off)</sub>	Off-state Q output current	V <sub>O</sub> = 200 V		10	μA
V <sub>OH</sub>	High-level output voltage	I <sub>O</sub> = -100 μA	V <sub>CC</sub> - 1.5		V
V <sub>OL</sub>	Low-level output voltage	Q outputs	I <sub>OL</sub> = 50 mA, See Figure 3	30	V
		Serial output	I <sub>OL</sub> = 100 μA	1	
I <sub>IH</sub>	High-level input current	V <sub>I</sub> @ V <sub>CC</sub>		1	μA
I <sub>IL</sub>	Low-level input current	V <sub>I</sub> = 0		-1	μA
I <sub>CC</sub>	Supply current from V <sub>CC</sub>			250	μA

**switching characteristics, V<sub>CC</sub> = 12 V, T<sub>A</sub> = 25 °C**

PARAMETER	TEST CONDITIONS	MIN	MAX	UNIT
t <sub>PHL</sub>	Propagation delay time, high-to-low level SERIAL OUTPUT from CLOCK	C <sub>L</sub> = 20 pF to ground, See Figure 6	200	ns
t <sub>PLH</sub>	Propagation delay time, low-to-high level SERIAL OUTPUT from CLOCK		200	ns
t <sub>d(on)</sub>	Turn-on delay time, Q outputs from ENABLE	I <sub>OL</sub> = 50 mA, STROBE at V <sub>CC</sub> , R <sub>L</sub> = 1.4 kΩ to 100 V. See Figure 7	500	ns

RECOMMENDED OPERATING CONDITIONS

INPUT VOLTAGE LOGIC-LEVEL LIMITS  
vs  
SUPPLY VOLTAGE

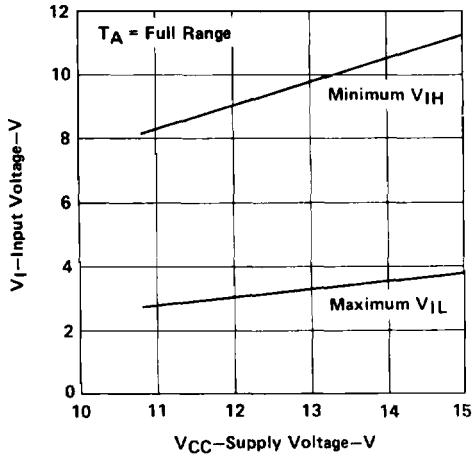


FIGURE 1

MAXIMUM ON-STATE Q OUTPUT CURRENT  
vs  
SUPPLY VOLTAGE

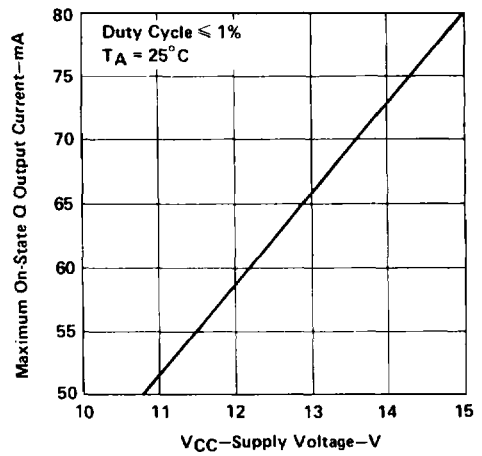
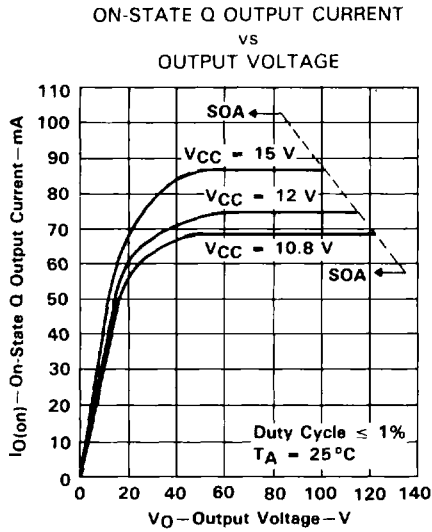


FIGURE 2

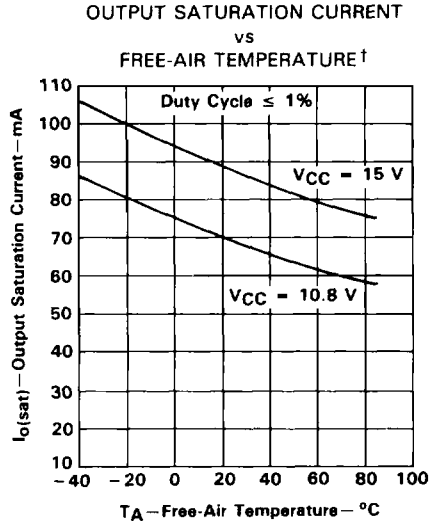
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**ELECTROLUMINESCENT ROW DRIVERS**

**TYPICAL CHARACTERISTICS**



SOA = Safe Operating Area

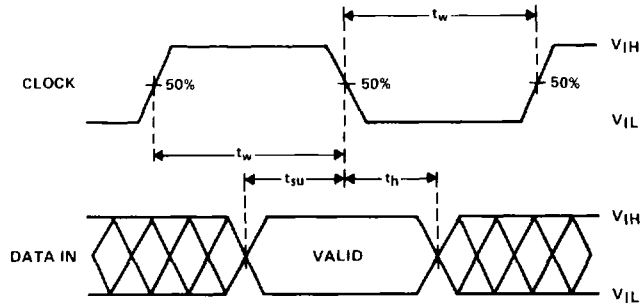
**FIGURE 3**



**FIGURE 4**

† Data for temperatures below  $0^\circ\text{C}$  and above  $70^\circ\text{C}$  apply only for SN65551 and SN65552.

**PARAMETER MEASUREMENT INFORMATION**



**FIGURE 5. INPUT TIMING VOLTAGE WAVEFORMS**

PARAMETER MEASUREMENT INFORMATION

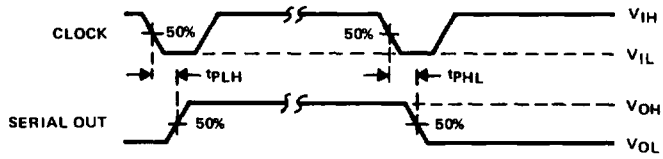


FIGURE 6. VOLTAGE WAVEFORMS, SERIAL OUTPUT

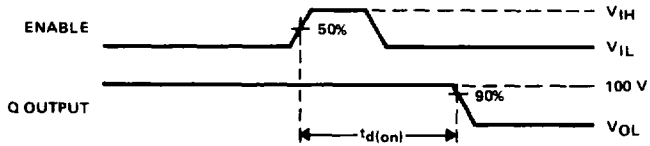


FIGURE 7. VOLTAGE WAVEFORMS, Q OUTPUT