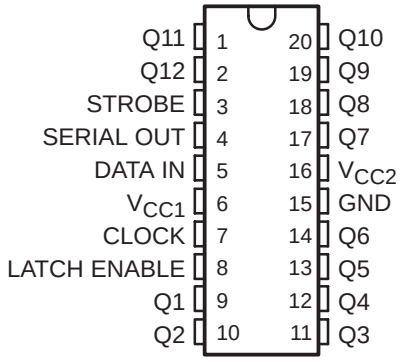
SLDS054 − D3516, MAY 1990

- **Each Device Drives 12 Lines**
- **60-V Output Voltage Swing Capability**
- **25-mA Output Source Current Capability**
- **High-Speed Serially-Shifted Data Input**
- **TTL-Compatible Inputs**
- **Latches on All Driver Outputs**

DW OR N PACKAGE
(TOP VIEW)



description

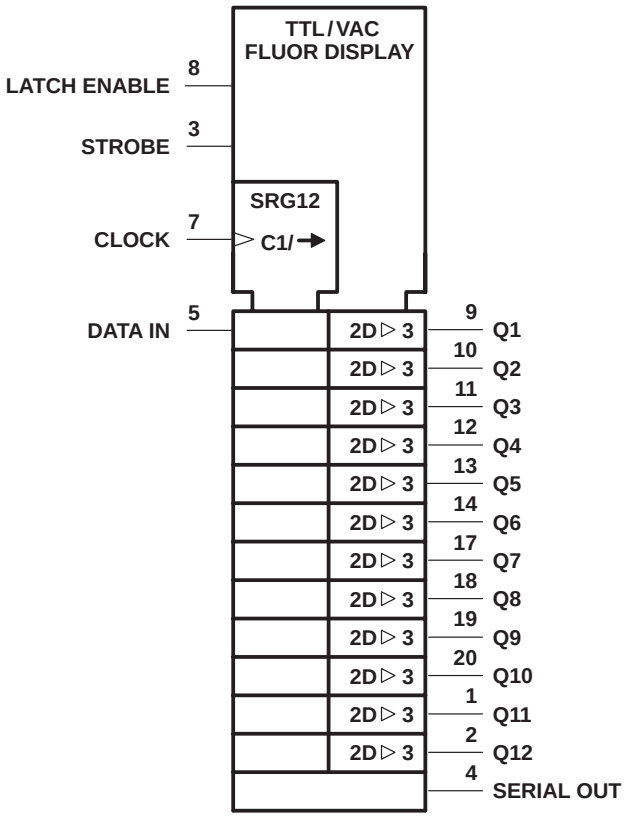
The SN65512C and SN75512C are monolithic BIDFET† integrated circuits designed to drive a dot matrix or segmented vacuum fluorescent display.

All device inputs are diode-clamped pnp inputs and assume a high logic level when open circuited. The nominal input threshold is 1.5 V. Outputs are totem-pole structures formed by an npn emitter follower and double-diffused MOS (DMOS) transistors.

The device consists of a 12-bit shift register, 12 latches, and 12 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 12 latches. The active-low STROBE input enables all Q outputs. Serial data output from the shift register can be used to cascade shift registers. This output is not affected by LATCH ENABLE or STROBE.

The SN65512C is characterized for operation from −40°C to 85°C. The SN75512C is characterized for operation from 0°C to 70°C.

logic symbol‡

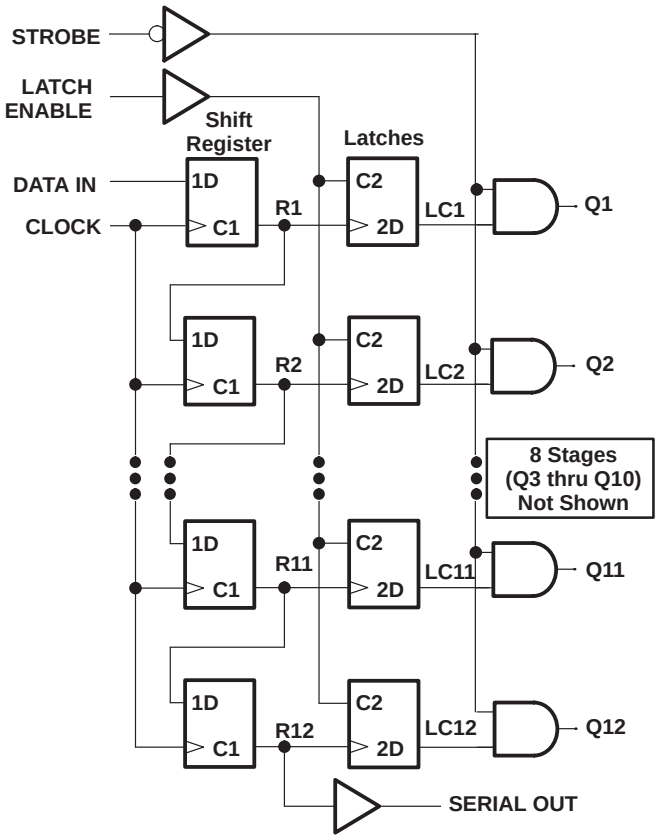


‡ This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

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

TEXAS INSTRUMENTS
POST OFFICE BOX 655303 • DALLAS, TEXAS 75265
POST OFFICE BOX 1443 • HOUSTON, TEXAS 77001

logic diagram (positive logic)



FUNCTION TABLE

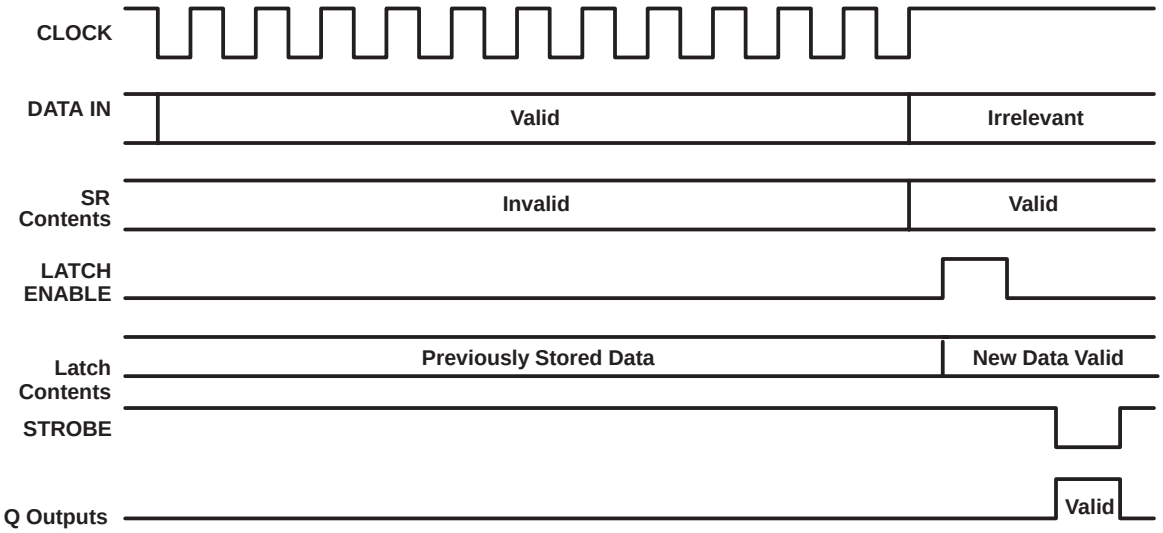
FUNCTION	CONTROL INPUTS			SHIFT REGISTER R1 THRU R12	LATCHES LC1 THRU LC12	OUTPUTS	
	CLOCK	LATCH ENABLE	STROBE			SERIAL	Q1 THRU Q12
Load	↑ No ↑	X	X	Load and shift† No change	Determined by LATCH ENABLE‡	R12	Determined by STROBE
Latch	X	L H	X	As determined above	Stored data New data	R12	Determined by STROBE
Strobe	X	X	H L	As determined above	Determined by LATCH ENABLE‡	R12	All L LC1 thru LC12, respectively

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

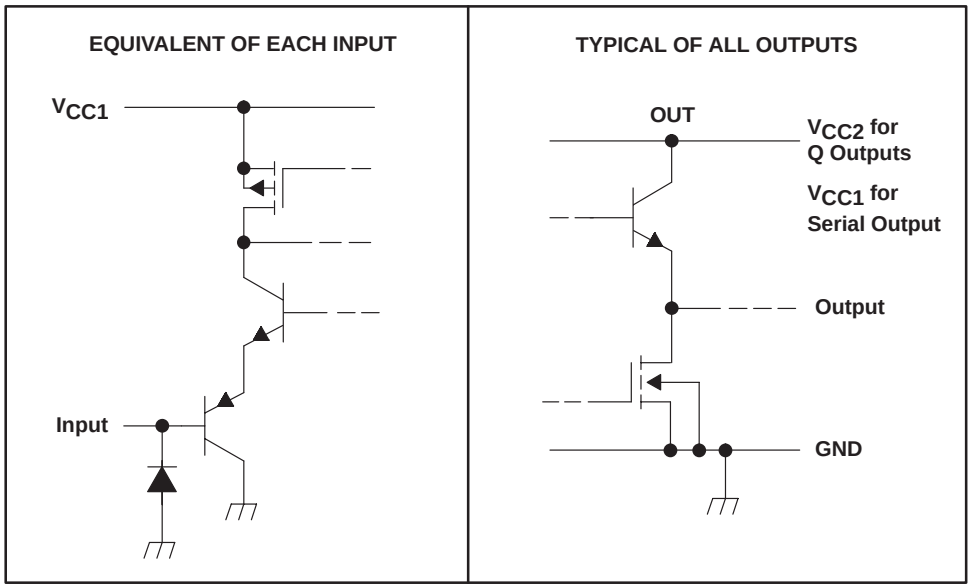
† R12 takes on the state of R11, R11 takes on the state of R10, . . . R2 takes on the state of R1, and R1 takes on the state of the data input.

‡ New data enter the latches while LATCH ENABLE is high. These data are stored while LATCH ENABLE is low.

typical operating sequence



schematics of inputs and outputs



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

Supply voltage, V_{CC1} (see Note 1) . . . . . 15 V
Supply voltage, V_{CC2} . . . . . 70 V
Input voltage, V_I . . . . . V_{CC1}
Continuous total power dissipation . . . . . See Dissipation Rating Table
Operating free-air temperature range: SN65512C . . . . . −40°C to 85°C
SN75512C . . . . . 0°C to 70°C
Storage temperature range . . . . . −65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds . . . . . 260°C

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

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING
DW	1125 mW	9.0 mW/°C	720 mW	585 mW
N	1150 mW	9.2 mW/°C	736 mW	598 mW

recommended operating conditions

		SN65512C		SN75512C		UNIT
		MIN	MAX	MIN	MAX	
Supply voltage, V_{CC1}		5	15	5	15	V
Supply voltage, V_{CC2}		0	60	0	60	V
High-level input voltage, V_{IH}		2		2		V
Low-level input voltage, V_{IL}			0.8		0.8	V
High-level output current, I_{OH}			−25		−25	mA
Low-level output current, I_{OL}	V_{CC1} = 5 V		5		5	mA
Clock frequency, f_{clock}	V_{CC1} = 15 V, T_A = 25°C	0	4	0	4	MHz
	V_{CC1} = 5 V, T_A = 25°C	0	1	0	1	MHz
Pulse duration, CLOCK high or low, t_w	V_{CC1} = 15 V, T_A = 25°C	100		100		ns
	V_{CC1} = 5 V, T_A = 25°C	500		500		ns
Setup time, DATA IN before CLOCK ↑, t_{su} (see Figure 1)	V_{CC1} = 15 V, T_A = 25°C	100		100		ns
	V_{CC1} = 5 V, T_A = 25°C	250		250		ns
Hold time, DATA IN after CLOCK ↑, t_h (see Figure 1)	V_{CC1} = 15 V, T_A = 25°C	50		50		ns
	V_{CC1} = 5 V, T_A = 25°C	250		250		ns
Operating free-air temperature, T_A		−40	85	0	70	°C

electrical characteristics over recommended operating free-air temperature range, V_{CC2} = 60 V

PARAMETER			TEST CONDITIONS		MIN	TYP†	MAX	UNIT
V_{IK}	Input clamp voltage		I_I = −12 mA				−1.5	V
V_{OH}	High-level output voltage	Q outputs	I_{OH} = −25 mA,	V_{CC1} = 5 V	57.5	58		V
		SERIAL OUT	I_{OH} = −200 μA,	V_{CC1} = 5 V	4.5	4.7		
V_{OL}	Low-level output voltage	Q outputs	I_{OL} = 1 mA,	V_{CC1} = 5 V		2.8	5	V
		SERIAL OUT	I_{OL} = 200 μA,	V_{CC1} = 5 V		0.05	0.2	
I_{IH}	High-level input current		V_{CC1} = 15 V,	V_I = 5 V		0.01	10	μA
I_{IL}	Low-level input current		V_{CC1} = 15 V,	V_I = 0.8 V		−25	−150	μA
I_{CC1}	Supply current from V_{CC1}		V_{CC1} = 15 V	V_I = 5 V		500	800	μA
				V_I = 0.8 V		2	6	mA
I_{CC2}	Supply current from V_{CC2}		V_{CC1} = 15 V	All outputs high		6	12	mA
				STROBE at 2 V		100	500	μA

† All typical values are at V_{CC1} = 5 V, T_A = 25°C.

switching characteristics, V_{CC1} = 5 V, V_{CC2} = 60 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	MIN	MAX	UNIT
t_{DHL}	Delay time, high-to-low level output	C_L = 30 pF, See Figure 2		300	ns
t_{DLH}	Delay time, low-to-high level output			300	ns
t_{THL}	Transition time, high-to-low level output			500	ns
t_{TLH}	Transition time, low-to-high level output			500	ns

PARAMETER MEASUREMENT INFORMATION

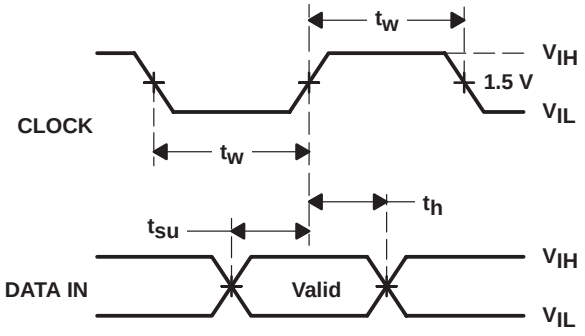


Figure 1. Input Timing Voltage Waveforms

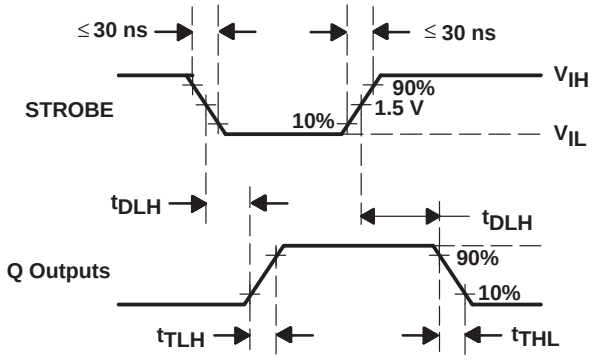


Figure 2. Switching Time Voltage Waveforms

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		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DLP® Products	www.dlp.com	Broadband	www.ti.com/broadband
DSP	dsp.ti.com	Digital Control	www.ti.com/digitalcontrol
Clocks and Timers	www.ti.com/clocks	Medical	www.ti.com/medical
Interface	interface.ti.com	Military	www.ti.com/military
Logic	logic.ti.com	Optical Networking	www.ti.com/opticalnetwork
Power Mgmt	power.ti.com	Security	www.ti.com/security
Microcontrollers	microcontroller.ti.com	Telephony	www.ti.com/telephony
RFID	www.ti-rfid.com	Video & Imaging	www.ti.com/video
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265