

DS75150

DS75150 Dual Line Driver



Literature Number: SNOSBL0A

DS75150 Dual Line Driver

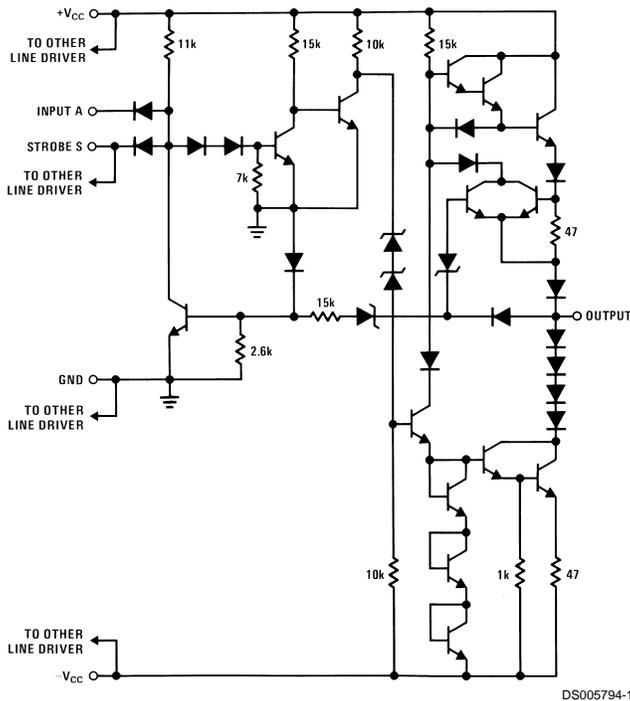
General Description

The DS75150 is a dual monolithic line driver designed to satisfy the requirements of the standard interface between data terminal equipment and data communication equipment as defined by EIA Standard RS-232-C. A rate of 20,000 bits per second can be transmitted with a full 2500 pF load. Other applications are in data-transmission systems using relatively short single lines, in level translators, and for driving MOS devices. The logic input is compatible with most TTL and LS families. Operation is from $-12V$ and $+12V$ power supplies.

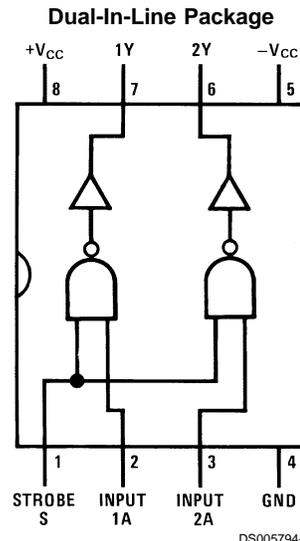
Features

- Withstands sustained output short-circuit to any low impedance voltage between $-25V$ and $+25V$
- 2 μs max transition time through the $-3V$ to $+3V$ transition region under full 2500 pF load
- Inputs compatible with most TTL and LS families
- Common strobe input
- Inverting output
- Slew rate can be controlled with an external capacitor at the output
- Standard supply voltages: $\pm 12V$

Schematic and Connection Diagrams



Component values shown are nominal.
1/2 of circuit shown



Positive Logic C = \overline{AS}

Top View
Order Number DS75150M
See NS Package Number M08A

Absolute Maximum Ratings (Note 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage $+V_{CC}$	15V
Supply Voltage $-V_{CC}$	15V
Input Voltage	15V
Applied Output Voltage	+25V
Storage Temperature Range	-65°C to +150°C
Maximum Power Dissipation (Note 1) at 25°C	
SO Package	655 mW
Lead Temperature (Soldering, 4 sec.)	260°C

Operating Conditions

	Min	Max	Units
Supply Voltage ($+V_{CC}$)	10.8	13.2	V
Supply Voltage ($-V_{CC}$)	-10.8	-13.2	V
Input Voltage (V_I)	0	+5.5	V
Output Voltage (V_O)		±15	V
Operating Ambient Temperature Range (T_A)	0	+70	°C

Note 1: Derate SO package 8.01 mW/°C above 25°C.

DC Electrical Characteristics (Notes 3, 4, 5, 6)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V_{IH}	High-Level Input Voltage	(Figure 1)	2			V
V_{IL}	Low-Level Input Voltage	(Figure 2)			0.8	V
V_{OH}	High-Level Output Voltage	$+V_{CC} = 10.8V, -V_{CC} = -13.2V, V_{IL} = 0.8V, R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ (Figure 2)	5	8		V
V_{OL}	Low-Level Output Voltage	$+V_{CC} = 10.8V, -V_{CC} = -10.8V, V_{IH} = 2V, R_L = 3\text{ k}\Omega$ to $7\text{ k}\Omega$ (Figure 1)		-8	-5	V
I_{IH}	High-Level Input Current	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 2.4V$, (Figure 3) Data Input		1	10	μA
		$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 2.4V$, (Figure 3) Strobe Input		2	20	μA
I_{IL}	Low-Level Input Current	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 0.4V$, (Figure 3) Data Input		-1	-1.6	mA
		$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 0.4V$, (Figure 3) Strobe Input		-2	-3.2	mA
I_{OS}	Short-Circuit Output Current	$+V_{CC} = 13.2V, -V_{CC} = -13.2V$, (Figure 4), (Note 5) $V_O = 25V$		2	5	mA
		$V_O = -25V$		-3	-6	mA
		$V_O = 0V, V_I = 3V$		15	30	mA
		$V_O = 0V, V_I = 0V$		-15	-30	mA
$+I_{CCH}$	Supply Current From $+V_{CC}$, High-Level Output	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 0V, R_L = 3\text{ k}\Omega, T_A = 25^\circ\text{C}$, (Figure 5)		10	22	mA
$-I_{CCH}$	Supply Current From $-V_{CC}$, High-Level Output	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 0V, R_L = 3\text{ k}\Omega, T_A = 25^\circ\text{C}$, (Figure 5)		-1	-10	mA
$+I_{CCL}$	Supply Current From $+V_{CC}$, Low-Level Output	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 3V, R_L = 3\text{ k}\Omega, T_A = 25^\circ\text{C}$, (Figure 5)		8	17	mA
$-I_{CCL}$	Supply Current From $-V_{CC}$, Low-Level Output	$+V_{CC} = 13.2V, -V_{CC} = -13.2V, V_I = 3V, R_L = 3\text{ k}\Omega, T_A = 25^\circ\text{C}$, (Figure 5)		-9	-20	mA

Note 2: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. Except for "Operating Temperature Range" they are not meant to imply that the devices should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

Note 3: Unless otherwise specified min/max limits apply across the 0°C to +70°C range for the DS75150. All typical values are $T_A = 25^\circ\text{C}$ and $+V_{CC} = 12V, -V_{CC} = -12V$.

Note 4: All current into device pins shown as positive, out of device pins as negative, all voltages referenced to ground unless otherwise noted. All values shown as max or min on absolute value basis.

Note 5: Only one output at a time should be shorted.

Note 6: The algebraic convention where the most-positive (least-negative) limit is designated as maximum is used in this data sheet for logic levels only, e.g., when -5V is the maximum, the typical value is more-negative voltage.

AC Electrical Characteristics

($+V_{CC} = 12V$, $-V_{CC} = -12V$, $T_A = 25^\circ C$)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t_{TLH}	Transition Time, Low-to-High Level Output	$C_L = 2500$ pF, $R_L = 3$ k Ω to 7 k Ω , (Figure 6)	0.2	1.4	2	μs
t_{THL}	Transition Time, High-to-Low Level Output	$C_L = 2500$ pF, $R_L = 3$ k Ω to 7 k Ω , (Figure 6)	0.2	1.5	2	μs
t_{TLH}	Transition Time, Low-to-High Level Output	$C_L = 15$ pF, $R_L = 7$ k Ω , (Figure 6)		40		ns
t_{THL}	Transition Time, High-to-Low Level Output	$C_L = 15$ pF, $R_L = 7$ k Ω , (Figure 6)		20		ns
t_{PLH}	Propagation Delay Time Low-to-High Level Output	$C_L = 15$ pF, $R_L = 7$ k Ω , (Figure 6)		60		ns
t_{PHL}	Propagation Delay Time High-to-Low Level Output	$C_L = 15$ pF, $R_L = 7$ k Ω , (Figure 6)		45		ns

DC Test Circuits

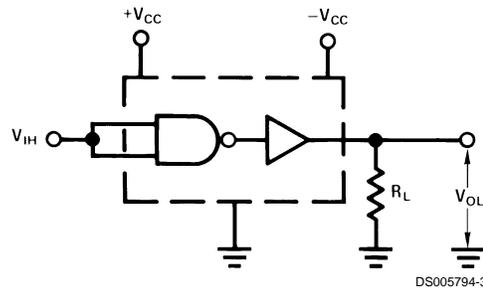


FIGURE 1. V_{IH} , V_{OL}

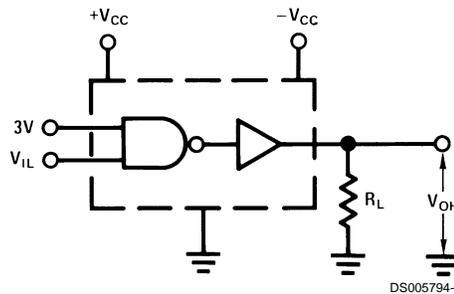


FIGURE 2. V_{IL} , V_{OH}

Each input is tested separately.

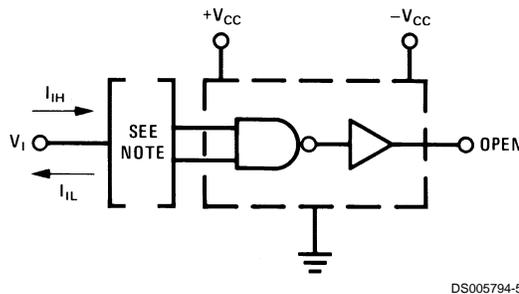
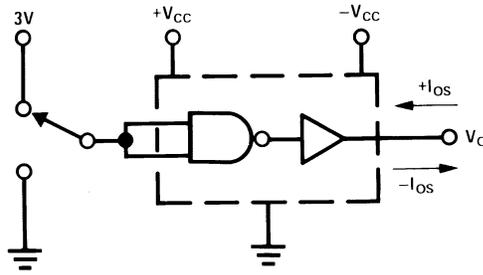


FIGURE 3. I_{IH} , I_{IL}

When testing I_{IH} , the other input is at 3V; when testing I_{IL} , the other input is open.

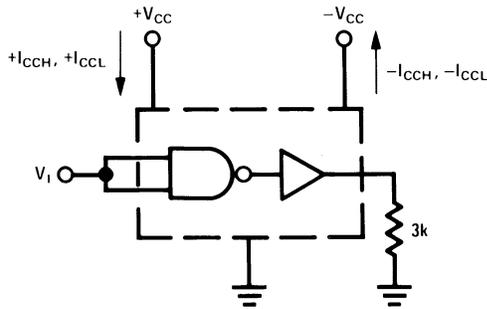
DC Test Circuits (Continued)



DS005794-6

I_{OS} is tested for both input conditions at each of the specified output conditions.

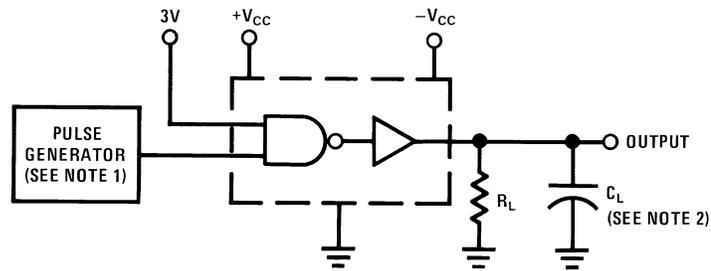
FIGURE 4. I_{OS}



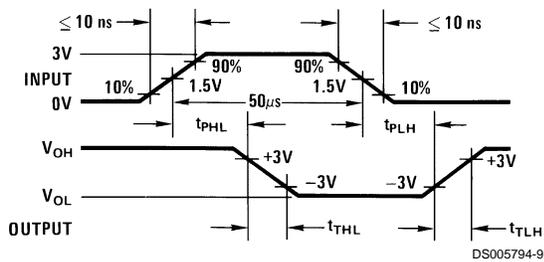
DS005794-7

FIGURE 5. I_{CCH+} , I_{CCH-} , I_{CCL+} , I_{CCL-}

AC Test Circuit and Switching Waveforms



DS005794-8



DS005794-9

Note 7: The pulse generator has the following characteristics:
duty cycle $\leq 50\%$, $Z_{OUT} = 50\Omega$.

Note 8: C_L includes probe and jig capacitance.

FIGURE 6.

Typical Performance Characteristics

Output Current vs Applied Output Voltage

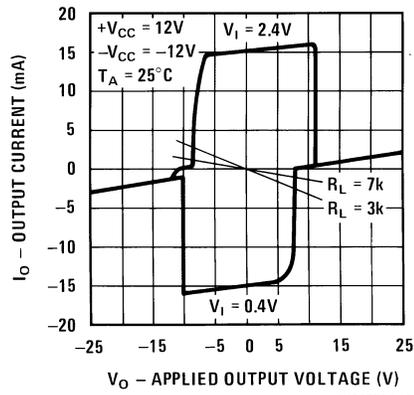
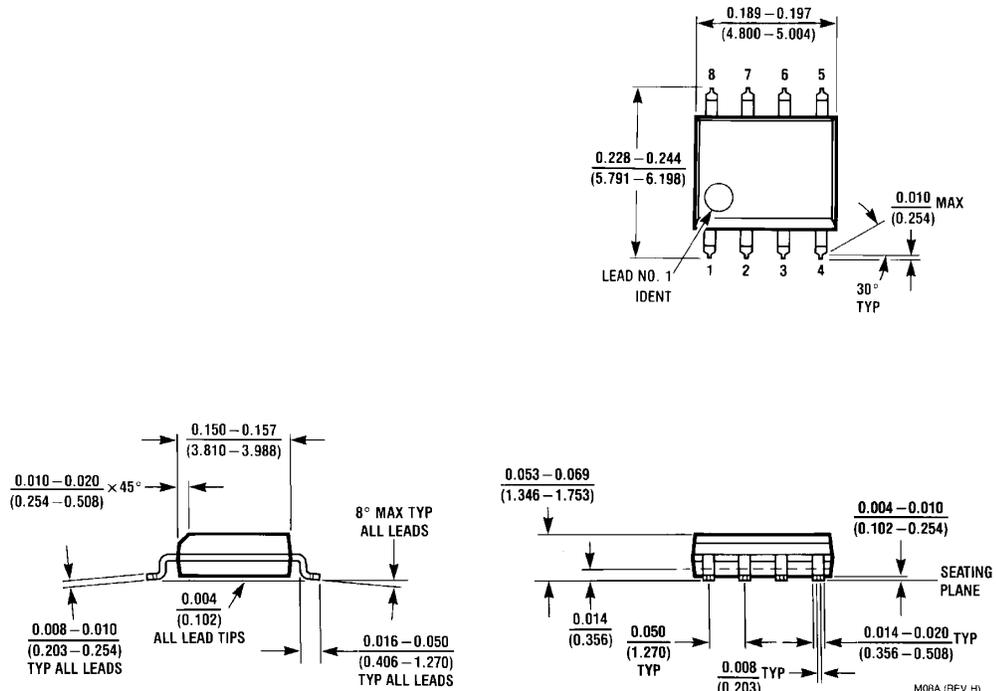


FIGURE 7.

DS005794-10

Physical Dimensions inches (millimeters) unless otherwise noted



SO Package (M)
Order Number DS75150M
NS Package Number M08A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.



National Semiconductor Corporation
 Americas
 Email: support@nsc.com

www.national.com

National Semiconductor Europe
 Fax: +49 (0) 180-530 85 86
 Email: europe.support@nsc.com
 Deutsch Tel: +49 (0) 69 9508 6208
 English Tel: +44 (0) 870 24 0 2171
 Français Tel: +33 (0) 1 41 91 8790

National Semiconductor Asia Pacific Customer Response Group
 Tel: 65-2544466
 Fax: 65-2504466
 Email: ap.support@nsc.com

National Semiconductor Japan Ltd.
 Tel: 81-3-5639-7560
 Fax: 81-3-5639-7507

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	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Mobile Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Transportation and Automotive	www.ti.com/automotive
Video and Imaging	www.ti.com/video

TI E2E Community Home Page

e2e.ti.com

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