

# DS75491,DS75492

*DS75491 MOS-to-LED Quad Segment Driver DS75492 MOS-to-LED Hex Digit Driver*



Literature Number: SNOSBM5A

## DS75491 MOS-to-LED Quad Segment Driver DS75492 MOS-to-LED Hex Digit Driver

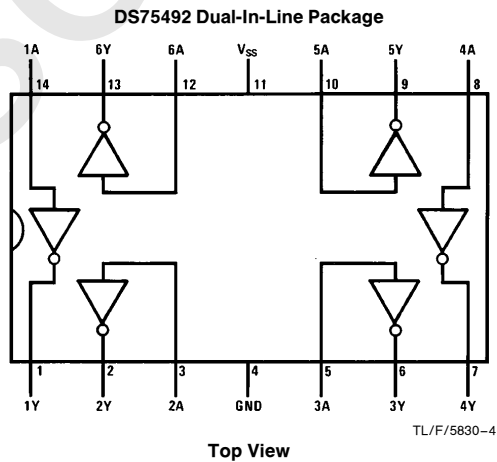
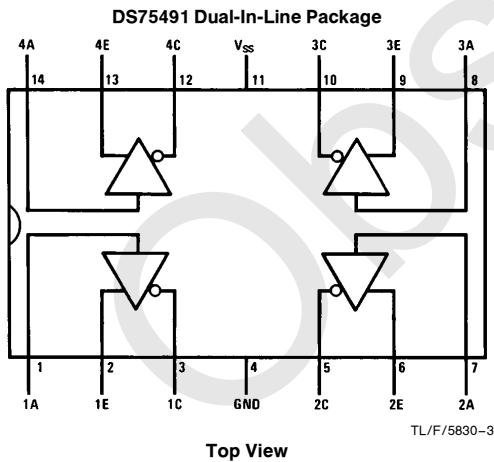
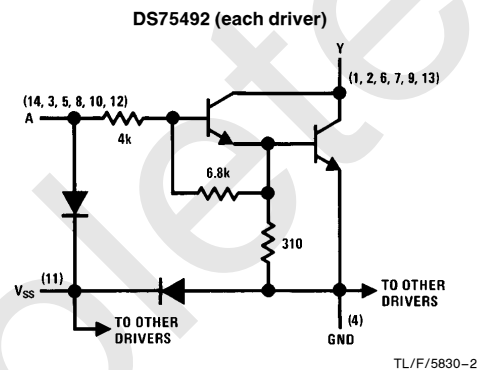
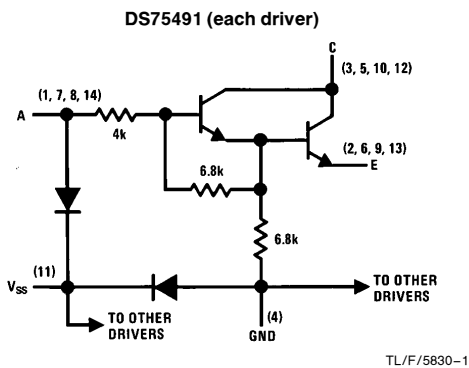
### General Description

The DS75491 and DS75492 are interface circuits designed to be used in conjunction with MOS integrated circuits and common-cathode LEDs in serially addressed multi-digit displays. The number of drivers required for this time-multiplexed system is minimized as a result of the segment-address-and-digit-scan method of LED drive.

### Features

- 50 mA source or sink capability per driver (DS75491)
- 250 mA sink capability per driver (DS75492)
- MOS compatibility (low input current)
- Low standby power
- High-gain Darlington circuits

### Schematic and Connection Diagrams



Order Number DS75491N, DS75492M or DS75492N  
See NS Package Number M14A or N14A

DS75491 MOS-to-LED Quad Segment Driver DS75492 MOS-to-LED Hex Digit Driver

## Absolute Maximum Ratings (Note 1)

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

	DS75491	DS75492
Input Voltage Range (Note 4)	-5V to $V_{SS}$	
Collector Output Voltage (Note 5)	10V	10V
Collector Output to Input Voltage	10V	10V
Emitter to Ground Voltage ( $V_I \geq 5V$ )	10V	
Emitter to Input Voltage	5V	
Voltage at $V_{SS}$ Terminal with Respect to any Other Device Terminal	10V	10V
Collector Output Current		
Each Collector Output	50 mA	250 mA
All Collector Outputs	200 mA	600 mA

Continuous Total Dissipation	DS75491	DS75492
	600 mW	600 mW
Operating Temperature Range	0°C to +70°C	
Storage Temperature Range	-65°C to +150°C	
Lead Temp. (Soldering, 10 sec)	300°C	300°C
Maximum Power Dissipation at 25°C		
Molded Package	1207 mW*	1280 mW†
*Derate molded package 9.66 mW/°C above 25°C.		
†Derate molded package 10.24 mW/°C above 25°C.		

## Electrical Characteristics $V_{SS} = 10V$ (Notes 2 and 3)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>DS75491</b>						
$V_{CE\ ON}$	"ON" State Collector Emitter Voltage	Input = 8.5V through 1 k $\Omega$ , $V_E = 5V$ , $I_C = 50\ mA$				
		$T_A = 25^\circ C$		0.9	1.2	V
		$T_A = 0-70^\circ C$			1.5	V
$I_{C\ OFF}$	"OFF" State Collector Current	$V_C = 10V$ , $V_E = 0V$			100	$\mu A$
		$I_{IN} = 40\ \mu A$			100	$\mu A$
		$V_{IN} = 0.7V$				
$I_I$	Input Current at Maximum Input Voltage	$V_{IN} = 10V$ , $V_E = 0V$ , $I_C = 20\ mA$		2.2	3.3	mA
$I_E$	Emitter Reverse Current	$V_{IN} = 0V$ , $V_E = 5V$ , $I_C = 0\ mA$			100	$\mu A$
$I_{SS}$	Current Into $V_{SS}$ Terminal				1	mA
<b>DS75492</b>						
$V_{OL}$	Low Level Output Voltage	Input = 6.5V through 1 k $\Omega$ , $I_{OUT} = 250\ mA$				
		$T_A = 25^\circ C$		0.9	1.2	V
		$T_A = 0-70^\circ C$			1.5	V
$I_{OH}$	High Level Output Current	$V_{OH} = 10V$			200	$\mu A$
		$I_{IN} = 40\ \mu A$			200	$\mu A$
		$V_{IN} = 0.5V$				
$I_I$	Input Current at Maximum Input Voltage	$V_{IN} = 10V$ , $I_{OL} = 20\ mA$		2.2	3.3	mA
$I_{SS}$	Current Into $V_{SS}$ Terminal				1	mA

## Switching Characteristics $V_{SS} = 7.5V$ , $T_A = 25^\circ C$

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>DS75491</b>						
$t_{PLH}$	Propagation Delay Time, Low-to-High Level Output (Collector)	$V_{IH} = 4.5V$ , $V_E = 0V$ , $R_L = 200\ \Omega$ , $C_L = 15\ pF$		100		ns
$t_{PHL}$	Propagation Delay Time, High-to-Low Level Output (Collector)			20		ns
<b>DS75492</b>						
$t_{PLH}$	Propagation Delay Time, Low-to-High Level Output	$V_{IH} = 7.5V$ , $R_L = 39\ \Omega$ , $C_L = 15\ pF$		300		ns
$t_{PHL}$	Propagation Delay Time, High-to-Low Level Output			30		ns

**Note 1:** "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.

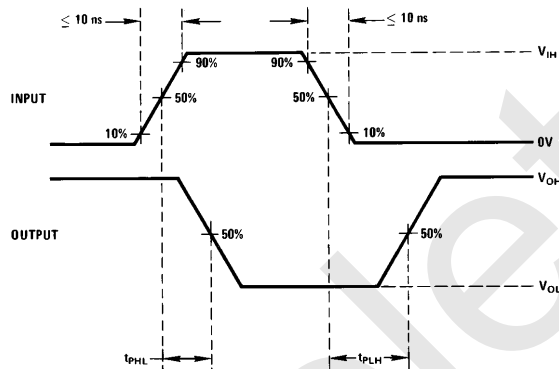
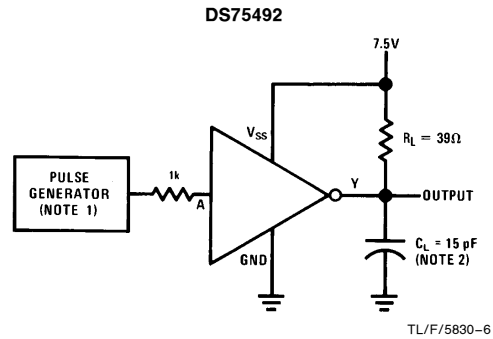
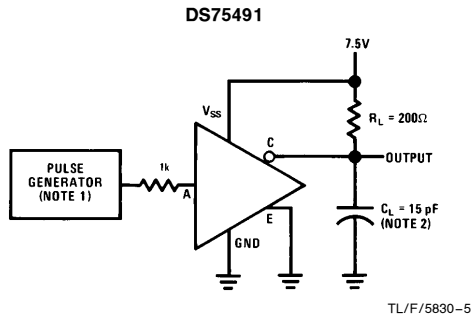
**Note 2:** Unless otherwise specified min/max limits apply across the 0°C to +70°C temperature range for the DS75491 and DS75492.

**Note 3:** All currents 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 4:** The input is the only device terminal which may be negative with respect to ground.

**Note 5:** Voltage values are with respect to network ground terminal unless otherwise noted.

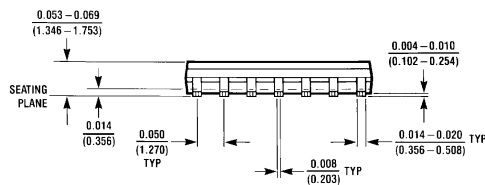
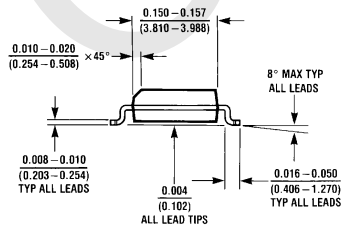
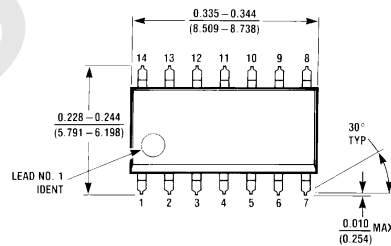
## AC Test Circuits and Switching Time Waveforms



**Note 1:** The pulse generator has the following characteristics:  $Z_{OUT} = 50\Omega$ ,  $PRR = 100\text{ kHz}$ ,  $t_W = 1\ \mu\text{s}$ .

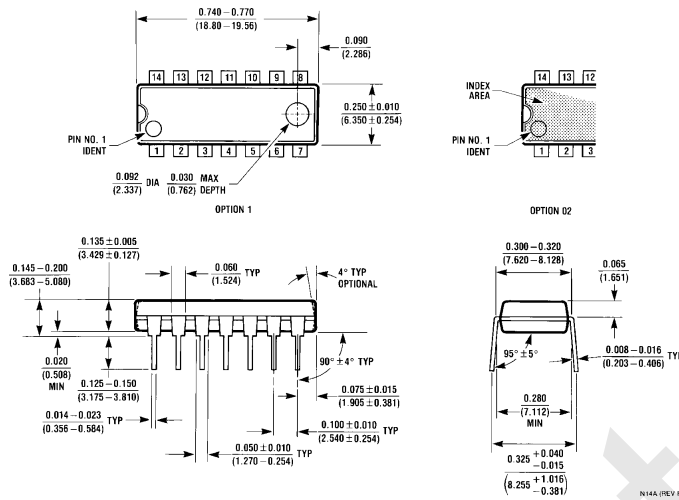
**Note 2:**  $C_L$  includes probe and jig capacitance.

## Physical Dimensions inches (millimeters)



**14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC**  
**Order Number DS75492M**  
**NS Package Number M14A**

**Physical Dimensions** inches (millimeters) (Continued)



**Moulded Dual-In-Line Package (N)**  
**Order Number DS75491N or DS75492N**  
**NS Package Number N14A**

**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 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**  
 1111 West Bardin Road  
 Arlington, TX 76017  
 Tel: 1(800) 272-9959  
 Fax: 1(800) 737-7018

**National Semiconductor Europe**  
 Fax: (+49) 0-180-530 85 86  
 Email: cnjwge@tevm2.nsc.com  
 Deutsch Tel: (+49) 0-180-530 85 85  
 English Tel: (+49) 0-180-532 78 32  
 Français Tel: (+49) 0-180-532 93 58  
 Italiano Tel: (+49) 0-180-534 16 80

**National Semiconductor Hong Kong Ltd.**  
 19th Floor, Straight Block,  
 Ocean Centre, 5 Canton Rd.  
 Tsimshatsui, Kowloon  
 Hong Kong  
 Tel: (852) 2737-1600  
 Fax: (852) 2736-9960

**National Semiconductor Japan Ltd.**  
 Tel: 81-043-299-2309  
 Fax: 81-043-299-2408

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.

## 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>
OMAP Mobile Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</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>

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