



# DS55461/2/3/4, DS75461/2/3/4 Series Dual Peripheral Drivers

## General Description

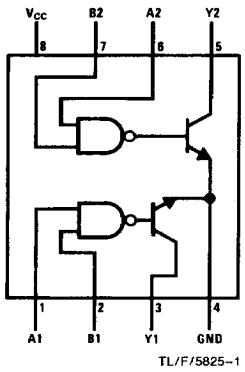
The DS55461/2/3/4 series of dual peripheral drivers are functionally interchangeable with DS55451/2/3/4 series peripheral drivers, but are designed for use in systems that require higher breakdown voltages at the expense of slightly slower switching speeds. Typical applications include power drivers, logic buffers, lamp drivers, relay drivers, MOS drivers, line drivers and memory drivers.

The DS55461/DS75461, DS55462/DS75462, DS55463/DS75463 and DS55464/DS75464 are dual peripheral AND, NAND, OR and NOR drivers, respectively, (positive logic) with the output of the logic gates internally connected to the bases of the NPN output transistors.

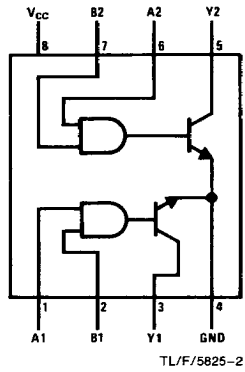
## Features

- 300 mA output current capability
- High voltage outputs
- No output latch-up at 30V
- Medium speed switching
- Circuit flexibility for varied applications and choice of logic function
- TTL compatible diode-clamped inputs
- Standard supply voltages

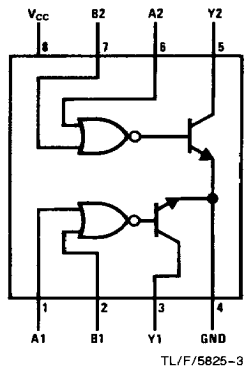
## Connection Diagrams (Dual-In-Line and Metal Can Packages)



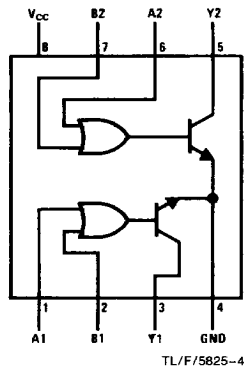
**Top View**  
Order Number DS55461J-8,  
DS75461J-8 or DS75461N



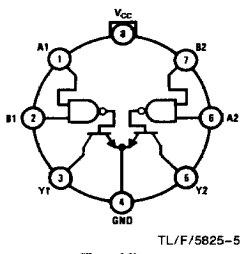
**Top View**  
Order Number DS55462J-8,  
DS75462J-8 or DS75462N  
See NS Package Numbers J08A or N08E



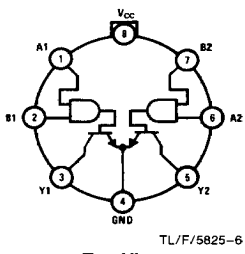
**Top View**  
Order Number DS55463J-8,  
DS75463J-8 or DS75463N  
See NS Package Numbers J08A or N08E



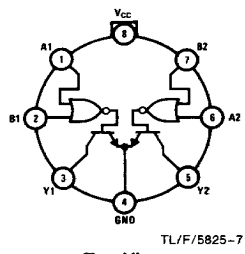
**Top View**  
Order Number DS55464J-8,  
DS75464J-8 or DS75464N



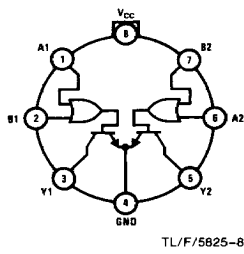
**Top View**  
Pin 4 is in electrical contact  
with the case.  
Order Number  
DS55461H or DS75461H



**Top View**  
Pin 4 is in electrical contact  
with the case.  
Order Number  
DS55462H or DS75462H  
See NS Package Number H08C



**Top View**  
Pin 4 is in electrical contact  
with the case.  
Order Number  
DS55463H or DS75463H



**Top View**  
Pin 4 is in electrical contact  
with the case.  
Order Number  
DS55464H or DS75464H



## Absolute Maximum Ratings (Note 1)

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

Supply Voltage (Note 2)	7V
Input Voltage	5.5V
Inter-emitter Voltage (Note 3)	5.5V
Output Voltage (Note 4)	35V
DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464	
Output Current (Note 5)	300 mA
DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464	
Maximum Power Dissipation* at 25°C	
Cavity Package	1090 mW
Molded Package	957 mW
TO-5 Package	760 mW

\*Derate cavity package 7.3 mW/°C above 25°C; derate molded package 7.7 mW/°C above 25°C; derate TO-5 package 5.1 mW/°C above 25°C.

Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 4 seconds)	260°C

## Operating Conditions

	Min	Max	Units
Supply Voltage (V <sub>CC</sub> )			
DS5546X	4.5	5.5	V
DS7546X	4.75	5.25	V
Temperature (T <sub>A</sub> )			
DS5546X	-55	+125	°C
DS7546X	0	+70	°C

## Electrical Characteristics

DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464 (Notes 6 and 7)

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
V <sub>IH</sub>	High Level Input Voltage	(Figure 1)	2			V	
V <sub>IL</sub>	Low Level Input Voltage	(Figure 1)			0.8	V	
V <sub>I</sub>	Input Clamp Voltage	V <sub>CC</sub> = Min, I <sub>I</sub> = -12 mA		-1.2	-1.5	V	
V <sub>OL</sub>	Low Level Output Voltage	V <sub>CC</sub> = Min, (Figure 1)	DS55461, V <sub>IL</sub> = 0.8V	I <sub>OL</sub> = 100 mA	0.15	0.5	V
				I <sub>OL</sub> = 300 mA	0.36	0.8	V
			DS55462, V <sub>IH</sub> = 2V	I <sub>OL</sub> = 100 mA	0.16	0.5	V
				I <sub>OL</sub> = 300 mA	0.35	0.8	V
			DS55463, V <sub>IL</sub> = 0.8V	I <sub>OL</sub> = 100 mA	0.18	0.5	V
				I <sub>OL</sub> = 300 mA	0.39	0.8	V
			DS55464, V <sub>IH</sub> = 2V	I <sub>OL</sub> = 100 mA	0.17	0.5	V
				I <sub>OL</sub> = 300 mA	0.38	0.8	V
			DS75461, V <sub>IL</sub> = 0.8V	I <sub>OL</sub> = 100 mA	0.15	0.4	V
				I <sub>OL</sub> = 300 mA	0.36	0.7	V
			DS75462, V <sub>IH</sub> = 2V	I <sub>OL</sub> = 100 mA	0.16	0.4	V
				I <sub>OL</sub> = 300 mA	0.35	0.7	V
			DS75463, V <sub>IL</sub> = 0.8V	I <sub>OL</sub> = 100 mA	0.18	0.4	V
				I <sub>OL</sub> = 300 mA	0.39	0.7	V
DS75464, V <sub>IH</sub> = 2V	I <sub>OL</sub> = 100 mA	0.17	0.4	V			
	I <sub>OL</sub> = 300 mA	0.38	0.7	V			
I <sub>OH</sub>	High Level Output Current	V <sub>CC</sub> = Min, V <sub>OH</sub> = 35V, (Figure 1)	V <sub>IH</sub> = 2V	DS55461, DS55463		300	μA
				DS75461, DS75463		100	μA
			V <sub>IL</sub> = 0.8V	DS55462, DS55464		300	μA
				DS75462, DS75464		100	μA

**Electrical Characteristics**

DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464 (Notes 6 and 7) (Continued)

Symbol	Parameter	Conditions		Min	Typ	Max	Units
$I_I$	Input Current at Maximum Input Voltage	$V_{CC} = \text{Max}, V_I = 5.5V, (Figure 3)$				1	mA
$I_{IH}$	High Level Input Current	$V_{CC} = \text{Max}, V_I = 2.4V, (Figure 3)$				40	$\mu A$
$I_{IL}$	Low Level Input Current	$V_{CC} = \text{Max}, V_I = 0.4V, (Figure 2)$			-1	-1.6	mA
$I_{CCH}$	Supply Current	$V_{CC} = \text{Max}, \text{Outputs High}, (Figures 4 and 5)$	$V_I = 5V$	DS55461/ DS75461, DS55463/ DS75463	8	11	mA
			$V_I = 0V$	DS55462/ DS75462	13	17	mA
				DS55464/ DS75464	14	19	mA
$I_{CCL}$	Supply Current	$V_{CC} = \text{Max}, \text{Outputs Low}, (Figures 4 and 5)$	$V_I = 0V$	DS55461/ DS75461	61	76	mA
				S55463/ DS75463	63	76	mA
			$V_I = 5V$	DS55462/ DS75462	65	76	mA
				DS55464/ DS75464	72	85	mA

**Switching Characteristics**DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464  $V_{CC} = 5V, T_A = 25^\circ C$ 

Symbol	Parameter	Conditions		Min	Typ	Max	Units
$t_{PLH}$	Propagation Delay Time, Low-To-High Level Output	$I_O \approx 200 \text{ mA}, C_L = 15 \text{ pF}, R_L = 50 \Omega, (Figure 6)$	DS55461/ DS75461, DS55463/ DS75463		45	55	ns
			DS55462/ DS75462, DS55464/ DS75464		50	65	ns
$t_{PHL}$	Propagation Delay Time High-To-Low Level Output	$I_O \approx 200 \text{ mA}, C_L = 15 \text{ pF}, R_L = 50 \Omega, (Figure 6)$	DS55461/ DS75461, DS55463/ DS75463		30	40	ns
			DS55462/ DS75462, DS55464/ DS75464		40	50	ns

## Switching Characteristics

DS55461/DS75461, DS55462/DS75462, DS55463/DS75463, DS55464/DS75464  $V_{CC} = 5V$ ,  $T_A = 25^\circ C$  (Continued)

Symbol	Parameter	Conditions	Min	Typ	Max	Units	
$t_{TLH}$	Transition Time, Low-To-High Level Output	$I_o \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ , $R_L = 50\Omega$ , (Figure 6)	DS55461/ DS75461		8	20	ns
			DS55462/ DS75462		12	25	ns
			DS55463/ DS75463		8	25	ns
			DS55464/ DS75464		12	20	ns
$t_{THL}$	Transition Time, High-To-Low Level Output	$I_o \approx 200 \text{ mA}$ , $C_L = 15 \text{ pF}$ , $R_L = 50\Omega$ , (Figure 6)	DS55461/ DS75461		10	20	ns
			DS55462/ DS75462, DS55464/ DS75464		15	20	ns
			DS55463/ DS75463		10	25	ns
$V_{OH}$	High-Level Output Voltage After Switching	$V_S = 30V$ , $I_o \approx 300 \text{ mA}$ , (Figure 7)	$V_S - 10$			mV	

**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:** Voltage values are with respect to network ground terminal unless otherwise specified.

**Note 3:** This is the voltage between two emitters of a multiple-emitter transistor.

**Note 4:** This is the maximum voltage which should be applied to any output when it is in the "OFF" state.

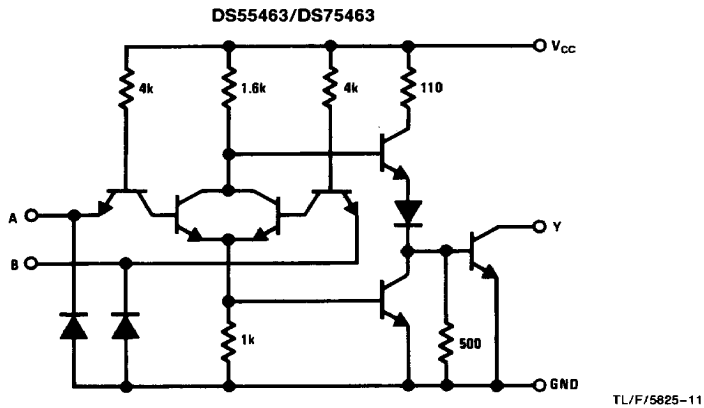
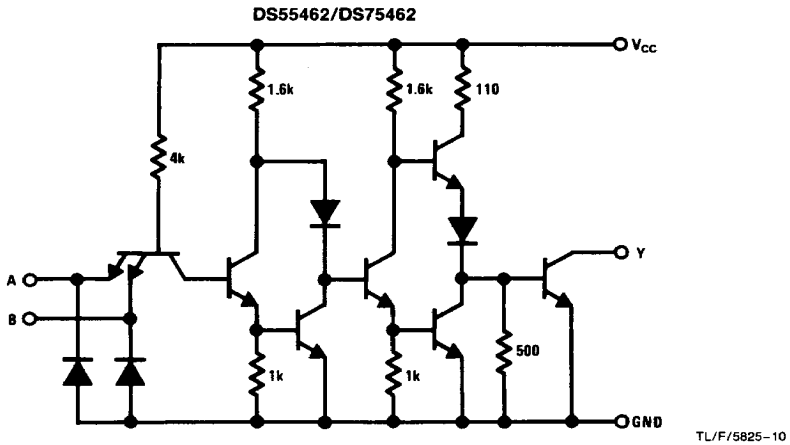
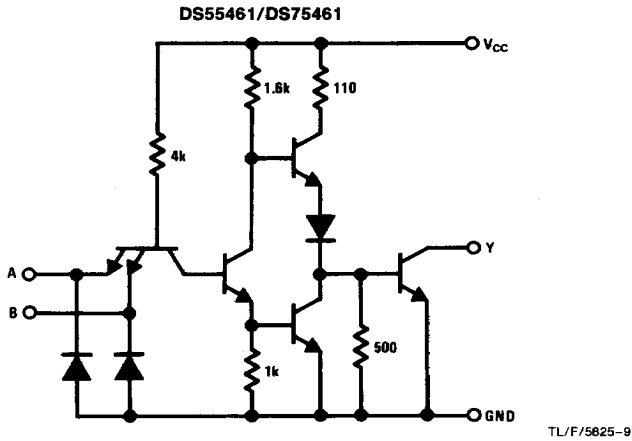
**Note 5:** Both halves of these dual circuits may conduct rated current simultaneously; however, power dissipation averaged over a short time interval must fall within the continuous dissipation rating.

**Note 6:** Unless otherwise specified min/max limits apply across the  $-55^\circ C$  to  $+125^\circ C$  temperature range for the DS44XXX series and across the  $0^\circ C$  to  $+70^\circ C$  range for the DS75XXX series. All typicals are given for  $V_{CC} = +5V$  and  $T_A = 25^\circ C$ .

**Note 7:** 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.

# Schematic Diagrams

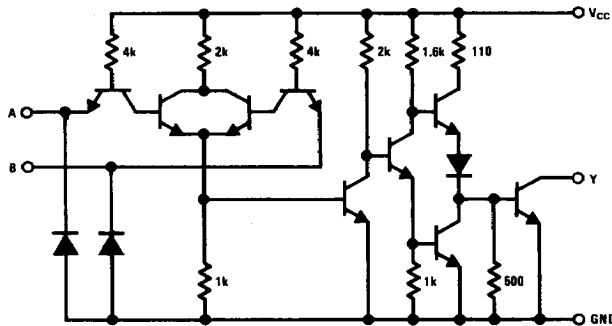
DS55461/DS55462/DS55463/DS55464/DS75461/DS75462/DS75463/DS75464



Resistor values shown are nominal.

## Schematic Diagrams (Continued)

DS55464/DS75464



Resistor values shown are nominal.

TL/F/5825-12

## Truth Tables (H = high level, L = low level)

DS55461/DS75461

A	B	Y
L	L	L (ON State)
L	H	L (ON State)
H	L	L (ON State)
H	H	H (OFF State)

DS55462/DS75462

A	B	Y
L	L	H (OFF State)
L	H	H (OFF State)
H	L	H (OFF State)
H	H	L (ON State)

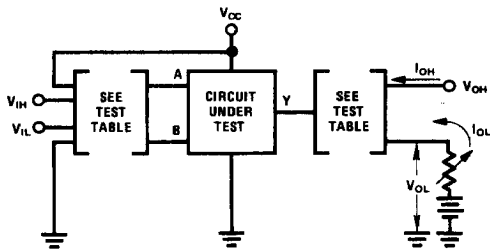
DS55463/DS75463

A	B	Y
L	L	L (ON State)
L	H	H (OFF State)
H	L	H (OFF State)
H	H	H (OFF State)

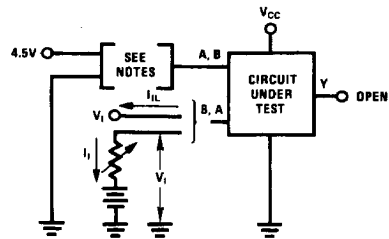
DS55464/DS75464

A	B	Y
L	L	H (OFF State)
L	H	L (ON State)
H	L	L (ON State)
H	H	L (ON State)

## DC Test Circuits



TL/F/5825-13



TL/F/5825-14

Note 1: Each input is tested separately.

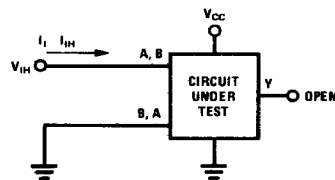
Note 2: When testing DS55463/DS75463 and DS75464, input not under test is grounded. For all other circuits it is at 4.5V.

FIGURE 2.  $V_I, I_{IL}$

Circuit	Input Under Test	Other Input	Output	
			Apply	Measure
DS55461	$V_{IH}$	$V_{IH}$	$V_{OH}$	$I_{OH}$
	$V_{IL}$	$V_{CC}$	$I_{OL}$	$V_{OL}$
DS55462	$V_{IH}$	$V_{IH}$	$I_{OL}$	$V_{OL}$
	$V_{IL}$	$V_{CC}$	$V_{OH}$	$I_{OH}$
DS55463	$V_{IH}$	Gnd	$V_{OH}$	$I_{OH}$
	$V_{IL}$	$V_{IL}$	$I_{OL}$	$V_{OL}$
DS55464	$V_{IH}$	Gnd	$I_{OL}$	$V_{OL}$
	$V_{IL}$	$V_{IL}$	$V_{OH}$	$I_{OH}$

Each input is tested separately.

FIGURE 1.  $V_{IH}, V_{IL}, I_{OH}, V_{OL}$

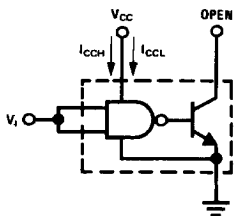


Each input is tested separately.

FIGURE 3.  $I_I, I_{IH}$

TL/F/5825-15

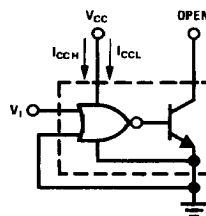
## DC Test Circuits (Continued)



TL/F/5825-16

Both gates are tested simultaneously.

**FIGURE 4.  $I_{CCH}$ ,  $I_{CCL}$  for AND, NAND Circuits**

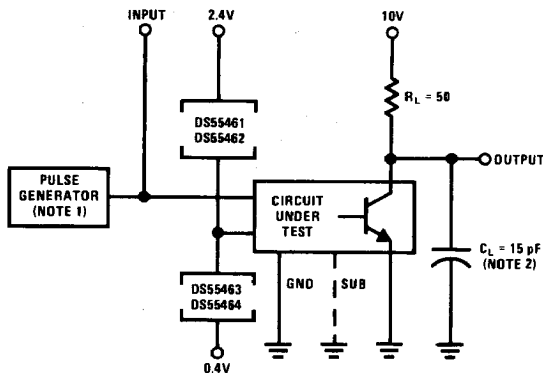


TL/F/5825-17

Both gates are tested simultaneously.

**FIGURE 5.  $I_{CCH}$ ,  $I_{CCL}$  for OR, NOR Circuits**

## Switching Characteristics

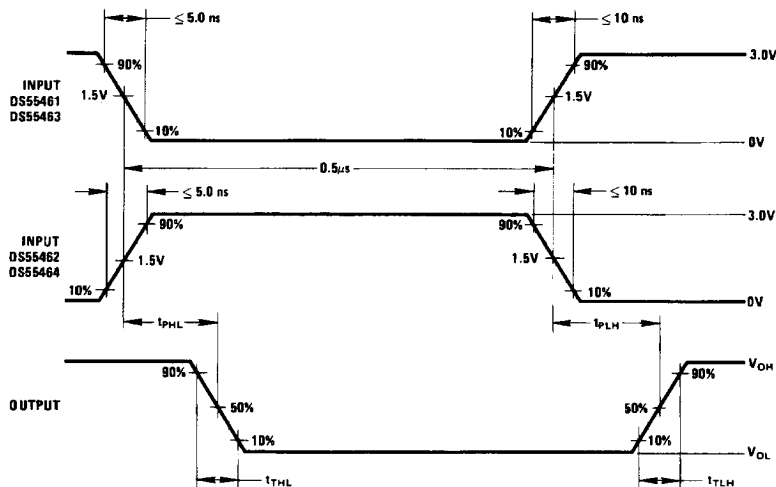


TL/F/5825-18

**Note 1:** The pulse generator has the following characteristics:

PRR = 1 MHz,  $Z_{OUT} \approx 50\Omega$ .

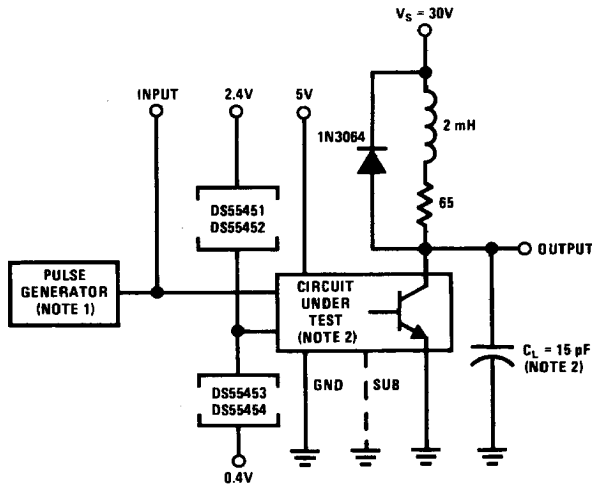
**Note 2:**  $C_L$  includes probe and jig capacitance.



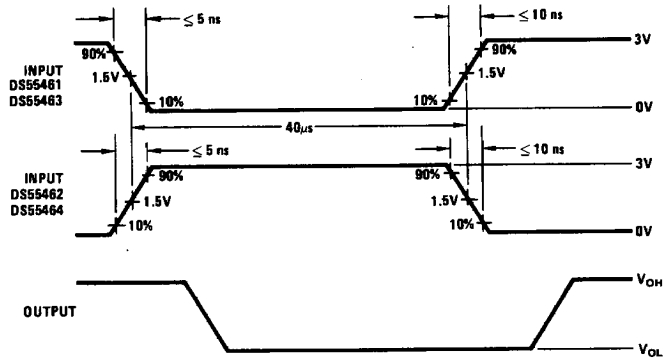
**FIGURE 6. Switching Times of Complete Drivers**

TL/F/5825-19

Switching Characteristics (Continued)



TL/F/5825-20



TL/F/5825-21

**Note 1:** The pulse generator has the following characteristics:  
 PRR = 1.25 kHz,  $Z_{OUT} \approx 50\Omega$ .

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

FIGURE 7. Latch-Up Test of Complete Drivers