



January 1996

## DS75110A Dual Line Drivers

### General Description

The DS75110A is a dual line driver with independent channels, common supply and ground terminals featuring constant current outputs. These drivers are designed for optimum performance when used with the DS75107, DS75108 line receivers.

The output current of the DS75110A is nominally 12 mA and may be switched to either of two output terminals with the appropriate logic levels at the driver input.

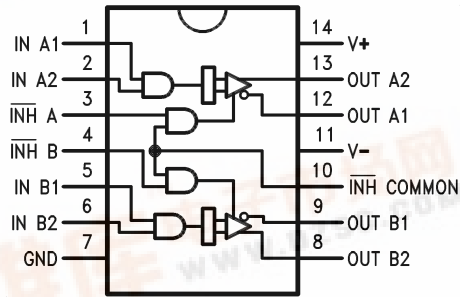
Separate or common control inputs are provided for increased logic versatility. These control or inhibit inputs allow the output current to be switched off (inhibited) by applying low logic levels to the control inputs. The output current in the inhibit mode,  $I_{O(Off)}$ , is specified so that minimum line loading is induced. This is highly desirable in system applications using parity line data communications.

### Features

- Improved stability over supply voltage and temperature ranges
- Constant current, high impedance outputs
- High speed: 15 ns max propagation delay
- Standard supply voltages
- Inhibitor available for driver selection
- High common mode output voltage range (-3.0V to 10V)
- TTL input compatibility

### Connection Diagram

14-Lead Dual-In-Line Package  
and SO-14 Package



DS009619-1

Top View

Order Number DS75110AM or DS75110AN  
See NS Package Number M14A or N14A

### Function Table

Logic		Inputs		Outputs	
		A/B	INH		
1	2	L	X	Off	Off
X	X	L	X	Off	Off
X	X	X	L	Off	Off
L	X	H	H	Off	On
X	L	H	H	Off	On
H	H	H	H	On	Off

H = High  
L = Low  
X = Don't Care

DS75110A Dual Line Drivers



## Absolute Maximum Ratings (Note 2)

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

Storage Temperature Range	
Ceramic DIP	-65°C to +175°C
Molded DIP and SO-14	-65°C to +150°C
Lead Temperature	
Ceramic DIP (Soldering, 60 sec.)	300°C

Molded DIP and SO-14 (Soldering, 10 sec.)	265°C
Maximum Power Dissipation (Note 1) at 25°C	
Molded Package	1040 mW
SO Package	930 mW
Supply Voltage	±7.0V
Input Voltage (Any Input)	5.5V
Output Voltage (Any Output)	-5.0V to +12V

## Recommended Operating Conditions

	DS75110A			Units
	Min	Typ	Max	
Positive Supply Voltage ( $V^+$ )	4.75	5.0	5.25	V
Negative Supply Voltage ( $V^-$ )	-4.75	-5.0	-5.25	V
Positive Common Mode Voltage ( $V_{CM+}$ )	0		10	V
Negative Common Mode Voltage ( $V_{CM-}$ )	0		-3.0	V
Operating Temperature ( $T_A$ )	0	25	70	°C

**Note 1:** Derate molded DIP package 8.3 mW/°C above 25°C, derate SO package 7.5 mW/°C above 25°C.

## Electrical Characteristics (Notes 3, 4)

Over recommended operating temperature range, unless otherwise specified.

Symbol	Parameter		Conditions	Min	Typ	Max	Units
$V_{IH}$	Input Voltage HIGH			2.0			V
$V_{IL}$	Input Voltage LOW					0.8	V
$V_{IC}$	Input Clamp Voltage		$V_{CC} = \text{Min}, I_I = -12 \text{ mA}$		-0.9	-1.5	V
$I_{O(On)}$	On-State Output Current		$V_{CC} = \text{Max}, V_O = 10V$		12	15	mA
			$V_{CC} = \text{Min}, V_O = -3.0V$	6.5	12		
$I_{O(Off)}$	Off-State Output Current (Inhibited Only)		$V_{CC} = \text{Min}, V_O = 10V$			100	µA
$I_I$	Input Current At Maximum Input Voltage	A, B or C Inputs	$V_{CC} = \text{Max}, V_I = 5.5V$			1.0	mA
		D Input				2.0	
$I_{IH}$	Input Current HIGH	A, B or C Input	$V_{CC} = \text{Max}, V_I = 2.4V$			40	µA
		D Input				80	
$I_{IL}$	Input Current LOW	A, B or C Input	$V_{CC} = \text{Max}, V_I = 0.4V$			-3.0	mA
		D Input				-6.0	
$I^+_{(On)}$	Positive Supply Current with Driver Enabled		$V_{CC} = \text{Max},$ A & B Inputs at 0.4V, C & D Inputs at 2.0V		23	35	mA
$I^-_{(On)}$	Negative Supply Current with Driver Enabled				-34	-50	mA
$I^+_{(Off)}$	Positive Supply Current with Driver Inhibited		$V_{CC} = \text{Max},$ A, B, C & D Inputs at 0.4V		21		mA
$I^-_{(Off)}$	Negative Supply Current with Driver Inhibited				-17		mA

**Note 2:** "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the devices should be operated at these limits. The tables of "Electrical Characteristics" provide conditions for actual device operation.

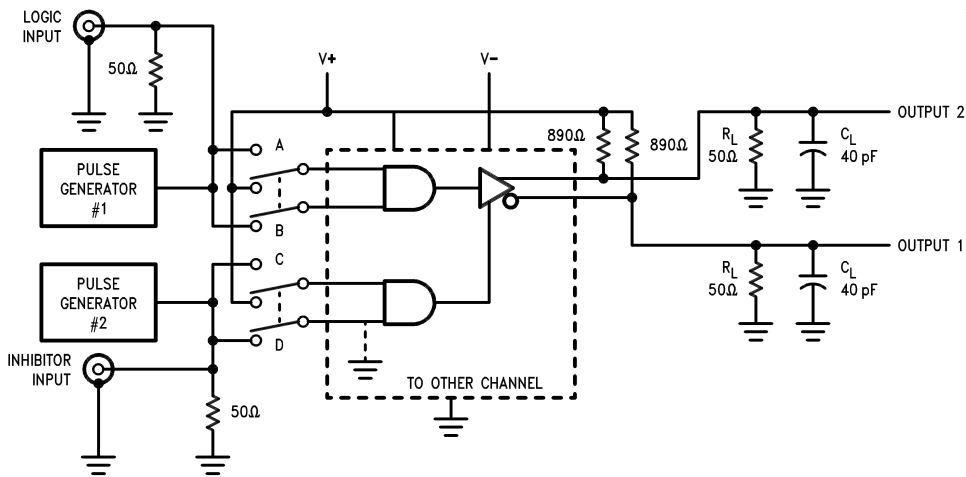
**Note 3:** Unless otherwise specified min/max limits apply across 0°C to +70°C range for the DS75110. All typicals are given for  $V_{CC} = 5V$  and  $T_A = 25^\circ\text{C}$ .

**Note 4:** When using only one channel of the line drivers, the other channel should be inhibited and/or its outputs grounded.

## Switching Characteristics

$V_{CC} = \pm 5V, T_A = 25^\circ C$

Symbol	Parameter	Conditions	From (Input)	To (Output)	Min	Typ	Max	Units
$t_{PLH}$	Propagation Delay Time, LOW to HIGH	$C_L = 40 \text{ pF},$ $R_L = 50\Omega$	A or B	1 or 2		9.0	15	ns
$t_{PHL}$	Propagation Delay Time, HIGH to LOW					9.0	15	ns
$t_{PLH}$	Propagation Delay Time, LOW to HIGH	See Test Circuit	C or D	1 or 2		16	25	ns
$t_{PHL}$	Propagation Delay Time, HIGH to LOW					13	25	ns



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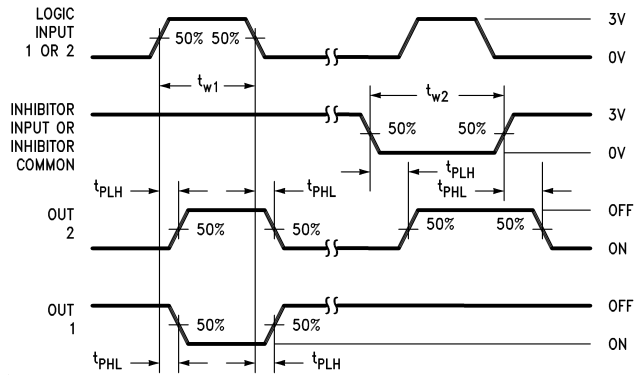
The pulse generators have the following characteristics:

$t_r = t_f = 10 \text{ ns} \pm 5.0 \text{ ns}, t_{w1} = 500 \text{ ns}, \text{PRR} = 1.0 \text{ MHz}, t_{w2} = 1.0 \mu\text{s}, \text{PRR} = 500 \text{ kHz}, Z_0 = 50\Omega.$

$C_L$  includes probe and jig capacitance.

For simplicity, only one channel and the inhibitor connections are shown.

FIGURE 1. AC Test Circuit



DS009619-4

FIGURE 2. AC Waveforms

# Equivalent Circuit

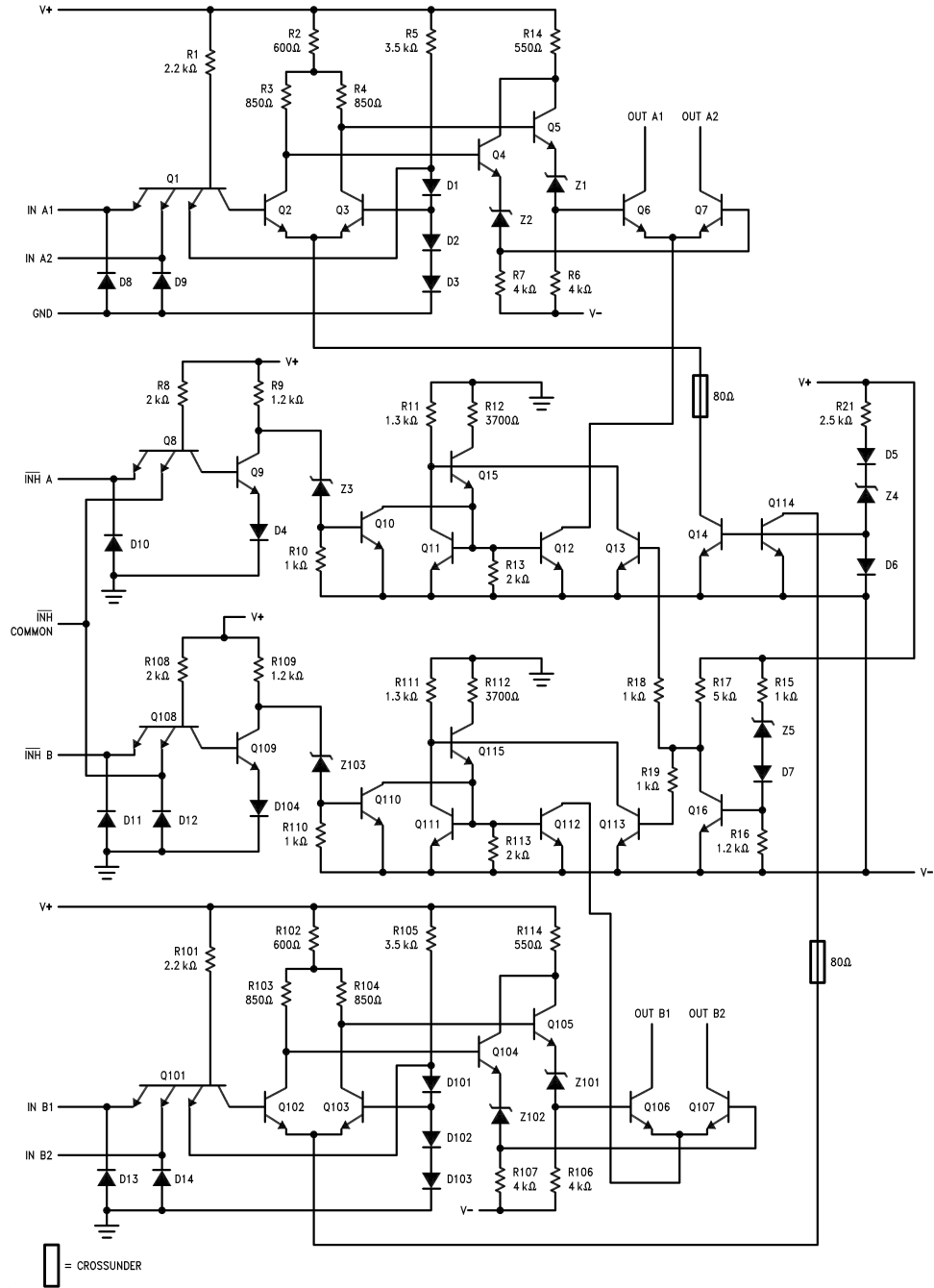
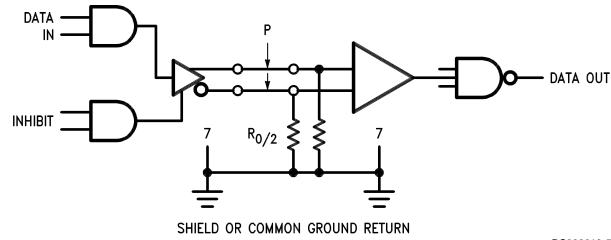


FIGURE 3. Equivalent Circuit

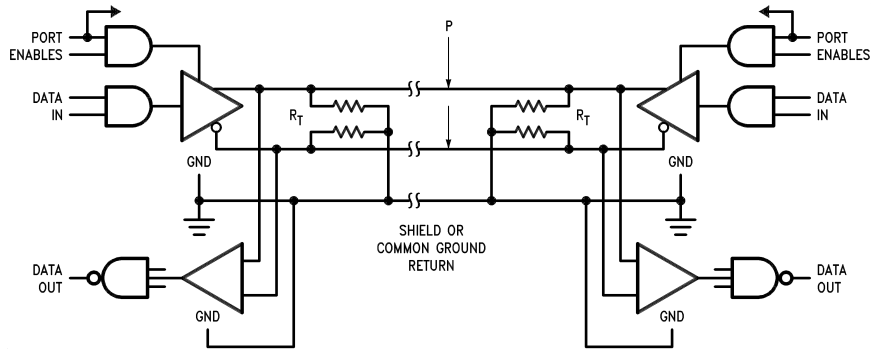
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## Typical Applications



DS009619-5

**FIGURE 4. Simplex Operation**

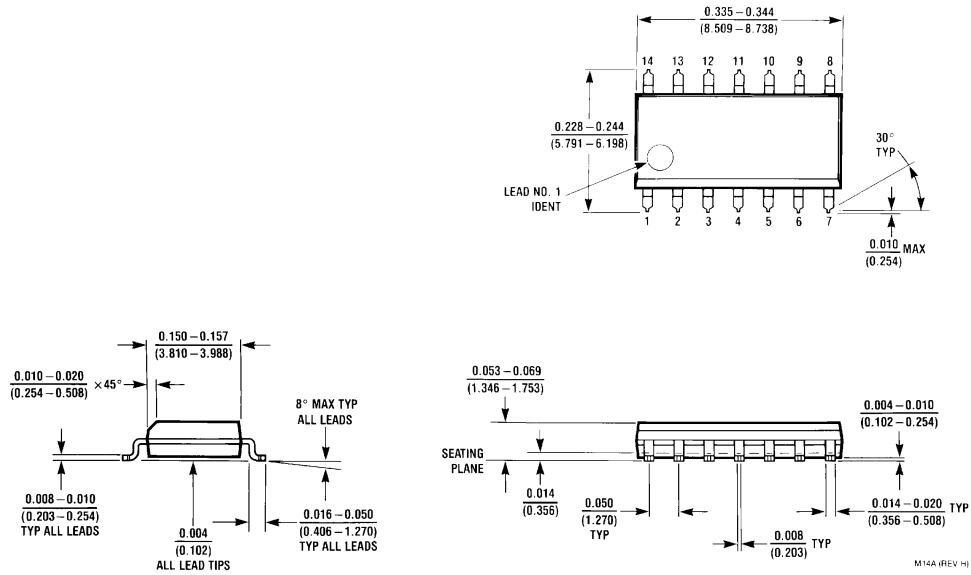


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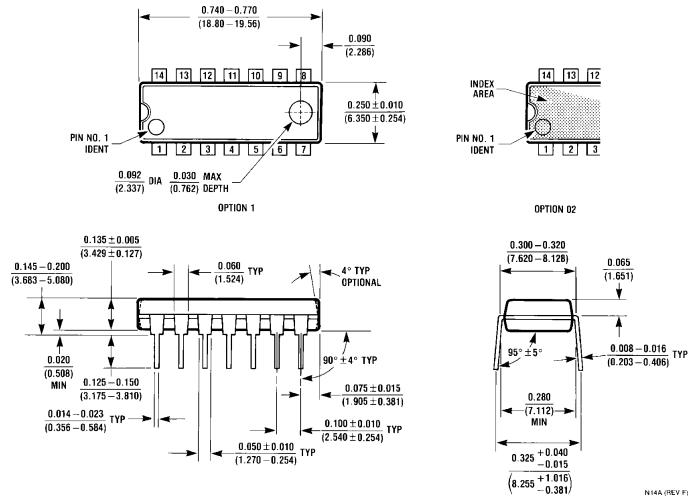
All drivers are DS75110A. Receivers are DS75107 or DS75108. Twisted-pair or coaxial transmission line should be used for minimum noise and cross talk. When only one driver in a package is being used, the outputs of the other driver should either be grounded or inhibited to reduce power dissipation.

**FIGURE 5. Half-Duplex Operation**

**Physical Dimensions** inches (millimeters) unless otherwise noted



**Molded Surface Mount Package (M)**  
**Order Number DS75110AM**  
**NS Package Number M14A**



**Molded Dual-In-Line Package (N)**  
**Order Number DS75110AN**  
**NS Package Number N14A**

## Notes

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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.



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